

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

HAZARDOUS CHEMICAL WASTES Storage, Transport and Disposal

First Report on the Inquiry into Hazardous Chemicals

**REPORT FROM THE HOUSE OF REPRESENTATIVES STANDING
COMMITTEE ON ENVIRONMENT AND CONSERVATION**

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Terms of Reference of the Committee¹

That a Standing Committee be appointed to inquire into and report on:

- (a) environmental aspects of legislative and administrative measures which ought to be taken in order to ensure the wise and effective management of the Australian environment and of Australia's natural resources; and
- (b) such other matters relating to the environment and conservation and the management of Australia's natural resources as are referred to it by —
 - (i) the Minister responsible for those matters; or
 - (ii) resolution of the House.

Terms of Reference of the Hazardous Chemicals Inquiry¹

To inquire into and report on:

the management of chemicals potentially hazardous to health and the environment, particularly:

- (a) the adequacy of existing Commonwealth and State legislative arrangements;
- (b) research, assessment and dissemination of information; and
- (c) international cooperation.

1. The terms of reference of both the Committee and the Inquiry in the Thirty-second Parliament remain unchanged from those of the Thirty-first Parliament.

Members of the Committee in the 32nd Parliament

<i>Chairman</i>	Mr J. C. Hodges, M.P.
<i>Deputy Chairman</i>	Dr H. A. Jenkins, M.P.
<i>Members</i>	Mr M. A. Burr, M.P. Mr E. C. Cameron, M.P. Mr P. H. Drummond, M.P. Mr B. L. Howe, M.P. Mr A. J. MacKenzie, M.P. Mr S. J. West, M.P.
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<i>Secretary to the Inquiry</i>	Mr A. J. Kelly
<i>Specialist Adviser</i>	Dr D. G. MacPhee

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<i>Deputy Chairman</i>	Dr H. A. Jenkins, M.P.*
<i>Members</i>	Mr M. Baillieu, M.P.* Mr B. Cohen, M.P. Mr J. F. Cotter, M.P.* Mr P. S. Fisher, M.P. Mr B. L. Howe, M.P.* Mr B. D. Simon, M.P.
<i>Secretary to the Sub-committee</i>	Mr A. J. Kelly

*Members of the Sub-committee on Hazardous Chemicals

Abbreviations

AEC	Australian Environment Council
DCT	Department of the Capital Territory
EEC	European Economic Community
EPA	Environment Protection Authority (Victoria)
EPA	Environmental Protection Agency (United States)
MWDA	Metropolitan Waste Disposal Authority (Sydney)
NACC	National Advisory Committee on Chemicals
OECD	Organisation for Economic Cooperation and Development
PCBs	Polychlorinated biphenyls (see Glossary)
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act (United States)
TSCA	Toxic Substances Control Act (United States)
UNEP	United Nations Environment Program

Glossary

<i>Mutagen</i>	An agent which causes damage to genes which are transmitted from generation to generation i.e. it causes heritable genetic damage.
<i>Carcinogen</i>	An agent which causes cancer to appear at increased frequency in an exposed population. Many chemicals which cause cancer do so because they are mutagenic, producing mutations in cells other than those which are transmitted from generation to generation. Thus most mutagens are carcinogens and vice versa.
<i>Teratogen</i>	An agent which causes damaging changes to the developing foetus e.g. by inhibiting normal development of particular organs or limbs. Teratogens may be, but are not necessarily, mutagenic.
<i>Polychlorinated biphenyls (PCBs)</i>	A group of organochlorine compounds which are stable when heated, are chemically inert, do not degrade biologically and are good electrical insulators. These technologically useful properties, together with the cheapness of PCBs, led to their widespread use in dielectric fluids in transformers and capacitors, marine antifouling paints, heat transfer fluids, textile coatings, pesticide extenders and even kiss-proof lipstick. Since 1966 when their bioaccumulative and toxic properties were discovered, governments around the world, including Australia, have severely curtailed their use. Materials in use require careful disposal which usually means destruction in a high-temperature incinerator.

Acknowledgments

The Committee gratefully acknowledges the assistance of Mr R. D. Carlisle, the Metropolitan Waste Disposal Authority of New South Wales and the United States Environment Protection Agency in providing some of the photographs and graphic material used in the Report.

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Recommendations

The Committee recommends that:

- i. the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure—
 - (a) generators of hazardous wastes are required to register hazardous wastes whether stored or disposed of on or off the generating site;
(paragraph 87)
 - (b) registration details include the constituents that present potential hazards, the quantities to be stored or disposed of and the manner in which they are to be stored or disposed of;
(paragraph 87)
 - (c) that subsequent to registration, generators keep records of the quantities generated, stored and disposed of and make regular returns of this information to the regulatory authority;
(paragraph 87)
 - (d) regulatory authorities keep abreast of recovery and recycling developments and in their monitoring of the waste stream advise industry on available techniques;
(paragraph 100)
 - (e) hazardous wastes which can be reprocessed economically are not to be landfilled, immobilised or incinerated unless required as a source of energy for incineration;
(paragraph 100)
 - (f) regulatory authorities encourage the re-use of hazardous wastes wherever possible through the operation of waste exchanges;
(paragraph 100)
 - (g) the production and distribution, with financial support from the Commonwealth, of a national waste exchange bulletin containing information supplied by each State and Territory;
(paragraph 100)
 - (h) uniform standards for hazardous waste storage areas are drawn up and implemented as a matter of urgency;
(paragraph 106)
 - (i) storage sites are established by regulatory authorities and those generators lacking adequate storage facilities by required to store their hazardous wastes at them;
(paragraph 106)
 - (j) hazardous waste storage areas are licensed and subject to regular inspection;
(paragraph 106)
 - (k) public access is given to up-to-date records of the types, quantities and location of stored hazardous wastes;
(paragraph 106)
 - (l) the development of national standards for hazardous waste recycling, immobilisation and disposal facilities;
(paragraph 133)

- (m) all operators involved in the handling of hazardous wastes are licensed;
(paragraph 133)
 - (n) regulatory authorities have adequate numbers of trained inspectors to enforce standards;
(paragraph 133)
 - (o) licensed operations be regularly inspected and public access be given to the results of monitoring tests;
(paragraph 133)
 - (p) penalties for non-observance of waste standards and regulations be substantial, including the cancellation of a licence where appropriate;
(paragraph 133)
 - (q) licensing provisions for operators handling hazardous chemicals include the operator having adequate indemnity insurance against accidental damage caused by wastes;
(paragraph 133)
 - (r) a fund be established to finance hazardous waste clean up operations where an operator fails to perform the work within reasonable time. The fund to be financed substantially by levies raised through a licensing system. Costs incurred by the fund in cleaning up should be recovered wherever possible and the fund reimbursed;
(paragraph 133)
 - (s) the development of standards for the safety of waste disposal sites after closure, including appropriate future uses;
(paragraph 149)
 - (t) programs are developed to identify sites of past hazardous waste disposal so that they can be assessed and any necessary remedial action taken;
(paragraph 151)
 - (u) the development of an effective multiple docket system for the regulation of the movement of hazardous wastes;
(paragraph 172)
 - (v) the Maunsell Report on the Management and Disposal of Hazardous Industrial Wastes be made public as soon as possible; and
(paragraph 19)
 - (w) the national strategy of the Australian Environment Council for dealing with hazardous wastes be completed as soon as possible.
(paragraph 19)
2. (a) the Commonwealth urgently seek the views of the States and the Northern Territory on the question of a single national incinerator, and, if appropriate;
(b) the Commonwealth approach the New South Wales Government with a view to allowing national access to the Sydney incinerator either through co-operative funding of its construction or through a grant under section 96 of the Constitution.
(paragraph 123)
 3. if State Governments have failed to incorporate the Australian Code for the Transport of Dangerous Goods by Road and Rail into legislation by 1985 the Commonwealth should legislate to enforce the Code to the fullest extent of its power.
(paragraph 181)
 4. the Minister for Transport seek through the Australian Transport Advisory Council the development of categories of hazardous wastes for incorporation in the Index of

Dangerous Goods within the Australian Code for the Transport of Dangerous Goods by Road and Rail.

(paragraph 181)

5. Australian Capital Territory

(a) the Department of the Capital Territory prepare a hazardous waste disposal strategy as a matter of urgency;

(paragraph 209)

(b) legislation to effectively regulate the notification, transport and disposal of hazardous wastes in the Australian Capital Territory be prepared and introduced as a matter of urgency;

(paragraph 210)

(c) an ordinance relating to the control and disposal of radioactive materials in the Australian Capital Territory be introduced within six months of this report being presented and that in the event of this not occurring the Minister for Health make a statement to the House explaining the failure to do so;

(paragraph 214)

(d) standards for chemical effluent discharge to the sewer in the Australian Capital Territory be developed and incorporated in the Sewerage Regulations, and

(paragraph 216)

(e) dischargers of chemical waste to the sewerage system be required to register the nature and volumes of the waste with the relevant authority.

(paragraph 216)

6. Other Commonwealth Responsibilities

(a) staffing of the secretariat to the National Advisory Committee on Chemicals be substantially increased to meet its responsibilities;

(paragraph 231)

(b) (i) all Commonwealth departments and instrumentalities comply with relevant State, Territory or Commonwealth legislation concerning hazardous waste;

(ii) for Commonwealth authorities not bound by State or Territory legislation, the Commonwealth develop a set of standards for the regulation of waste disposal consistent with the standards developed by the Australian Environment Council and that there be statutory obligations for those Commonwealth departments and authorities to comply with these standards;

(paragraph 237)

(c) the Department of Defence test ground and surface water flowing from World War II chemical weapon storage and disposal sites for the presence of chemical leachate;

(paragraph 240)

(d) Customs (Prohibited Import) Regulations be introduced to prevent the dumping of hazardous waste from overseas;

(paragraph 244)

(e) Australia seek international machinery to regulate the shipping of hazardous waste between countries and in the meantime notify any countries to which hazardous wastes from Australia are exported;

(paragraph 244)

(f) in no circumstances should hazardous waste be exported to countries which do not have the facilities required to safely dispose of the waste;

(paragraph 244)

(g) if State Governments fail to introduce effective waste disposal strategies by 1985 the Commonwealth legislate to control hazardous wastes to the fullest extent of its power;

(paragraph 247)

Introduction

1. The Committee has decided to present a first report on part of its Hazardous Chemicals Inquiry rather than wait until the Inquiry is completed. The transport, storage, treatment and disposal of hazardous wastes and the inadequacies of some present procedures are regarded by the Committee as serious enough to warrant a separate and earlier report. The transport of hazardous waste is integral to the waste disposal problem and is dealt with in this report. The transport of other hazardous chemicals as well as the other matters covered by the Inquiry will be covered later in the main report. The conduct of the Inquiry to date is described in Appendix I.

2. The chemical industry has shown strong growth in the period since World War II. With that growth has come a similar growth in the generation of hazardous industrial waste. A number of disasters caused by dumped hazardous waste have been discovered comparatively recently. As the full significance of these discoveries has emerged public awareness of the dangers of hazardous wastes has increased but not to a level which results in the hazards being fully controlled. Improperly disposed of waste in various parts of the world, such as the United States and the Netherlands, has:

- polluted groundwater forcing users to find alternative water supplies;
- contaminated rivers, lakes and other surface water, destroying wildlife, aquatic life and local vegetation;
- polluted the air where volatile wastes are involved;
- burnt and exploded;
- poisoned animals and humans via the food chain; and
- poisoned animals and humans by direct contact.

Drinking water resources have been poisoned, people have sustained permanent ill-effects, agricultural land and fishing grounds have been ruined. In some cases dumping was at organized dumps; in others, moonlighters dumped chemicals wherever they could.

3. Several examples from the United States illustrate the seriousness of the problem.

- In 1978 the water supplies of Toone and Teague, Tennessee, were contaminated with organic compounds when water leached from a nearby landfill. When the landfill was closed, about 6 years earlier, the site held some 350 000 drums, many of them leaking pesticide wastes. Because these towns no longer have access to uncontaminated ground water, they must pump water in from other locations.
- Ground water in a 30 square mile area near Denver was contaminated from disposal of pesticide waste in unlined disposal ponds. The waste, from manufacturing activities of the U.S. Army and a chemical company, dates back to the 1943 to 1957 period. Decontamination, if it is possible, could take several years and cost as much as \$80 million.
- About 17 000 drums littered a 7 acre site in Kentucky—which became known as the 'Valley of the Drums'—about 25 miles south of Louisville. Some 6000 drums

were full, many with their toxic contents oozing onto the ground. In addition, an indeterminate quantity of hazardous waste was buried in drums and subsurface pits. In 1979, U.S. Environmental Protection Agency (EPA) analyses of soil and surface water in the drainage area identified about 200 organic chemicals and 30 metals.

- The health of some residents of Love Canal, near Niagara Falls, was seriously damaged by chemical waste buried a quarter of a century ago. The Hooker Chemicals & Plastics Corporation had dumped some 22 000 tons of toxic wastes into the abandoned canal and covered it over. A total of 1200 houses and a school have been built near the site. As drums holding the waste corroded, their contents percolated through the soil into yards and basements. In August 1978 after abnormally high rates of miscarriages, birth defects, respiratory problems and nervous breakdowns were discovered among people living near the abandoned dump, the State of New York ordered the evacuation of 239 families from nearby homes. Since then, the State has spent \$36m to clean up the dump. Costs are expected to reach \$50m. About 80 chemicals, a number of them suspected carcinogens, were identified.

4. In the Netherlands it was discovered in 1980 that a housing estate at Lekkerkerk near Rotterdam had been built on top of a chemical dump. Chemicals had corroded through water pipes and were contaminating drinking water. Contaminants included toxic aromatic wastes such as benzene and toluene. Authorities removed and incinerated 150 000 tonnes of contaminated soil. Clean-up costs are in the order of \$80m.

5. In the United Kingdom similar discoveries have been made:

- At Shipham in Somerset a new housing estate was built on old mine spoil heaps heavily contaminated with cadmium. Some home grown vegetables contained more than 200 times the safe level of cadmium.
- It cost \$700 000 to decontaminate three small housing estates built on old gasworks tips in the London Borough of Greenwich. Concentrations of 20 000 parts per million of lead and 850 parts per million of cadmium were found in children's playing areas along with lumps of toxic oxide wastes containing cyanide. Government scientists have reported that old gasworks sites contain toxic and cancer-causing chemicals including cyanides, toluene, phenols, arsenic, lead, asbestos, coal tars, spent oxides, methane gas, and even radioactive wastes.

6. In Australia incidents of improper disposal of hazardous wastes include:

- drums of waste illegally dumped on municipal tips exploded, killing or injuring tip workers and damaging machinery.
- several hundred badly corroded drums of combustible waste are being used for traffic barriers at a drive-in theatre in outer Melbourne.
- the site of a disused gasworks in Fremantle was proposed for a housing development. Like many gasworks sites, it was found to be contaminated with phenols and other toxic substances.
- oil contaminated with polychlorinated biphenyls (PCB's) disposed of on-site by a junk yard in Melbourne found its way into a nearby recreational lake, Edwardes Park Lake. The lake contains very high residue levels of polychlorinated biphenyls, particularly in the sediments.
- In 1978 asbestos tailings were still being found throughout the town of Wittenoom, W.A., on streets, footpaths, and around the school and kindergarten, twelve years after the blue asbestos mine outside the town had been closed. The Public Health Department in 1978 recommended to the Western Australian

Government that the town be evacuated because of the danger from asbestos tailings. A similar situation occurred in the asbestos mine township of Baryulgil in New South Wales.

7. Accounts of major incidents such as Love Canal, Lekkerkerk and Valley of the Drums, while alarming, do not give a full picture of the problems associated with hazardous wastes. The problem is not just one of a few major disasters but includes a much larger number of lesser incidents. While perhaps less spectacular these other incidents pose similarly grave dangers to health and the environment. Smaller incidents can be insidious, affecting people in residential, school and similar areas for long periods before they are discovered.

8. The cost to the public in cleaning up these dumped materials has been enormous even when the companies responsible have undertaken large parts of the work. In a number of cases the company responsible for the dumping cannot pay the clean-up costs, no longer exists or is unknown. Clean-up costs are frequently in the order of millions of dollars.¹ Clean-up merely removes the source of further pollution. Where damage to the environment has already occurred it is usually irreversible in the short term. Many of the chemicals will remain a hazard for tens or hundreds of years. Many local governments in the United States are having to close down public and private water supplies, supply residents with bottled water and quarantine agricultural land and fishing grounds. A study by the U.S. Environmental Protection Agency in 1979 estimated the cost of cleaning up abandoned and unsound waste sites at as much as US\$44 billion. The cost to the community of damage to health is largely uncalculated and probably incalculable. It is clear from overseas experience that the cost of cleaning up unsafe disposal sites greatly exceeds the cost of proper disposal procedures.

9. The major hazardous waste disasters that have been widely reported in the press, such as Love Canal, have occurred in other countries. Their distance from Australia and the larger scale of industry involved has helped to foster the attitude that such events could not or do not happen in Australia. Such complacency is without justification. At the beginning of the inquiry the Committee issued a press release announcing the inquiry saying, among other things, that 'the absence of major disasters due to hazardous chemicals in Australia has been largely through good luck rather than good management'. Despite the expressed disappointment of one industry association with this statement, the evidence taken during the Inquiry supports the Committee's original view. With the benefit of this evidence the Committee now has to add that while not on the scale of some overseas disasters there have been disasters in Australia.

10. The Australian Environment Council (AEC) has defined 'hazardous industrial waste' to mean any waste or combination of wastes which pose a substantial hazard or potential hazard to human health or the environment. The Council says that in practice, hazardous wastes may be defined as any waste which if disposed of to sanitary landfill, air or water in an untreated form, will be hazardous to human health or the environment. Such wastes would include: toxic organics; toxic inorganics; non-biodegradable and bioaccumulative materials; flammables; explosive and potentially explosive materials; corrosives, and teratogenic, carcinogenic or mutagenic materials.² It is surprising that radioactive materials and infectious biological materials are not included. These wastes are just as hazardous as the other wastes mentioned but because they are regulated by health authorities rather than by environmental authorities they tend to be omitted from lists of hazardous wastes. The Committee has received very little evidence on infectious biological materials and has not dealt with them in this report. Hazardous industrial wastes may be solids, sludges, liquids or gases. Particular

problems may arise from mixtures of wastes especially where the composition of the mixture is unknown.

11. The Committee is appalled at the lack of accurate information in Australia on the amounts of hazardous wastes being generated, stored and disposed of and consequently the lack of predicted generation rates. Some data is available for the more intractable wastes in Sydney and Melbourne but must be regarded as being incomplete. This is shown in Tables 1 and 2. A table showing the information for Victoria in more detail is incorporated as Appendix IV. In Sydney, 70 million litres a year of less-hazardous liquid wastes are disposed of to landfill at the Metropolitan Waste Disposal Authority's facility at Castlereagh. In Melbourne approximately 110 million litres a year of similar liquid waste is disposed of at the Tullamarine facility operated by a private company, Cleanaway. Outside of Sydney and Victoria there is an abysmal lack of information regarding quantities of waste generated, with quantities of polychlorinated biphenyls (PCB's) being generally the only information available. At the Willawong disposal site in Brisbane, which is operated by a private company on behalf of the Brisbane City Council, between 9 and 12 million litres of hazardous liquid wastes are disposed of a year. As discussed in Chapter 2 the nature of a large proportion of this Brisbane waste is unknown. The identification and quantification of hazardous waste is one of the essential first steps in a hazardous waste management program. Consequently most States and Territories have a long way to go in establishing effective programs. If governments

TABLE 1

Quantities of more-hazardous waste generated and stored in Sydney

Category	Quantities in tonnes generated (p.a.)	Stored	Comments
1. Persistent Organics	950	7 900	chlorinated hydrocarbon wastes from the manufacture of plastics and chlorinated solvents. PCB wastes including material contaminated with PCBs
2. Acutely toxic, mutagenic, etc.		120	dioxin wastes absorbed on charcoal. Pesticide wastes
3. Flammable	12 770		oily fractions, sludges, solvent residues
4. Odorous			small quantities of wastes produced irregularly mainly containing mercaptans
5. Explosive, reactive and oxidising			off specification products containing peroxides whose shelf life has been exceeded, e.g. methyl ethyl ketone peroxide, benzoyl peroxide, sodium hypochlorite
6. Toxic metals and organometallics	1 500		brine sludges containing mercury. Organic metallics from leaded petrol additives. Arsenic and lead arsenate wastes
7. Toxic inorganics			small volumes of cyanide wastes
8. Strongly acidic or caustic wastes			small quantities. Ocean dumping of acid wastes now ceased.
9. Dusts			Asbestos waste
10. Gas generating	2 300		refinery caustic wastes
11. Water reactive			e.g. phosphorous oxychloride produced on a once off basis
12. Cylinders			Occasionally cylinders containing toxic gases which are unserviceable are disposed of to landfill

Note: an absence of entry does not necessarily indicate nil quantity.

Source: Department of Home Affairs and Environment, Submission dated November 1981.

TABLE 2

Quantities of more-hazardous waste generated and stored in Melbourne

Category	Quantities in tonnes generated (p.a.)	Stored	Comments
1. Persistent organics	562	1 500	chlorinated hydrocarbons, waste poly-chlorinated biphenyls
2. Acutely toxic, mutagenic etc.	minor	19	
3. Flammable	11 000 to 20 000	1 100	Solvents, sludges, waste oils, oily emulsions
4. Odorous	small	small	
5. Explosive, reactive, and oxidising	unknown	unknown	
6. Toxic metals and organo-metallics	200	1 400	
7. Toxic inorganics	unknown	30	
8. Strongly acidic or caustic	small	small	
9. Dusts	600		
10. Gas generating	minor	minor	
11. Water reactive	minor	minor	
12. Cylinders	small	11	
13. Miscellaneous	unknown	16	

Source: Department of Home Affairs and Environment, Submission dated November 1981.

are to seriously tackle the problems of hazardous waste these enormous information gaps need to be closed.

12. Because information on current hazardous waste generation is far from complete, prediction of the types and quantities of waste likely to be generated in the future is extremely difficult. Increased generation could be expected from: increased industrial activity; greater chemical usage by existing industry, and tighter air and water emission legislation and enforcement. Reductions in the quantity of wastes requiring disposal could be expected from: increased disposal costs; increased raw material costs; improved manufacturing processes; and increased recovery and recycling of materials. In Victoria the major generator of chlorinated hydrocarbon waste has advised that in the near future it will terminate the manufacturing process which produces the waste. Since the imposition of import restrictions in the early 1970s the volume of PCBs being imported has markedly declined. Quantities imported, other than in totally enclosed equipment, for the last six years are:

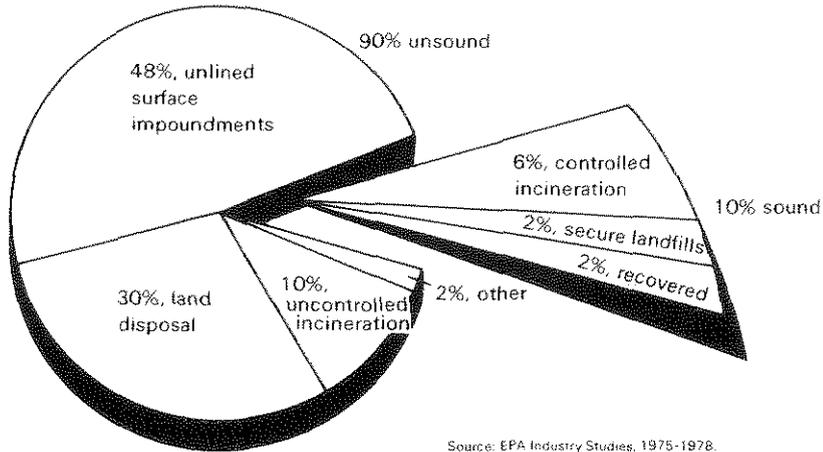
1975	300 tonnes	1978	32.5 tonnes
1976	60 tonnes	1979	nil
1977	13.5 tonnes	1980	nil

The quantity of PCBs requiring disposal is largely limited to that in storage and use today. While it will be many years before PCBs are entirely withdrawn from service the amounts requiring disposal will eventually decline. The withdrawal from service of PCBs and therefore the generation of PCB waste is expected to reach a peak during the 1980s.

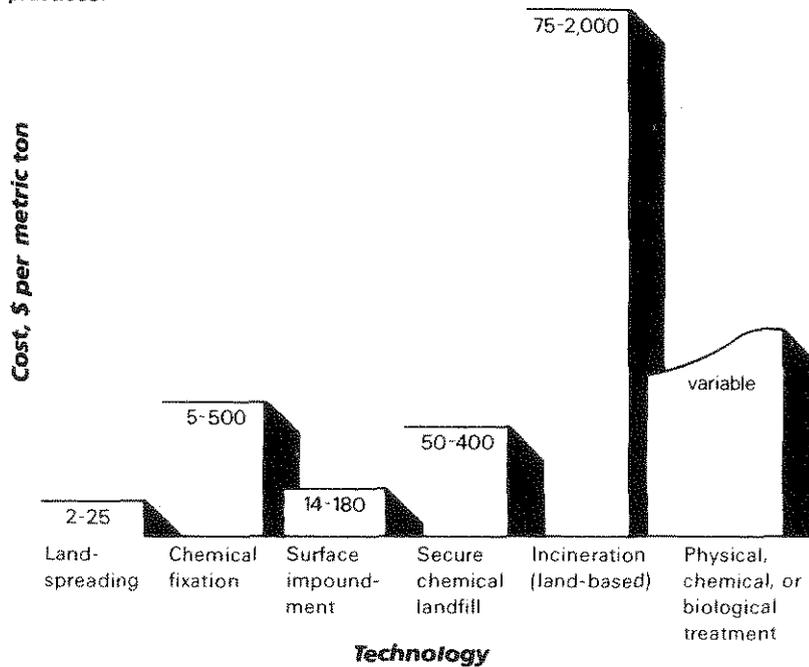
13. Recovery and recycling of chemicals is a desirable course of action but not always a practical one. The full recovery of some chemicals, particularly some heavy metals, is extremely difficult and in many cases prohibitively expensive. Demand for land

Most hazardous waste is disposed of by environmentally unsound methods:

Percent of total hazardous waste in the United States

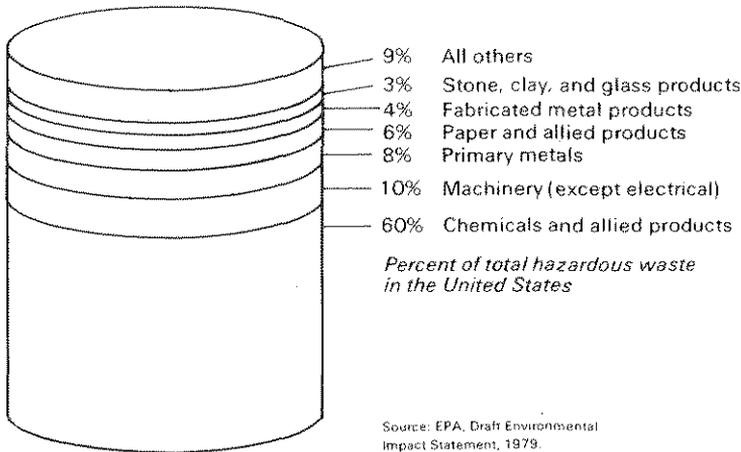


Environmentally sound technologies are available for treatment and disposal of hazardous waste. Costs vary widely, according to type and volume of waste handled, and are substantially in excess of unsound practices:



Source: EPA, Draft Economic Impact Analysis, 1979

The chemicals and allied products industry generates 60 percent of industrial hazardous waste:



In the absence of similar basic waste data for Australia these diagrams from the United States give some indication of the likely situation in Australia.

disposal facilities is increasing due to stricter air and water emission standards. Material removed by pollution control equipment has to be disposed of safely. Some disposal procedures used previously, such as low-temperature incineration and ocean dumping, are no longer regarded as being satisfactory. The Committee believes that the management of hazardous wastes has to be considered as an integral part of an overall hazardous chemical management strategy. While disposal is being considered separately in this Report the final and main report of the inquiry will place waste disposal in the wider context of hazardous chemical management.

14. While hazardous waste disposal techniques are still developing, sound techniques are available now but are not being fully implemented and in many instances unsound practices are continuing. In a survey of 17 industries between 1975 and 1978 the Environmental Protection Agency in the United States found that while sound technologies were available to manage hazardous waste they were not being used for 90 percent of the waste generated. It found that up to 80 percent of hazardous waste is disposed of on the generator's property. A Congressional Report in 1979 based on a survey of 1605 industrial plants of the 53 largest U.S. chemical companies found that 94 percent of the waste had been disposed of on-site.³ The Report observed that many on-site facilities would not qualify to continue operating once the Resource Conservation and Recovery Act regulations were promulgated. It appears likely that the situation in Australia is very similar. Many State Governments lack demonstrated technical expertise in waste management with the problem being worse where local government with even fewer resources is expected to shoulder the responsibility. Many of the problems of waste management which are common to each State and Territory should be addressed at a national level.

15. The Commonwealth has well-known constitutional responsibility for waste disposal in the A.C.T. and external territories, for the import and export of waste, for marine dumping and for the disposal of wastes by Commonwealth Departments or on Commonwealth lands. The *Environment Protection (Impact of Proposals) Act 1974* provides for environmental assessment of Commonwealth proposals, including financial assistance by the Commonwealth to the States. The Commonwealth represents Australia in international organisations concerned with hazardous wastes and has a general educative role on matters affecting the nation as a whole. The role of the Commonwealth is discussed further in Chapter 9. The main constitutional responsibility for the regulation and monitoring of hazardous chemical waste disposal lies with the States. In the Sydney metropolitan area and in South Australia the State Governments have a direct involvement in hazardous waste disposal. In the other States and the Northern Territory it is generally a local government responsibility, within the confines of State legislation and departmental oversight.

16. The Australian Environment Council (AEC), which consists of the State, Territory and Commonwealth ministers having prime responsibility for the environment, has begun developing a management program on environmentally hazardous chemicals. The program recognises the common interests of its members and the importance of protecting the Australian environment from contamination by hazardous wastes. In 1977 the AEC established a National Advisory Committee on Chemicals (NACC). The AEC has identified the disposal of environmentally hazardous chemicals as an area requiring priority attention by its National Advisory Committee on Chemicals. The AEC and industry have both claimed to have attached a high priority to the problem of the disposal of hazardous wastes. The Australian Chemical Industry Council considers it to be a major problem facing industry.

17. The NACC has commenced work on hazardous waste disposal in two areas: the development of a policy-oriented national strategy, and a joint AEC/industry study. The NACC claimed that these activities are timed to complement and make maximum contribution to activities proceeding in individual States, Territories and regions. A seven-page policy outline document was published in August 1979. The main elements of the common policy approach proposed, cover waste identification, reporting, transportation, treatment and disposal. NACC is currently planning the development of guidelines for the implementation of these policy elements.

18. The joint AEC/industry project on management and disposal of hazardous industrial wastes involves an environmental and economic assessment of disposal options available for various wastes of national concern. The project is intended to lead to recommendations on an appropriate national strategy for hazardous industrial wastes which will complement State and regional strategies. A study carried out by Maunsell and Partners Pty Ltd, was completed in May 1981 but has not yet been published by the AEC. Access to the report by the Committee was refused by the Minister for Home Affairs and Environment because it has not been published. The completion of the national strategy has been expected for some time.

19. The Committee recommends that:

the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure—

- (a) the Maunsell Report on the Management and Disposal of Hazardous Industrial Wastes be made public as soon as possible; and**
- (b) the national strategy of the Australian Environment Council for dealing with hazardous wastes be completed as soon as possible.**

20. The Royal Australian Chemical Institute has recently published a code on one element of the problem, the disposal of laboratory wastes. This code followed from consultations between the Institute and NACC on problems in this area.

21. The Australian Chemical Industry Council has stressed that while hazardous chemical management and control is in their opinion a State matter and should be administered by the States, the pattern of management, controls, regulations and standards of disposal must be uniform from State to State so that neither unauthorised transfer of wastes nor migration of industries to less-regulated areas is encouraged.

22. Despite the many announcements and the development of codes by governments and industry over the last decade there has been little improvement in the control of hazardous wastes by the Commonwealth and most State, Territory and local governments. The problem requires urgent action by governments to identify and quantify wastes and ensure they are safely stored, treated and disposed of.

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1. Capital works and maintenance to contain mine tailings polluting the Molonglo River at Captains Flat, N.S.W. will cost \$2.4m. It was estimated in 1980-81 that it would cost \$12m for containment and cleaning up of abandoned uranium mines at Rum Jungle in the Northern Territory.
 2. Chemicals are said to have a mutagenic effect if they cause damage to genes which are transmitted from generation to generation, i.e. if they cause heritable genetic damage. Chemicals are said to be carcinogenic in the broad sense that they cause cancers to appear at increased frequency in an exposed population. Many chemicals which cause cancer do so because they are mutagenic, producing mutations in cells other than those which are transmitted from generation to generation. Thus most mutagens are carcinogens and vice versa. Chemicals exerting a teratogenic effect do so by causing damaging changes to the developing foetus in the mother's body, e.g. by inhibiting normal development of particular organs or limbs. Teratogenic chemicals may be, but are not necessarily, mutagenic.
 3. United States, House of Representatives, Committee on Interstate and Foreign Commerce, Subcommittee on Oversight and Investigations, *Waste Disposal Site Survey*, Report, October 1979.

Overseas Regulation and Control

United States

23. Hazardous waste disposal practices in the United States until the early 1970s were typified by uncontrolled landfill disposal with industrial wastes generally being disposed of on property owned by the generator or directly into neighbouring waterways. The discovery of a number of disasters involving hazardous waste disposal led to the enactment of the Resource Conservation and Recovery Act (RCRA) in 1976. The United States Environmental Protection Agency (EPA) is required by the Resource Conservation and Recovery Act to issue standards applicable to owners and operators of hazardous waste management facilities. These standards are to be used in issuing permits for facilities used to store, treat or dispose of hazardous waste. They cover a complete 'cradle-to-grave' system for the management of hazardous waste. This Act, together with the Toxic Substances Control Act (TSCA), provides a 'cradle-to-grave' coverage of hazardous chemicals in general. A 'superfund' has been established to finance the cleaning up of abandoned or inadequately managed waste disposal sites. In addition to these three major measures, legislation such as the Clean Water Act, the Safe Drinking Water Act and the Refuse Act is used in hazardous waste regulation.

24. The Toxic Substances Control Act was enacted by Congress in 1976 and came into full effect in mid-1979. Under the Act the EPA is authorised to obtain from industry data on the production, use, health effects and other matters concerning chemical substances and mixtures. If warranted, the EPA may regulate the manufacture, processing, distribution in commerce, use, and disposal of a chemical. Products which are regulated under other laws, such as pesticides, drugs and food additives are exempted.

25. Regulations issued by the EPA under the Resource Conservation and Recovery Act must include: (1) a regulation to identify hazardous wastes that are to be regulated; (2) standards applicable to generators and transporters of hazardous waste; (3) standards applicable to owners and operators of hazardous waste treatment, storage and disposal facilities; (4) regulations governing the issuing of permits to owners and operators of hazardous waste treatment, storage and disposal facilities, and (5) guidelines governing the authorisation of States to implement and enforce a State hazardous waste management program. The Federal Government sets the standards and other requirements under the Act. If these are not fulfilled then the Federal Government takes enforcement action.

26. The regulations are to be issued in stages. The first stage, which came into effect in November 1980, put into operation major elements of the management scheme. The regulations cover such items as requiring generators to identify the hazardous waste they produce and to comply with specified requirements, particularly relating to wastes transported off-site for treatment, storage or disposal. Transporters must meet certain requirements relating to transport, and owners and operators of existing hazardous waste treatment, storage and disposal facilities are required to comply with interim standards.

27. A generator who treats, stores or disposes of hazardous waste on-site must comply with various standards covering definition of hazardous waste, record-keeping, obtaining an EPA identification number and various reports to authorities. A generator must not treat, store, dispose of, transport or offer for transportation hazardous waste without having received an EPA identification number. Similarly, a generator must not offer his hazardous waste to transporters or to treatment, storage or disposal facilities that have themselves not received an identification number.

28. The U.S. has developed a manifest, or docket, system which allows hazardous wastes to be traced from the generator to the place of ultimate disposal. Significant features of the system are as follows. It is the responsibility of the generator to prepare a manifest which must contain the following information: a document number; the generator's name, address, telephone number and EPA identification number; the name and EPA identification number of each transporter to be involved and of the designated facility (plus that of any alternative facility) and a description and quantity of the waste. Sufficient copies must be provided: one for the generator; and two each for each transporter and owner or operator of the designated facility. One copy is to be retained in their records, and the other is to be returned to the generator.

29. The generator must keep a copy of each manifest for three years. The generator must also keep records of any test results, waste analyses, or other determinations made in accordance with the regulations, for at least three years from the date that the waste was last sent for treatment, storage or disposal, both on and off-site.

30. A generator may accumulate hazardous waste on-site without a permit for up to 90 days provided that: all such waste is shipped off-site within 90 days; the waste is stored in containers in accordance with the regulations; and the date of commencement of storage is clearly marked on each container.

31. As mentioned above, the U.S. Federal Government recently established a 'superfund' to finance the cleaning up of hazardous waste disposal sites. The 'superfund' is expected to accumulate more than US\$1 billion over five years primarily through a tax on raw materials used by the chemical industry and supplemented by government funds.

Canada

32. In Canada, a consultant study on hazardous waste generation in the Western Provinces was carried out recently for Environment Canada. The wide dispersion of industry in this region makes a useful parallel with the Australian situation. The study examined the generation of wastes, waste types and the availability of waste facilities. The consultants concluded that a single, high-temperature incinerator should be built to destroy intractable wastes generated by industry in the area.

United Kingdom

33. The *Deposit of Poisonous Waste Act 1972* made it an offence to remove or deposit waste which is poisonous, noxious or polluting and liable to give rise to an environmental hazard on land without giving three days prenotification to the local authority and the regional water authority. This was an emergency Act, not meant to be more than a stop-gap measure, and in 1974 the Control of Pollution Act was passed. The 1974 Act controls the disposal of waste on land by means of site licensing and made it an offence to dispose of controlled waste anywhere other than on a site licensed for that purpose. Responsibility for licensing and enforcement rests with waste disposal authorities which

are district or county councils. The Act gives power to the Secretary of State for the Environment to make special provision for any dangerous or difficult waste which in his opinion merits it, and in exercise of this power the *Control of Pollution (Special Waste) Regulations* 1980 came into force in 1981. At the same time the 1972 Act was repealed.

34. The purposes of the Special Waste Regulations are:

- to preserve prenotification for a limited range of the most hazardous wastes;
- to end the notification of other less hazardous wastes under the 1972 Act and to rely on site licensing for control instead;
- to keep a 'cradle-to-grave' record of each disposal of special waste, by a consignment note system;
- to keep records in perpetuity of the location of special wastes at landfill sites;
- to give the Secretary of State power to direct a consignment of special waste to a specific site.

The U.K. legislation has to comply with EEC directives on waste disposal and the 1980 Regulations satisfy those requirements.

35. In September 1981, the House of Lords Select Committee on Science and Technology produced a Report on Hazardous Waste Disposal.⁴ Some of the conclusions and recommendations it reached are:

- Public hostility to hazardous waste disposal facilities is common and is too important to be ignored. (para. 114)
- As a result of commercial pressures and a lack of national planning, some disposal sites take more than their fair share of hazardous waste (paras. 115-7).
- Hazardous waste can cause, and has caused, pollution, damage to health, and even death. But in the United Kingdom the number of accidents directly attributable to such wastes is remarkably small and so far all serious cases of pollution arise from deposits predating the introduction of controls in 1972 (paras. 119-122).
- All producers of hazardous waste should be required to:
 1. register with their waste disposal authority;
 2. identify the person within the company responsible for hazardous waste disposal, and
 3. make a quarterly return of hazardous waste produced by them, identifying the waste disposal contractor (if any) who disposed of it, the disposal route taken and the disposal site (para. 132).
- if producers of new substances are obliged to notify those substances under proposed Regulations, they should have to notify the wastes arising from those substances as well (para. 135).
- All professional handlers of hazardous waste outside the place of production should have to be licensed by their waste disposal authorities. Licences should be subject to automatic revocation in certain circumstances. (paras. 136-7).
- Results from monitoring licensed disposal sites should be made publicly available (para. 142).
- Site operators should be required to monitor sites during, and for a set period after, operation (para. 143).
- It is unjustifiable that ratepayers have to pay for the control and monitoring of hazardous waste disposal. To avoid this, charges should be introduced for applications for site licences and, on a recurring basis, for the licences themselves. Bonds from site operators to insure against environmental damage especially after site closure, are strongly encouraged (paras. 168-172).

- Penalties for illegal dumping should be substantially increased (para. 173).
- When waste disposal authorities accept hazardous waste for disposal at their own sites, their charges must reflect the true cost of disposal. If they introduce unfair competition, this will adversely affect the standards of private operators (para. 174).
- In ensuring adequate provision of facilities, waste disposal authorities must have regard to:
 1. public opinion and the proper need of local residents for reassurance that the best practicable means of disposal is being decided as much on environmental as on economic grounds;
 2. growing scientific knowledge and the likelihood that some disposal methods now in use will be proved not to be the best for particular wastes;
 3. the need to secure specialist disposal facilities such as incinerators and treatment plants and to provide landfill sites for unusual (but not unsuitable) wastes (paras. 178-182).

To ensure the provision of specialist facilities, it may become necessary for the public sector to provide such facilities or support them financially or direct wastes to them. A degree of protection from unwarranted competition may also be needed to maintain their viability. It may be possible to achieve this protection by voluntary agreement but, failing this, powers of direction and market intervention should be introduced (para. 183).

36. The House of Lords Committee concluded that it is important that the United Kingdom comes to terms with the hazards of waste disposal and that considerable effort is devoted to controlling and minimising these hazards. It must be made possible for the public to feel confident that real control is taking place and that disposal is geared to the best practicable, not the cheapest tolerable, means.

Japan

37. Japan introduced legislation urgently in the early 1970s to deal with the serious environmental problems that had arisen in the previous decade. Most notably the Minamata, Itai-itai and Yusho Oil episodes (mercury, cadmium and PCB poisoning respectively) led to action to reduce health hazards.

38. The Waste Management Law of 1970 requires any person undertaking the collection, transport or disposal of industrial wastes to have a permit. Where generators transport or dispose of their own wastes it must be in accordance with the standards stipulated in a Cabinet Order.

39. Generators, both public and private, are required to appropriately dispose of their wastes and must endeavour to reduce the amount of wastes by regeneration or re-use of wastes. Generators must store industrial wastes, until the time of disposal, in accordance with the standards stipulated in the Ordinance of the Ministry of Health and Welfare. If the transport, storage and disposal of waste is not in accordance with the standards laid down, the prefectural governor may order the generator or operator: to change their method of operation; to provide necessary improvements, or to suspend the use of the treatment plant for a certain period of time.

40. Waste disposal sites are required to be enclosed and signposted to warn that the area is a waste (or harmful waste) disposal site. Disposal sites must be isolated from surface and underground water and measures taken to prevent leachate from polluting surface and underground water. The disposal of PCB polluted substances is closely regulated.

41. The Japanese Government endorses the 'polluter pays' principle with two exceptions. Government loans for pollution-control equipment for new plants are available at 1-2 percent below market interest rates, and, during 1976, accelerated depreciation rates were permitted on such equipment.

Federal Republic of Germany

42. The management of hazardous wastes in the Federal Republic of Germany is the shared responsibility of the Federal and State (Lander) Governments whereby the federal framework law is executed by the Lander. The federal legislation is the Waste Disposal Law of 1972, which entered into force in 1977. An administrative order of 1977 lists those chemical wastes which require special disposal facilities. The basic principle governing the disposal of wastes is that waste is to be disposed of in such a way that the well-being of the community is not impaired. Record books containing information on special wastes must be maintained by generators and transporters, and by operators of disposal plants for such special wastes.

43. Some Lander have established hazardous waste disposal companies in partnership with industry. Legislation has been enacted to make the use of the facilities obligatory. This approach prevents lower-cost, undesirable waste disposal practices from undermining the economic performance of the Lander/industry facilities.

Netherlands

44. The Netherlands enacted its Chemical Waste Act in 1979. The Act prohibits the disposal to landfill of a range of chemical wastes. The classification of wastes subject to these restrictions is determined on the basis of a combination of factors including industry processes, waste types, and chemical content and concentration levels in the wastes. The main aim of the legislation is to prevent groundwater contamination.

Denmark

45. A treatment plant capable of treating most types of toxic waste has been established in Denmark. It is owned and operated by Kommunekemi which is a limited company predominantly owned by local government bodies. The plant was constructed with loan funds from the national government. All waste consignments must be accompanied by a detailed declaration of the nature of the waste. Wastes are recycled and valuable materials are recovered as far as possible.

Sweden

46. The Swedish government has approved the construction of a State-owned facility for the destruction of toxic wastes. It is anticipated that the facility will begin operation within two years.

International organisations

47. The Waste Management Policy Group of the Organisation for Economic Co-operation and Development (OECD) Environment Directorate is studying aspects of the management of hazardous wastes. The three areas of its work are:

- the extent and means of transport of wastes across frontiers;
- the costs to industry of compliance with hazardous wastes regulations, and to the regulating agencies of enforcement;
- liability (and insurance) for damage caused by hazardous wastes.

The Governing Council of the United Nations Environment Program (UNEP) in its decision of 29 April 1981 urged all Governments:

in order to protect health and the environment, to ensure the institution of adequate protection measures for the handling and disposal of hazardous chemical wastes, to exchange information on such measures and the procedures used in their implementation, and to develop notification procedures and control for international transfers of such wastes between countries involved.

48. The European Economic Community issued a Directive in March 1978 on toxic and dangerous wastes covering a number of management practices to be adopted by member countries. It listed twenty-seven classes of chemical wastes requiring priority consideration due to their toxic or dangerous characteristics. The Directive requires member States:

- to establish or designate a competent authority or authorities to be responsible for the planning and supervision of the disposal of toxic and dangerous wastes;
- to ensure that toxic and dangerous waste is kept separate from other matter when collected, transported, stored or disposed of;
- to record and identify the site for disposal and the type and quantity of the waste;
- to introduce a system of permits so that all steps in the life-cycle of the waste can be adequately controlled;
- to introduce a manifest system to identify wastes transported.

Member States were directed to introduce measures that would enable them to comply with the Directive within two years.

Summary

49. The pattern of hazardous waste control in these industrialised countries includes the following:

- (a) registration of wastes, waste generators, transporters and disposal operators;
- (b) docket systems for tracing and controlling the movement of wastes;
- (c) standards for the transport and disposal of wastes, and
- (d) regulation to civil liability and insurance.

To ensure the economic viability of disposal facilities for the more dangerous wastes, some waste disposal authorities, e.g. those in Denmark and the Federal Republic of Germany, require those wastes to be sent to specific facilities. This restriction of competition is regarded as necessary to encourage and protect the massive investment required for the most effective disposal facilities.

4. House of Lords Select Committee on Science and Technology, Hazardous Waste Disposal, Volume 1 - Report, Session 1980-81, 1st Report. HMSO. London.

Adequacy of Present Disposal

50. The risk posed by chemicals to the environment depends not only on their toxicity characteristics but on their access to environmental pathways. At present much of the disposable hazardous waste is being disposed of to landfill. The suitability of a particular site for the disposal of a given waste will be dependent on the geology and hydrology of the site, the nature and physical form of the waste, the proposed rate of disposal and the presence of other waste on the site.

51. Disposal of hazardous waste in or on the land presents two main problems. The waste and its toxic components may remain hazardous for hundreds of years, and in some cases forever. Secondly, the waste or its byproducts may migrate from the confines of the site.

52. A number of hazardous wastes will not degrade to a point where they are no longer dangerous, or will do so only very slowly. Toxic heavy metals, for example, will not degrade, although they can be converted to a form in which they are more stable and less dangerous. Liquid wastes are generally regarded as the more difficult to control as they have a greater likelihood of migrating through the ground and possibly into water systems. For this reason some regulatory authorities treat all liquid waste as hazardous until individual wastes are proved otherwise.

53. While there is a major concentration in and around Sydney and Melbourne of those industries which produce hazardous wastes, hazardous waste generators are not confined to New South Wales and Victoria nor to capital cities. Many decentralised plants generate hazardous wastes. The responsibility for managing or supervising the disposal of these wastes often falls to local governments which are ill-equipped for the task.

54. The Committee inspected landfill liquid waste disposal facilities at Castlereagh in Sydney, Tullamarine in Melbourne, Willawong in Brisbane and the City of Canning in Perth. The Sydney facility is operated by a state authority; that in Melbourne by a private company; that in Brisbane by a private company on behalf of the City Council and the Canning facility by a local government. The Committee has not looked at waste disposal facilities outside these capital cities but understands that the capital city facilities it inspected, despite their shortcomings, would generally be of more advanced design and be better controlled than facilities elsewhere in the respective States.

55. A high degree of control appears to be exercised within the metropolitan area of Sydney. The Metropolitan Waste Disposal Authority requires all generators and transporters of hazardous wastes to be licensed. Generators must notify the Authority of each waste type they intend to dump and receive an identifying approval number. A multiple docket system is used to ensure that loads are identified, are not mixed and arrive at their specified destination. The Authority operates an interim facility for less-hazardous liquid waste disposal at Castlereagh. The categories of wastes accepted at Castlereagh include acids, alkalis, tannery wastes, greasetrap wastes, ink waste, oil and water mixtures, paints and resins, vegetable and animal oils, fats and sludges. At

present 70 million litres of these wastes are disposed of annually at Castlereagh. Wastes not accepted are those containing significant amounts of pesticides, halogenated hydrocarbons, cyanide, arsenic, mercury and lead. The unacceptable wastes are being stored on the generators' premises awaiting the construction of suitable disposal facilities. A partial list of quantities and types of wastes stored was given in Table I.

56. The ground at Castlereagh is deep, low-permeability clay. Cells dug in the clay are filled with domestic and industrial waste before adding the liquid waste. The cells are used only once and are covered by several metres of clay after use. Each cell is accurately located by survey and a record is kept of the liquid waste placed in the cell so that, if circumstances require, a specific cell can be located in the future. Because cells are used only once large areas of land are required. Bores have been sunk at regular intervals around the site to monitor groundwater. Surface levels are managed throughout the operation to ensure containment of surface run-off during rain.

57. A pilot plant at Castlereagh has been developing techniques to treat liquid wastes to reduce the volume of waste going to landfill. A full scale plant is proposed to be built soon in conjunction with a high-temperature incinerator as part of the Sydney hazardous waste disposal strategy. Outside of the metropolitan area, local government is responsible for the control and monitoring of chemical waste disposal within the guidelines of the State Pollution Control Commission. The Metropolitan Waste Disposal Authority (MWDA) is responsible for the disposal of all kinds of wastes within the Sydney metropolitan area. The Committee believes that the high degree of control and expertise possessed by the MWDA in the management of hazardous wastes should be extended to the whole State and particularly to the highly industrialised cities of Newcastle and Wollongong.

58. While the Victorian Government to date does not operate hazardous chemical waste disposal facilities itself, the Environment Protection Authority (EPA) is the regulatory and licensing authority for waste disposal within the State. Public disposal facilities are operated by private industry and local government. The EPA operates a docket system similar to that in Sydney which is aimed at ensuring that the nature of the load is specified, loads are not mixed and that they arrive at their specified destination.

59. The major chemical waste disposal site in Melbourne is operated by a private company, Cleanaway, at Tullamarine. The facility operates in an old quarry site which is said to be an impermeable basin. The site accepts low-toxicity, non-inflammable liquid and solid industrial waste. The more hazardous wastes are excluded from the site. As at Castlereagh, loads are sampled at the gate and the samples analysed on a random basis to check compliance with the description on the docket. However, at the time of the Committee's inspection there was no-one on the gate to ensure samples were taken. Liquid wastes are placed into pockets in industrial solid waste. Some of the liquid is retained in the solid fill. The excess seeps through the deposited waste where, it is claimed, it is 'digested'. The leachate is collected at the bottom and pumped to one of several ponds where it is aerated and evaporated. The system is known as a biological bed treatment.

60. It is proposed that as the capacity for landfill at the Tullamarine site diminishes, a treatment plant will be established which will permit the bulk of the liquid to be discharged to the sewer after treatment. The small volume of remaining solids will be landfilled. The EPA has stated that after liquid disposal to landfill has ceased at Tullamarine the site will be pumped dry and the surface sealed to prevent the infiltration of rainwater.

61. During inspections in Melbourne the Committee heard of illegal waste disposal practices. While the Committee is not able to determine whether these malpractices are rare or commonplace it is clear that they do occur and are not confined to Melbourne. Malpractices included tankers discharging wastes in forest areas and to the sewer through manholes in isolated locations. The Committee heard of ways in which the docket system could be cheated. A major deficiency of the docket system in Victoria is that the dockets and docket books are not cross-checked by the EPA after use.

62. There is no single waste disposal site in the Perth area. Instead, a number of local governments operate land disposal sites, as do some companies. There is little or no control over chemical waste transport. Some public disposal sites are not permanently manned and even when they are, gatemen cannot easily verify that wastes are what the driver claims. Chemicals and septic tank wastes can be, and presumably are being, mixed. Public and private sites for the disposal of liquid wastes are required to be licensed under the Rights in Water and Irrigation Act but there are no facilities available for those wastes not permitted under the licence system. It is believed that these are being landfilled by one means or another. The controls over chemicals disposed to landfill are seen as inadequate.

63. The Committee is concerned as to the future fate of the escaping liquids. Should this leachate find its way into groundwater used as part of Perth's water supply the costs to community health and the finding of suitable alternative water supplies would be considerable. Approximately half of Perth's water supply is from underground sources. Alternative dumping sites are being investigated to replace those located near groundwater pumping areas. It concerns the Committee that some disposal sites are located near housing and many households use bore water on their gardens. A number of companies are permitted by State legislation to discharge waste directly into the sea in the Kwinana-Cockburn Sound area.

64. The Committee inspected the liquid waste disposal facility of the City of Canning near Perth. The common approach of liquid waste disposal sites in the Perth area is to tip the wastes into ponds and allow the liquid element to both evaporate and percolate away through the permeable ground which is usually sandy. Should deposited solids interfere with the soaking away of liquids the ponds are allowed to dry out and the solids are scraped out, making the ground permeable again. The Canning facility is far from adequate as a present-day liquid chemical waste disposal facility, despite the commendable efforts of the Canning Council to reduce the adverse effects of the facility. It is a major burden for an individual council to shoulder in the absence of guaranteed uniformity with other council areas and lacking the financial and technical resources to build and operate the kind of facility needed.

65. The Western Australian Government recognised the problems involved. A 1979 Report of the Health Department, stated:

Liquid waste disposal is a growing problem and is likely to increase. The present methods of disposal cannot continue and it is essential that this type of waste be treated through an approved processing plant, or eliminated through waste exchange.

66. At the time of the Committee's visit to Perth the State Government was conducting a survey to determine a hazardous chemical disposal site. The State Government has recently proposed a single secure landfill site for solid hazardous waste. This proposal has been supported by the Local Government Association of Western Australia. The Committee is not aware of any firm proposals by the State Government for the provision of a liquid waste facility. An Industrial Waste Exchange provides the opportunity for some waste to be recycled rather than dumped.

67. The situation in Brisbane, referred to in two submissions, gives grave cause for concern. An interim site is operated by a private company under contract to the Brisbane City Council on land leased from the Council. The site at Willawong is an area of swampy low-lying land within the Oxley Creek—Blunder Creek drainage basin and is mainly floodplain. The waste disposal area is surrounded by bushland with scattered housing and is situated between the suburbs of Acacia Ridge and Inala. Two distinct operations are conducted at Willawong to dispose of the estimated 27-36 million litres of liquid wastes received per year. In one, aqueous wastes are treated to remove solids and the remaining liquid spray-irrigated and evaporated. This method is used for approximately two-thirds (18-24 million litres a year) of the total liquid waste and has little apparent hazard potential. In the other operation the other third of the total wastes (9-12 million litres a year), which is mainly non-aqueous, is buried in trenches. Most of this waste is hazardous and some is very hazardous.

68. *Hazardous liquids are put into trenches dug in ground comprising layers of sand and clay. The ground is retrenched after several months and after previous material has leached away. The ground into which waste is poured has been used, between 1 and 3 years earlier, for nightsoil disposal. Hazardous wastes include oil, solvents, paint sludges, organic chemicals, thick animal and vegetable sludges, acids, alkalis and toxic industrial wastes. Infiltration into the soil is an essential part of the process in direct contrast to current concepts of good practice. Leaching could be expected to affect three nearby creeks which flow into the Brisbane River. During its inspection the Committee observed a considerable amount of leachate oozing from a creek bank.*

69. Disposal charges are set by the Brisbane City Council and are a quarter of the charges in Sydney and Melbourne. The revenue from these low disposal charges does not permit adequate treatment by the company operating the site. Largely because the owners of the disposal plant are industrial cleaners and waste carriers themselves, carriers delivering waste to the dump are unwilling to disclose the generators of, and therefore the nature of the waste. Willawong Liquid Waste Disposal Pty Ltd is owned by Berkeley Sanitation Services (51 percent) and Greasetrap Cleaning Service (49 percent) with Greasetrap Cleaning Service being the largest liquid waste tanker operator in Brisbane. The Committee was told that:

Although the declaration of generators was originally intended by the Brisbane City Council, the various liquid waste transporters opposed on the grounds that they would thereby reveal their customer lists. Greasetrap Cleaning Service as a partner in Willawong Liquid Waste Disposal Pty Ltd., opposed declaring generators because it feared that its senior partner (Berkeleys) would use the information to expand its liquid waste transporting operation (this being a minor part of its overall activity in the waste disposal field). Other transporters opposed declaring generators because they feared that Greasetrap Cleaning Service, as a partner in Willawong, and as the major liquid waste transporter in Brisbane, would use the information to take away their business. The Brisbane City Council although it had the power under Paragraph 22 of the Refuse Management Regulations did not choose to do so.⁵

70. As there is limited knowledge of the nature of the waste dumped, little or no treatment is possible and near fatal incidents have occurred. Loads are often mixed, making treatment more difficult. The operators of Willawong were not aware, until informed by the Committee, that waste from a battery factory, inspected earlier in the day by the Committee, contained lead. They believed the waste to be just acid. It follows that little information is being gathered on the types and volumes of waste being generated in the area, which could be used in the design of a permanent chemical waste disposal facility.

71. The contract under which Willawong is operated for the Brisbane City Council prohibits the disposal of hazardous wastes at the plant but does not define what is meant by the term. The definition given in the Refuse Management Regulations of the Council, at Paragraph 11 (c), states:

Hazardous industrial waste—being any industrial waste containing any substances which may present danger to the safety of persons or equipment at the disposal area, by reason of toxicity or of flammable, corrosive or explosive properties.

This definition is inadequate in that it does not include danger to the community or danger to the environment.⁶

72. The Committee heard evidence of wastes that are unsuitable for the most well-controlled landfill, such as polychlorinated biphenyls (PCBs) and cyanides, being dumped at Willawong.⁷ Evidence was given that all of the staff at the site had been advised by their doctors to give up working at Willawong. Their illnesses include kidney malfunction, blood disorders and possible liver disease. It would appear that some intractable wastes from outside Queensland have been taken there for easy disposal.⁸ The Committee was appalled by the Willawong operation and the continued lack of effective control by the State Government and the Brisbane City Council.

73. The nature of some of the wastes disposed of and the hydrology of the site mean that hazardous leachate will continue to enter the surrounding waterways and groundwater even if the site were closed. Evidence was given that tests indicate much of the waste would remain toxic for several hundred years.⁹ Chlorinated hydrocarbons have been identified in leachate analyses¹⁰ and there is contamination of nearby water by heavy metals. The cost of cleaning up the site to prevent this continuing hazard would probably run into the millions of dollars. A witness, Mr Carlisle, in describing the situation said:

One could say that at Willawong now there is this big sponge full of unknown liquids, which gradually will leak out. It is leaching out now, and we do not know just how much it will leach out in the next few decades. Certainly no more waste or a minimal amount of waste should be put into Willawong. I do not think Willawong can be closed down tomorrow because the waste still has to be disposed of. It is better that it be disposed of in an area where we know what is happening rather than just be dumped into creeks and sewers all around Brisbane. But it needs a definite commitment by the authorities to look for a suitable area around Brisbane and set up a sealed landfill within a reasonable time, say two years, to at least avoid or not make any worse the current problem at Willawong of the leachate that is escaping.¹¹

The Committee was told that the Willawong site might be used, after closure, for sporting fields. Given the swampy low-lying nature of the land this use must be ruled out unless all of the contaminated soil is removed.

74. The Queensland Government has recently advised that it is not expected that the operational life of Willawong can be extended beyond the mid-1980s. A major study has been initiated by the Queensland Government to find a long-term solution to the problem of disposal of hazardous, toxic and industrial liquid wastes in the south-east area of the State.

75. Hazardous waste disposal in the Australian Capital Territory and marine dumping are Commonwealth responsibilities and are dealt with in Chapter 9. As stated in paragraph 54 the Committee's inspections were not comprehensive. The Committee did not inspect waste facilities at other major generating centres such as Adelaide, Newcastle and Wollongong. In South Australia a waste disposal authority was established some time ago but still is not operating. It is understood that the Maunsell Report has dealt

with facilities in the capital cities. The access to adequate facilities of new decentralised industrial centres such as Albury-Wodonga and Gladstone is of concern to the Committee. It is not just major generating centres that are of concern but any centre producing hazardous waste. Waste disposal strategies should cover the whole of a State and not just the capital city.

Conclusion

76. The approach to hazardous waste disposal varies considerably between States and Territories. The problems of controlling hazardous waste and of providing adequate disposal are common to all Governments. It is essential that effective waste disposal strategies be developed as a matter of urgency at the national level with the participation of State, Territory and Commonwealth Governments.

77. Proper disposal facilities alone are not the answer to the problem. A comprehensive 'cradle-to-grave' strategy with adequate penalties to back it up is required to ensure wastes are safely handled at all stages from generation through to disposal.

5. Mr R. D. Carlisle, Transcript p. 1146.

6. Transcript, p. 1153.

7. Transcript, p. 1163.

8. Transcript, p. 1404.

9. Transcript, p. 1409.

10. Transcript, p. 1167.

11. Transcript, p. 1176.

Hazardous Waste Management

Hazardous waste strategy

78. Individual elements of hazardous waste control, such as adequate disposal facilities, cannot be effective on their own in overcoming the hazardous waste problem. They need to be integrated into an overall hazardous waste management strategy. This is particularly necessary in view of the fragmentation of hazardous chemical control.

79. The development of an effective hazardous waste strategy by a government will provide in its implementation: mechanisms for identifying wastes; checks on the movement of wastes; the provision of some facilities by government; and last, but by no means least, a demonstration to the community of the effectiveness of the strategy and the necessity of elements in the strategy. A hazardous waste management strategy is essential for the effective control of hazardous wastes.

Identification and measurement of hazardous wastes

80. An essential first step in a chemical waste management strategy is the identification and quantification of chemical wastes that constitute a hazard to human health or the environment. Hazards are assessed on the basis of toxicity, mutagenicity, carcinogenicity, persistence, degradability, potential for accumulation in tissues, flammability, corrosiveness and other hazardous characteristics.

81. Generally, regulatory authorities have listed hazardous substances and the appropriate methods of their disposal. While lists should be maintained, the registration of individual hazardous wastes by the generator is necessary to overcome the deficiencies of lists, to allow the monitoring of the waste stream and to facilitate its control.

82. In the United States ten to fifteen percent of industrial waste is hazardous. This hazardous fraction amounts to 57 million tonnes a year. Canada estimates about ten percent of its industrial waste is hazardous. The New South Wales Government states that the percentage of hazardous waste in the total waste stream is less in New South Wales and indicates that most of the hazardous waste is generated by a dozen or so industries including the producers of iron and steel, pesticides, pharmaceuticals, petroleum, rubber, plastics and textiles.

83. The waste stream can be divided into two broad categories. In one category are those wastes which are suitable for recycling, for disposal to the sewer or to landfill either directly or after treatment. These disposal methods are the ones currently in common use with the last two being the most common. The other part of the waste stream comprises those wastes for which there are no currently available, environmentally acceptable disposal facilities in Australia. These are called intractable or special wastes and require higher level disposal technologies than the first group. These technologies minimise the hazard of the waste as an essential part of the disposal process and include incineration, encapsulation and fixation. The end products for disposal after treatment often require special landfill provisions. These intractable wastes are currently being stockpiled awaiting suitable disposal facilities, although some improper disposal is undoubtedly occurring. Their storage is itself a matter of concern.

Minimising the hazardous waste stream

84. The prime responsibility in minimising the hazardous waste problem should be with the generator. Decisions made by the generator can greatly influence the size of the problem. Alternative procedures which might be taken to reduce the amount or type of waste for disposal are:

- altering a process or improving process control to produce less waste or to render the waste less hazardous. There is often a financial incentive to such changes through reducing disposal costs, reduced product loss or improved product quality;
- segregating wastes to assist analysis, control and treatment thereby reducing disposal costs. Small volumes of hazardous waste contaminating large volumes of waste can significantly increase transport and disposal charges; and
- recovery, recycling and waste exchanges. Recovery can be undertaken by the generator or by specialist off-site operations. Pickling and plating baths, oils, solvents and paint materials are some of the more common materials recovered and recycled.

85. Generators should have a responsibility to consider the hazardous wastes produced and their disposal when researching and developing new chemical processes and in reviewing the management of existing processes. Not all processes permit full recovery and recycling and even when waste generation is reduced, hazardous wastes are still produced and require means of safe disposal.

86. Large volumes of hazardous wastes are disposed of by generators on-site. Hazardous wastes which are evaporated to the atmosphere, are discharged to the sewer or waterways or seep into ground water from private sites pose the same dangers to the environment and community health as do those from public disposal sites and require similar regulation.

87. The Committee recommends that:

the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure—

- **generators of hazardous wastes are required to register hazardous wastes whether stored or disposed of on or off the generating site;**
- **registration details include the constituents that present potential hazards, the quantities to be stored or disposed of and the manner in which they are to be disposed of; and**
- **that subsequent to registration, generators keep records of the quantities generated, stored and disposed of and make regular returns of this information to the regulatory authority.**

DISPOSAL

88. Having identified wastes as being hazardous and requiring care in their disposal, the next consideration is the selection of the most appropriate method of disposal. For a number of wastes there is more than one suitable treatment method. For others there is only one method e.g. high-temperature incineration. The main alternatives for tractable liquid wastes at present are: landfill without prior treatment; treatment to render safe for discharge to sewer or landfill, and recycling.

Disposal of less-hazardous waste to sewer

89. Most sewerage authorities make regulatory provisions for the control of the kind and quantity of hazardous waste that may be disposed of through the sewer. Improper disposals to the sewer can disrupt the biological treatment of sewage as well as remaining a hazard at sewage outfalls. In the Sydney Metropolitan Area, for example, all trade waste dischargers to the sewer are required to provide to the sewerage authority details of the processes involved, quantities of the wastes to be discharged and the composition of the waste. Policing of sewer discharges, while difficult, is essential.

Landfill of less-hazardous waste

90. Much of the liquid waste currently disposed of to landfill has a high water content. The Landfill Sub-committee of the Victorian Industrial Waste Advisory Committee states that 'the routine landfill of liquid industrial waste is environmentally undesirable and liquid wastes should be incinerated, dewatered or otherwise disposed of'. It goes on to say 'treatment of liquids is a far more appropriate option than landfill'.¹²

91. Well conducted liquid chemical waste landfill operations require a continuing supply of land. Land having the optimum combination of suitable geological and geographical features is a finite resource. Both New South Wales and Victoria are developing treatment programs to reduce or eliminate the volume of liquid waste for disposal to landfill. Liquid wastes will be treated by chemical and physical methods followed by biological oxidation. After treatment most of the liquid will be suitable for discharge to the sewer with the remaining liquid being recycled or incinerated. Most residual solids or pastes will be landfilled, being of smaller volume and less likely to migrate through the soil. Some residual solids or pastes may require incineration or immobilisation.

92. Current scientific knowledge about the breakdown of hazardous wastes placed in land disposal facilities is imperfect. It is therefore necessary to assume that hazardous wastes placed in landfill will remain hazardous for very long periods of time, and therefore will remain a potential danger to human health and the environment. Decision-makers must take this into account when drafting regulations to cover hazardous waste disposal sites. Decisions relating to future land-use must recognise that such sites may never be suitable for other uses and that sites and surrounding groundwater may require long-term monitoring. Should monitoring indicate that leachate is migrating from a site extensive and expensive remedial work may be required.

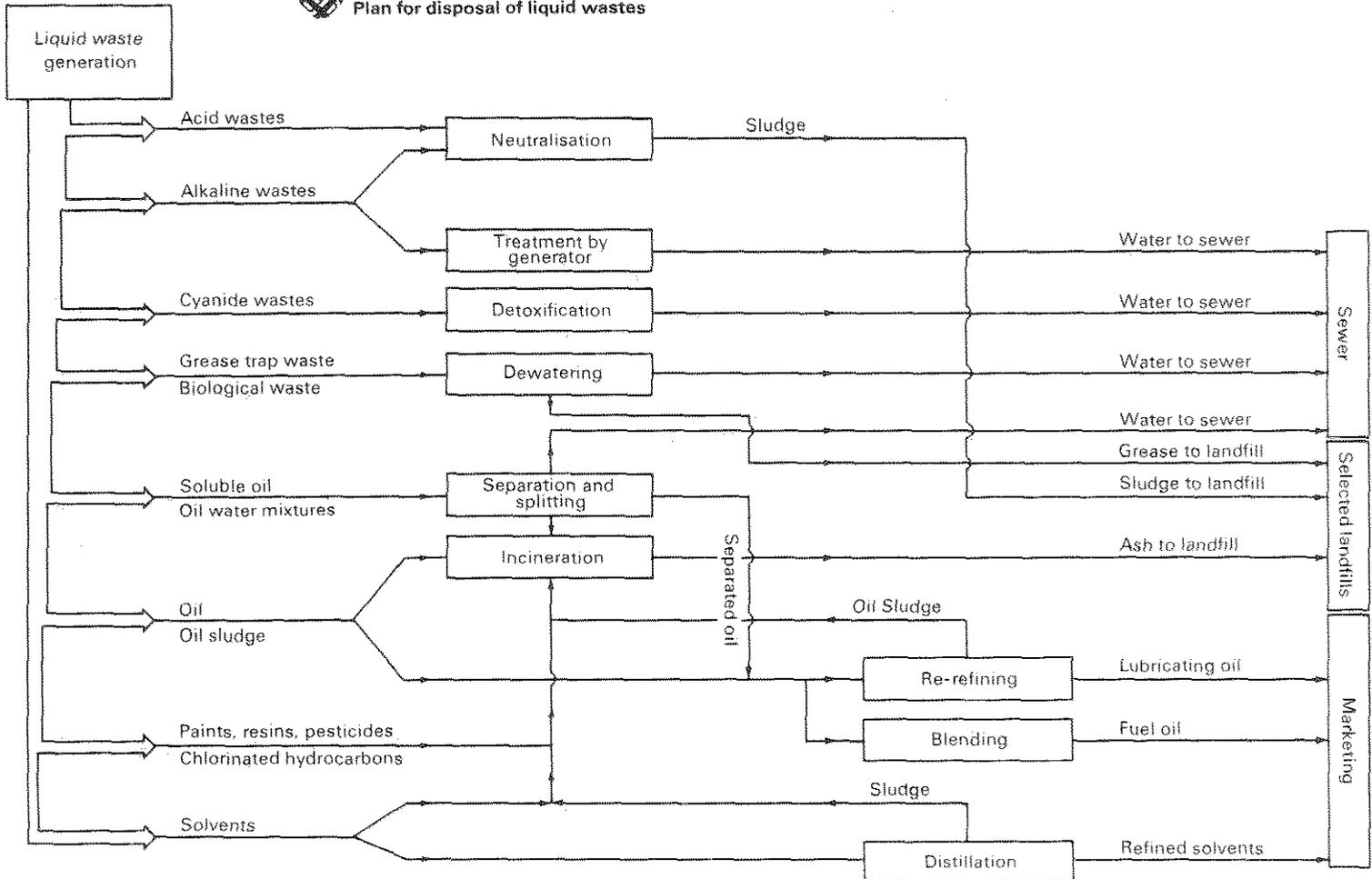
93. The Committee concludes that an expected growth in chemical usage together with finite land disposal resources, will result in those disposal procedures which minimise the volume of waste ultimately requiring landfill, becoming essential. The Committee believes that in the development of disposal plans for liquid wastes, preference should be given to schemes which result in the least volume of liquid being landfilled.

Recycling

94. Recycling of wastes, whether more-hazardous or less-hazardous, can take several forms. One form can be undertaken by the generator where material is recovered for re-use in the manufacturing process that produces the waste. Wastes may be recycled either with or without treatment in another manufacturing process. The best known form of recycling is the recovery of useful fractions for re-use. These processes are usually carried out by specialist recovery operators off-site and recover valuable materials such as oils and solvents. The recovery of other valuable materials, such as the silver in photographic waste, is economically viable.



Metropolitan Waste Disposal Authority, N.S.W.
Plan for disposal of liquid wastes



95. Not all wastes are suitable for recycling. Even when valuable materials such as mercury or lead are present, full recovery might not be economically feasible due to factors such as high processing costs, small volumes and irregular composition. As extraction techniques improve, more waste products are likely to become eligible for some recycling.

Waste exchanges

96. A considerable amount of waste is suitable for recycling or exchange. Several States operate waste exchange schemes. As an example the New South Wales exchange, run by the Metropolitan Waste Disposal Authority, has been operating successfully for four years. The exchange covers non-hazardous as well as hazardous wastes. The objective of the exchange is to put potential users of waste materials in touch with industries producing the waste and vice versa. The exchange is an information service and point of contact between parties and does not handle the wastes itself. A register of materials available and required is maintained by the exchange and a list is published every four months. Over 5,000 copies of the list are distributed across Australia through the Chamber of Manufacturers of New South Wales and by the Waste Authority's inspectors in their contact with industry. Interest in the exchange has been sustained and a number of companies have been formed during the period to recycle waste materials. It is estimated that a saving of over \$150,000 per year is being made by companies who have established ongoing transactions through the exchange. Further substantial savings are being made through one-off exchanges. Liaison is maintained with exchanges in other States. As an example liaison with Western Australia resulted in a user being found for 1.5 tonnes of zinc bromide.

97. While a number of companies engage in off-site recycling of wastes the profitability of waste exchanges as business enterprises appears somewhat doubtful. Several exchanges in the United Kingdom closed down after government support was withdrawn.

98. Waste exchanges assist in reducing the volume of wastes requiring final disposal to landfill, incineration or the like, and therefore reduce the load on disposal facilities, on the environment and reduce the cost of disposal. Regulatory authorities appear to be the most appropriate agents to operate exchanges as they are in the best position to know the particular wastes being disposed of and the possibilities for exchange and re-use.

99. The Victorian Draft Strategy has recommended that 'Materials which can be reprocessed economically should not be landfilled or incinerated, unless required as a source of energy for incineration'.¹³

100. The Committee recommends that:

the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure—

- **regulatory authorities keep abreast of recovery and recycling developments and, in their monitoring of the waste stream, advise industry on available techniques;**
- **hazardous wastes which can be reprocessed economically are not landfilled, immobilised or incinerated unless required as a source of energy for incineration;**
- **regulatory authorities encourage the re-use of hazardous wastes wherever possible through the operation of waste exchanges; and**
- **the production and distribution, with financial support from the Commonwealth, of a national waste exchange bulletin containing information supplied by each State and Territory.**

Storage of intractable wastes

101. A large volume of hazardous waste is stored at present, usually in steel drums on industrial sites, awaiting the development of satisfactory disposal methods. Stored material is that which is too toxic to dispose of under licence into air, water, or landfill sites. Stored waste is held mainly by a few major industries with lesser quantities held by a number of smaller companies and research institutions. There is a high probability that some material which should be stored is being improperly disposed of or illegally dumped.

102. Electricity commissions throughout Australia have PCBs stored for disposal. The use of PCBs in new products has been substantially reduced, but as older units go out of service the components must be drained and washed. The waste is then stored awaiting high-temperature incineration.

103. There appears to have been a degree of unnecessary build-up and storage of toxic wastes. Some of the chemicals being stored, although dangerous, cannot be regarded as intractable as adequate disposal methods are already available. Wastes for which there is an acceptable disposal method should not be stockpiled unnecessarily.

104. Waste has now been stockpiled for a number of years and is likely to require storage for several years more. Most drums are stored in the open and many contain corrosive material. It is increasingly likely that some of these drums are corroding and will leak. Concern is growing over stockpiled waste and the Victorian Environment Protection Authority has recommended that its legislation be amended to provide for the registration of hazardous waste storage areas. The Authority believes its records cover more than 80 percent of the waste stored and liaises regularly with companies storing the waste. In New South Wales an inventory is maintained of intractable wastes. Conditions for storage are specified and enforced through general pollution control powers and all storage facilities are inspected at least once a year. The Australian Chemical Industry Council believes that hazardous waste stocks should be declared and storage be supervised by the relevant State authority.

105. After suitable disposal facilities are established some stockpiling of waste will continue to be necessary although on a greatly reduced scale. Wastes may require storage until a sufficient volume is reached for economic transport or treatment. There may be a temptation for some generators to continue storage, after adequate disposal facilities become available, to delay or avoid disposal costs. The United States requirement that the date of commencement of storage be marked on the container is desirable. Regulation of hazardous waste storage is most urgently required now but there will be an ongoing necessity for the regulation of storage.

106. The Committee recommends that:

the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure—

- **uniform standards for hazardous waste storage areas are drawn up and implemented as a matter of urgency;**
- **storage sites are established by regulatory authorities and those generators lacking adequate storage facilities be required to store their hazardous wastes at them;**
- **hazardous waste storage areas are licensed and subject to regular inspection;**
- **and**
- **public access is given to up-to-date records of the types, quantities and location of stored hazardous wastes.**

Immobilisation of intractable wastes

107. One approach to the disposal of intractable wastes is immobilisation of the waste so as to physically and/or chemically isolate the hazard from its surroundings. Chemical treatment may convert soluble hazardous waste into insoluble waste (although care must be taken that it is not disposed of with other waste which might reverse the process). Chemical treatment may be used to produce a less toxic or non-toxic waste.

108. Chemical fixation is a physico-chemical process in which the waste is incorporated into an inert matrix to limit or prevent its migration into the environment. Should the waste block be fractured the waste remains bound to the matrix and leaching is prevented. The Australian Environment Council and the Victorian and New South Wales Governments have instituted research into the fixation of arsenic and mercury bearing wastes. Chemical fixation and encapsulation are not yet used to any great extent in Australia.

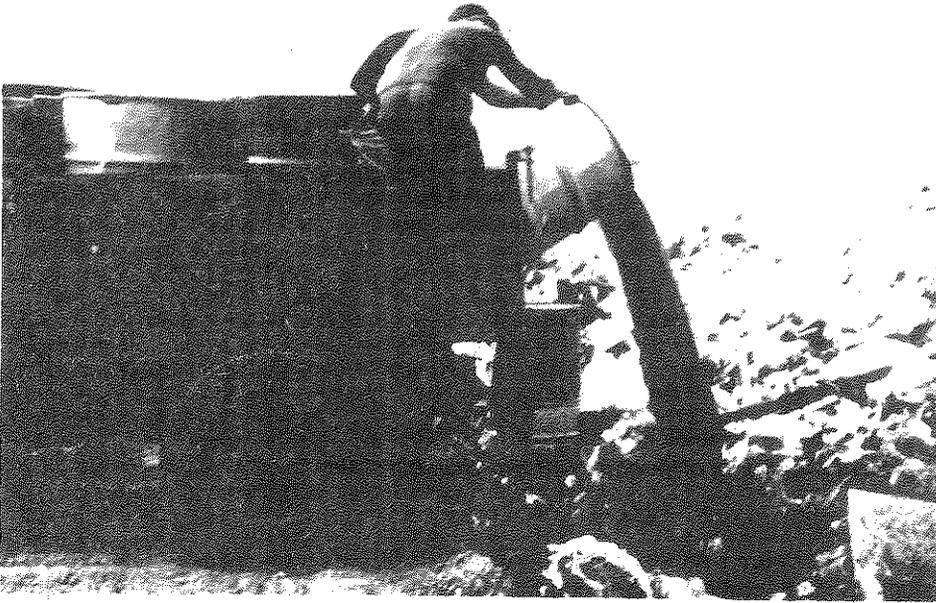
109. Encapsulation involves sealing the waste within a stable, inert material to prevent contact with the environment and prevent migration. Should the encapsulating jacket be broken the waste would be capable of leaching away. Encapsulation is more suited to those wastes which pose a handling hazard but are relatively inert once buried e.g. asbestos.

110. The introduction of these processes would appear to offer the possibility of safe disposal of presently intractable wastes at a much lower cost than other chemical treatment or incineration. It might also be possible for immobilised hazardous wastes to be disposed of on municipal landfill sites. Most of these processes have been operating on a commercial scale for a relatively short time and some care should be taken in assessing their long-term effectiveness. The Committee believes that until the long-term effectiveness of each process is established immobilised waste should be deposited in landfill where its presence can be recorded, groundwater monitored and the waste retrieved in the case of failure.

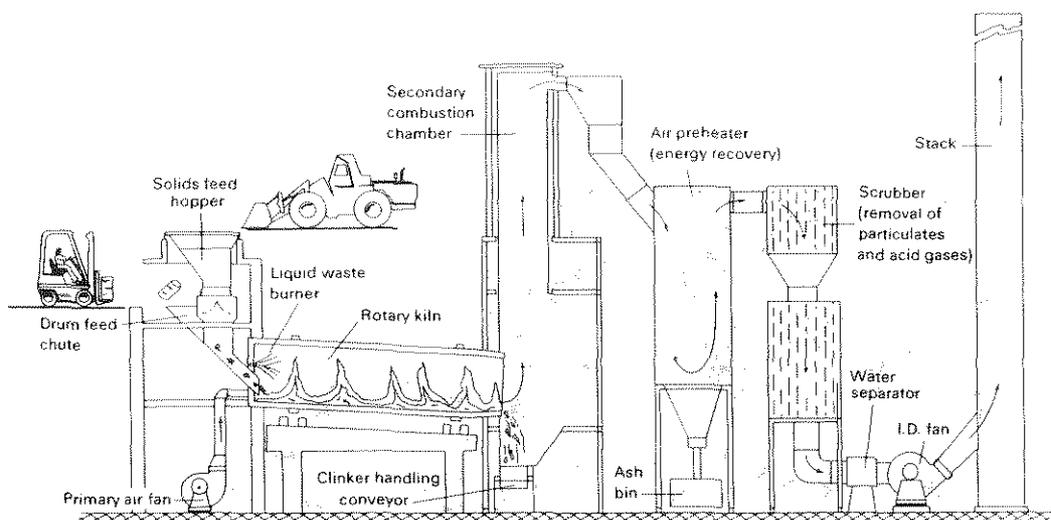
Incineration

111. Incineration in special high-temperature incinerators is the only environmentally acceptable means of disposing of some wastes such as chlorinated hydrocarbons, polychlorinated biphenyls (PCBs) and dioxin (TCDD). These chemicals are persistent and non-biodegradable. Incineration effectively destroys organic wastes and the energy in solvent and fuel waste can be exploited in the process. In Victoria a paint company and a drum reconditioning company have installed fluidised-bed incinerators to dispose of hazardous wastes. These do not operate at a sufficiently high-temperature to dispose of chlorinated hydrocarbons and are not licensed to do so. Such high-temperature incinerators for waste disposal are yet to be built in Australia. A high-temperature incinerator is operated by a private company in Western Australia but it does not have the scrubbing equipment necessary for rendering emission gases safe. Operation of such a facility without proper pollution control devices could be placing the community at risk. The Committee is of the opinion that intractable waste must only be disposed of in those high-temperature incinerators which utilise the best practicable pollution control technology.

112. New South Wales and Victoria are the major producers of wastes which require high-temperature incineration, with New South Wales being the biggest single producer. Having regard to the industries involved the total of such wastes generated by the rest of Australia is likely to be considerably less than that generated by either of these two States.



Chemical waste disposal facilities in Australia are generally inadequate or non-existent



A typical rotary kiln incinerator with gas cleaning plant

113. Waste volume is reduced by approximately 90 percent in incineration with the residual ash and scrubber sludge requiring disposal. Careful design and control is required in incinerator operations to avoid air pollution. The hazards to the environment of incinerated residues from a fully equipped incinerator would be very much less than that of the original waste.

114. The large capital and operating costs of high-temperature incinerators will require a high charge to users. This would be exacerbated by intermittent or low load operation. The Victorian Draft Strategy expresses grave doubts as to the commercial viability of a high-temperature incinerator in Victoria due to:

- a reduction in the rate of waste generation;
- no guarantee, as lower-cost alternative disposal methods become available, that intractable wastes identified will be handled by the facility; and
- the disposal fees necessary to cover costs would be considerably higher than disposal charges for non-intractable waste and would tend to accelerate the reduction of intractable waste generation.¹⁴

115. The Feasibility Study for an incinerator in Victoria recommended that, on purely economic considerations, before building its own incinerator:

Victoria should seek other disposal options for intractable wastes rather than establishing a specialised incineration facility in Melbourne. The options could include:

- (a) development of secured and an adequately monitored landfill site.
- (b) explore possible involvement in the proposed M.W.D.A. incinerator facility in Sydney.¹⁵

116. The Study also concluded that 'the economics of the operation would not be significantly improved by the co-combustion of selected solid and liquid non-intractable wastes, as the disposal fees . . . would have to be competitive with existing disposal outlets and would not cover the cost of the operation'.¹⁶ Increased recycling of oils and solvents has reduced the cost of their disposal.

117. While the Victorian prediction of a significant reduction in the rate of intractable waste generation is supported by other evidence, there may be further sources of wastes requiring incineration. New chemicals and wastes may be introduced which require incineration and some existing wastes may be found to require incineration in preference to their present method of disposal. The Victorian Study in early 1981 pointed to future developments such as coal liquefaction and the large petrochemical complex to be built at Point Wilson as likely generators of wastes requiring incineration. Since then the Point Wilson project has been suspended indefinitely. These incidents show how uncertain the economics of high-temperature incinerators are for the future.

118. The Queensland Government has told the Committee:

From discussions to date, through the Standing Committee of the Australian Environment Council, it is becoming evident that a particular waste disposal problem of national significance, such as the very serious problem of the disposal of intractable toxic liquid wastes such as Polychlorinated Biphenyls (PCBs), possibly could be handled by the Federal Government. In this regard it is felt that a single, suitably located Commonwealth owned incinerator, with provision for transportation of wastes to the site, would be of tremendous benefit to Australia as a whole.¹⁷

119. The New South Wales Government is well advanced with a proposal for a high-temperature incinerator to be built and operated in conjunction with a liquid waste treatment plant. It is understood that a detailed proposal has gone to State Cabinet. There is some doubt as to whether the incinerator when operating will accept waste from outside the State.

120. The Committee concludes that on present indications the construction of only one incinerator can be justified on economic grounds. It may be that at some future time clearer industry trends could justify the construction of a second incinerator. In the meantime it is essential that all States and Territories have access to a high-temperature incinerator.

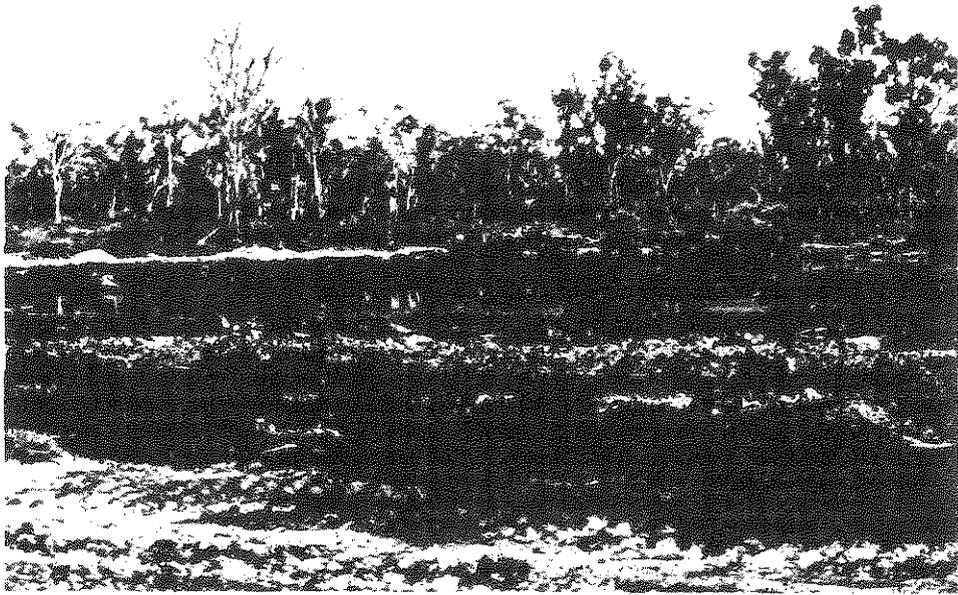
121. Reluctance to treat waste from another state is not new. A United States Environmental Protection Agency booklet published in 1980, states:

Another issue involves the interstate movement of hazardous waste. Some States believe that the U.S. Constitution allows them to ban the disposal of waste originating in other States. This approach runs counter to the concept of large regional hazardous waste facilities, which, by drawing wastes from several States, could operate at lower costs than smaller facilities. . . . The issue of importing waste is politically and emotionally charged and may take years to fully resolve. However, in 1978 the U.S. Supreme Court ruled that certain types of State waste import bans are a restraint on interstate commerce and, therefore, unconstitutional.¹⁸

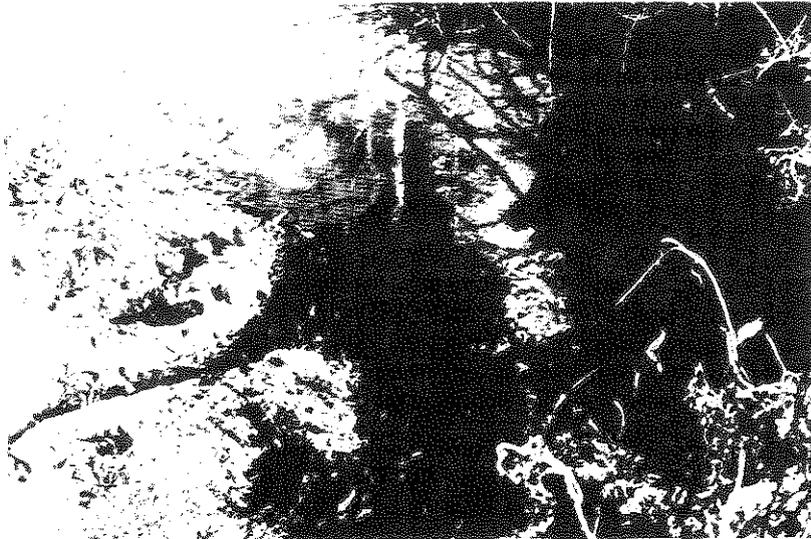
122. There is some concern that increased transport distances for hazardous waste which would be required by one incinerator will increase the risk of accidents. The volume of wastes involved is quite small in comparison with the total volume of hazardous materials transported. While adequate transport regulations should minimise any increased risk, particular care will need to be taken with the transport of these wastes.

123. The Committee agrees with the sentiments expressed by the Queensland Government and notes the recommendation of the Victorian Draft Strategy. Because there should be a national approach to what is a national problem, the Committee recommends that:

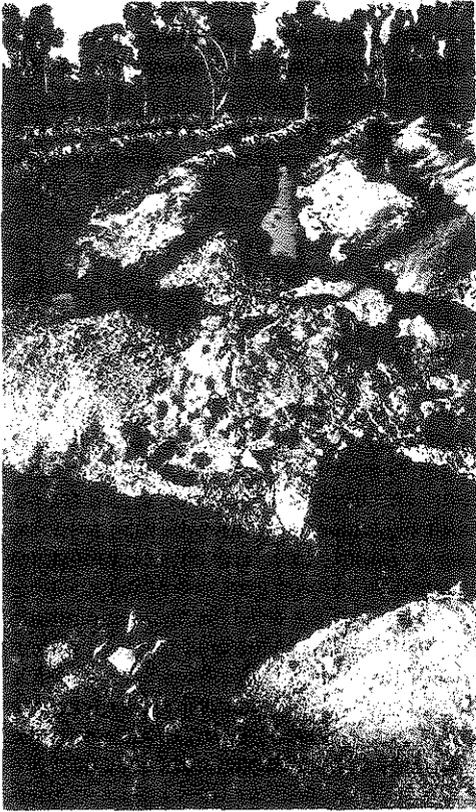
- the Commonwealth urgently seek the views of the States and the Northern Territory on the question of a single national incinerator, and, if appropriate;



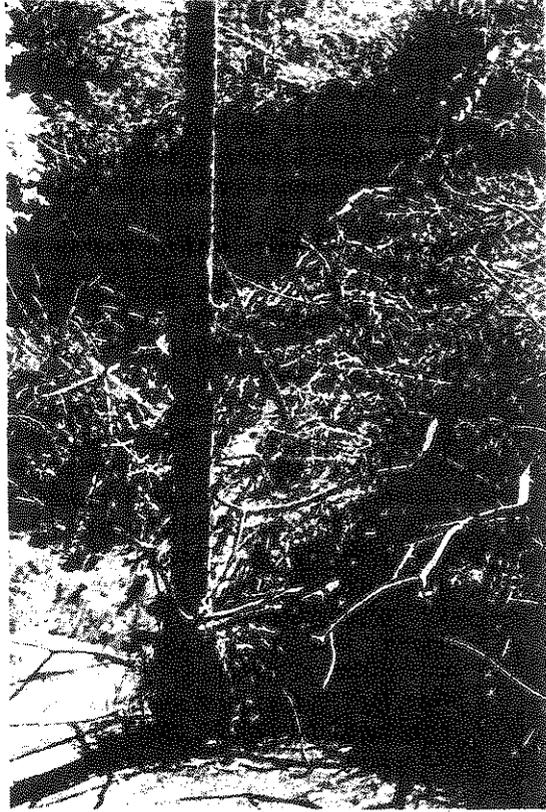
Willawong—pond containing rainwater run-off and overflow from trenches



Willawong—oily black leachate running into a creek alongside the landfill site. (View from the top of the creek bank)



Willawong—trenches filled nearly to the brim with liquid waste. No absorbent solids are being used



Willawong—white leachate oozing from the creek bank into a creek alongside the landfill site

- the Commonwealth approach the New South Wales Government with a view to allowing national access to the Sydney incinerator either through cooperative funding of its construction or through a grant under section 96 of the Constitution.

In the event of the Commonwealth being involved in the construction of a high-temperature incinerator then there should be a public inquiry into the proposal under the *Environment Protection (Impact of Proposals) Act 1974*.

Secure landfill of intractable wastes

124. A number of solid hazardous wastes are not regarded as suitable for disposal to normal chemical landfill facilities. These wastes require the higher degree of safety afforded by secure landfill. Although it is technically possible to design and construct a land disposal system consisting of an impermeable liner and cover, and a leachate collection system, there is some doubt as to whether such systems can operate effectively and efficiently over the long periods of time necessary. Natural materials such as very low-permeability clay soils that might be used for liners and covers are not completely impermeable. Man-made impermeable materials are subject to eventual deterioration. They are subject to physical rupture during both placement and operation and welded joints in the membrane are liable to imperfection or failure. Leachate collection systems are less than 100 percent effective when newly constructed and may lose efficiency over time by plugging or deterioration. To remain effective they must be maintained and operated, and the leachate collected must be treated as a hazardous waste. Natural water, from precipitation and other sources will inevitably infiltrate a site unless a water-tight containment system is constructed and perpetually maintained. If leachate is produced indefinitely, then the leachate collection and management system must be maintained and operated indefinitely. There must be considerable doubt whether private owners and operators of land disposal facilities can guarantee the long-term operation of such systems particularly after a site is closed.

125. Migration of volatile constituents of hazardous wastes from land disposal sites into the atmosphere is also possible in many cases (e.g. the migration of volatile carcinogenic components into the basements of homes in the Love Canal area of the U.S.A., Lekkerkerk near Rotterdam in the Netherlands and several homes in Hunters Hill in Sydney). Treatment and disposal procedures need to take account of volatile constituents.

Cost of disposal

126. There is a cost to the community for the disposal of a hazardous waste no matter who disposes of it or how. To minimise the costs to the community as a whole and to ensure an equitable allocation of disposal costs the Committee believes the generator of a hazardous waste must be responsible for the cost of proper disposal. The Australian Environment Council has endorsed the 'polluter pays' principle for hazardous waste disposal.

127. To effectively enforce regulations and standards for waste operators, penalties for non-compliance have to be substantial. The House of Lords Committee Report on Hazardous Waste Disposal noted that penalties for illegal dumping had to be 'high enough to act as a real disincentive' and not of the same order as the commercial charge for disposal.¹⁹

128. Penalties in other countries for breaches of hazardous waste regulations vary considerably, with part of the differences being attributable to the varying definitions of

offences. Penalties range from £1,000 and up to two years imprisonment for offences in the United Kingdom to US\$25,000 a day in the United States for continued non-compliance following a formal notification. For some offences in the United States fines of up to US\$1,000,000 for corporations and US\$250,000 for individuals can be incurred. For example, penalties of up to US\$50,000 a day or two years imprisonment can be imposed for knowingly endangering the health of a person by not identifying the true nature of a hazardous waste. The Committee believes penalties for breaches must be substantial to be effective.

129. Overseas experience has shown that the cost of accidents is an important aspect of cost allocation when the operator involved is unable to afford the cost of clean-up and compensation for damage. To avoid the community having to pay these costs all operators involved in the handling of hazardous wastes should carry adequate indemnity insurance against accidental damage caused by wastes.

130. There have been instances in Australia and overseas of abandoned waste sites which have had to be cleaned up, of operators who could not pay the costs of cleaning up and of operators who deny responsibility for, or who refuse to clean up a waste site, requiring lengthy legal proceedings before cleaning up can begin. In many of these cases the community has been left with paying the considerable cost. The Rum Jungle mines clean-up will cost more than \$12m. The Committee believes that some mechanism to ensure that industry contributes to these clean-ups is essential.

131. In the United States the 'superfund' has raised money from industry through a tax on raw materials in the chemical industry. This assumes a close connection between chemical manufacture and hazardous waste disposal, which may have been the case in the United States. Such a fund would not appear to cover waste generators such as mining companies. The Committee believes a fund should be established through the licensing system using levies on operators in a similar way to the levy on ships carrying bulk oil under the National Plan to Combat Pollution of the Sea by Oil. In devising such a levy, consideration would need to be given to the quantities of waste generated, stored, carried or disposed of by an operator and the risk of each type of operation being involved in a clean-up situation. Some government contribution to the fund would be necessary.

132. The legislative and administrative machinery should allow the regulatory authorities to step in, after a minimum notification period has elapsed, and rectify a hazardous situation where an operator refuses or is reluctant to act. Costs incurred by the fund in clean-ups should be recovered from those responsible wherever this is possible and the fund reimbursed.

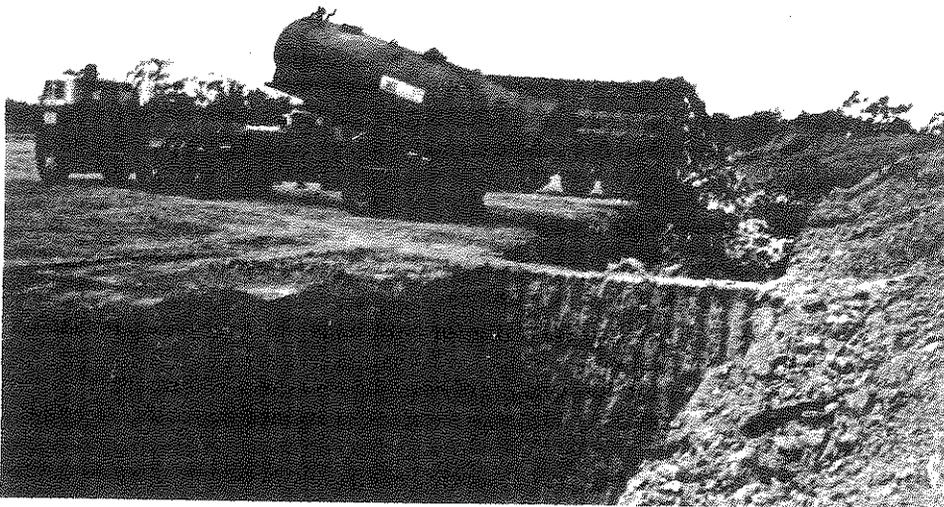
133. The Committee recommends that:

The Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure—

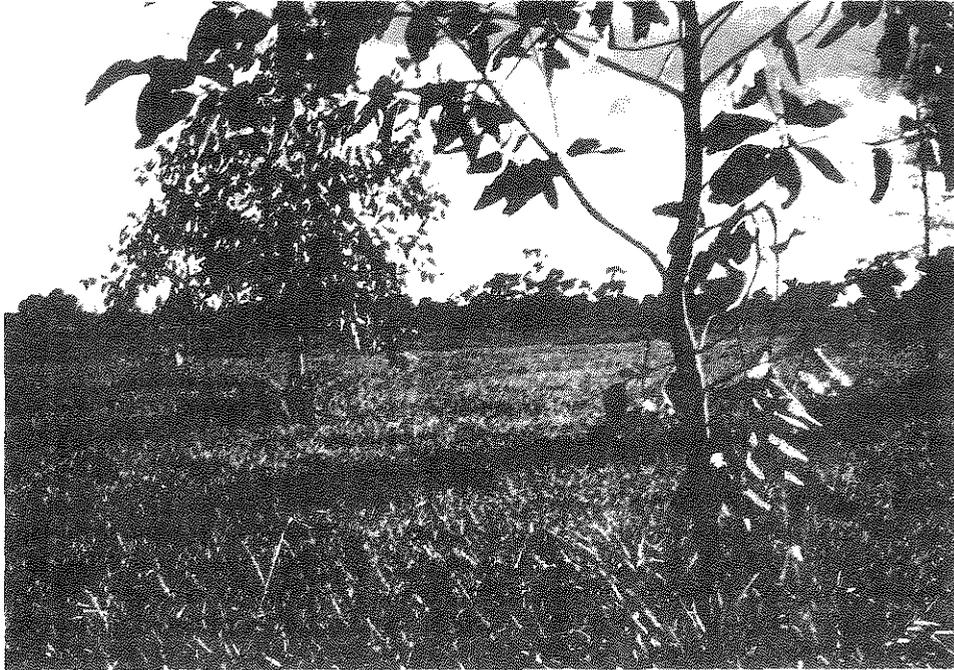
- the development of national standards for hazardous waste recycling, immobilisation and disposal facilities;
- all operators involved in the handling of hazardous wastes are licensed;
- regulatory authorities have adequate numbers of trained inspectors to enforce standards;
- licensed operations be regularly inspected and public access be given to the results of monitoring tests;
- penalties for non-observance of waste standards and regulations be substantial, including the cancellation of a licence where appropriate;



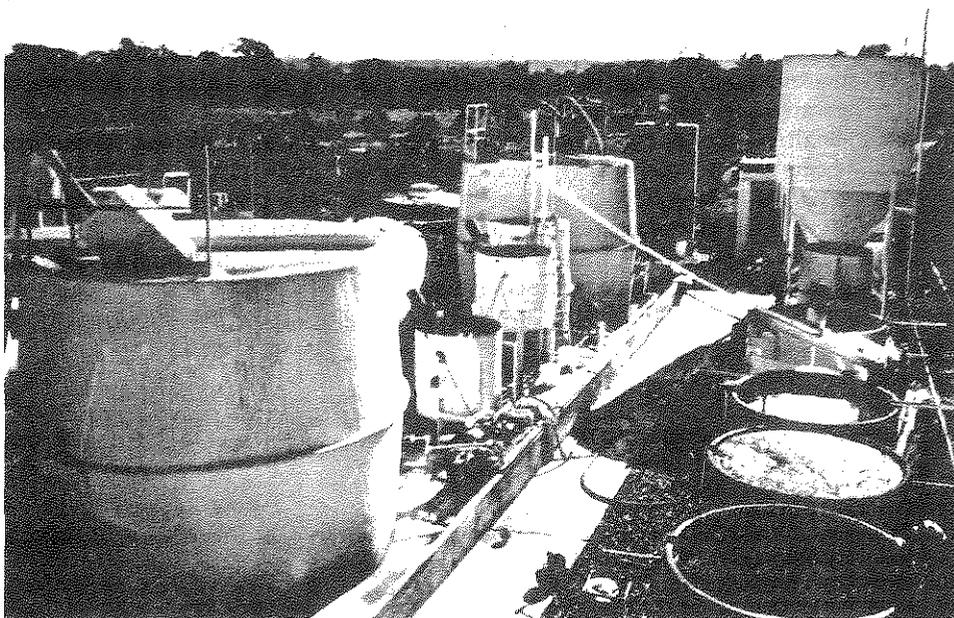
Castlereagh—cell excavation and protective bund wall which encompasses the site



Castlereagh—depositing of dry waste in cell with liquid waste being poured over previously deposited dry waste



Castlereagh—restoration of disposal area



Castlereagh—pilot plant for liquid waste disposal

- licensing provisions for operators handling hazardous chemicals include the operator having adequate indemnity insurance against accidental damage caused by wastes; and
- a fund be established to finance hazardous waste clean up operations where an operator fails to perform the work within reasonable time. The fund to be financed substantially by levies raised through a licensing system. Costs incurred by the fund in cleaning up should be recovered wherever possible and the fund reimbursed.

Conclusion

134. Not every State generates sufficient toxic waste to justify the establishment of a complete range of facilities in each State. Yet each State does generate some intractable waste, and storage cannot be seen as other than a short-term solution. A coordinated national approach to waste disposal through the Australian Environment Council is required to: avoid duplication of research and standards development; to establish consistent standards for safe disposal throughout Australia, and to ensure the viability of special disposal facilities for intractable wastes.

135. Transport of some wastes across State borders for disposal must be seen not only as a possibility but as a necessity. Uniform regulations for the transport of hazardous wastes are required across Australia to facilitate the safe transport of wastes to interstate facilities. Docket systems for the control of waste transport will need to cover interstate transport where this is necessary.

136. While the right types of facilities to handle the various wastes produced are important, the single most important element to ensure the safe disposal of hazardous waste is a management strategy. The following general principles should be built into any hazardous waste management strategy:

- (a) the development of standards, enforced through legislation, for all operators involved in the handling of hazardous wastes;
- (b) all operators involved in the handling of hazardous wastes be licensed;
- (c) environmental authorities be responsible for inspection of all hazardous waste operations to ensure standards are observed;
- (d) penalties for non-observance of waste standards and regulations be substantial;
- (e) all operators handling hazardous wastes devise contingency plans for effective action in the case of accident or equipment breakdown; and
- (f) all operators handling hazardous wastes carry adequate indemnity insurance against accidental damage caused by wastes.

12. Environment Protection Authority, *Disposal of Intractable Wastes in Victoria—a draft strategy*, East Melbourne, January 1981, pp. A-7. A-8.

13. Victorian Draft Strategy, p. 33.

14. Victorian Draft Strategy, p. 25.

15. Environment Protection Authority, *Incineration Facilities for Industrial Liquid Waste Disposal—a feasibility study*, East Melbourne, January 1981, p. 3.

16. *Incinerator Feasibility Study*, p. 2.

17. Letter from Premier, dated 11 January 1982.

18. *Everybody's Problem: Hazardous Waste*, United States Environmental Protection Agency, SW-826, Washington, 1980, p. 30.

19. House of Lords Report, paragraph 173.

Community Awareness and Land-use Planning

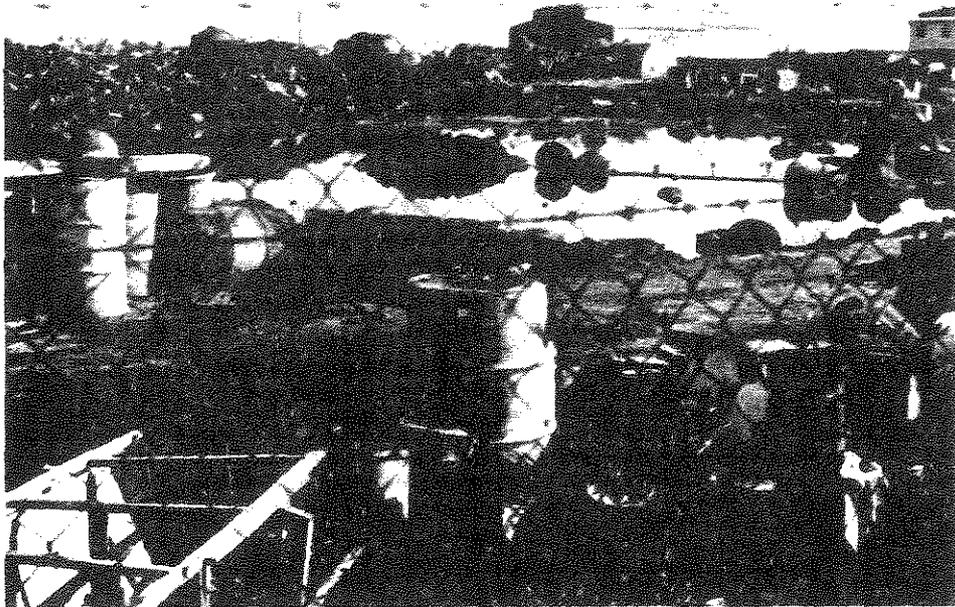
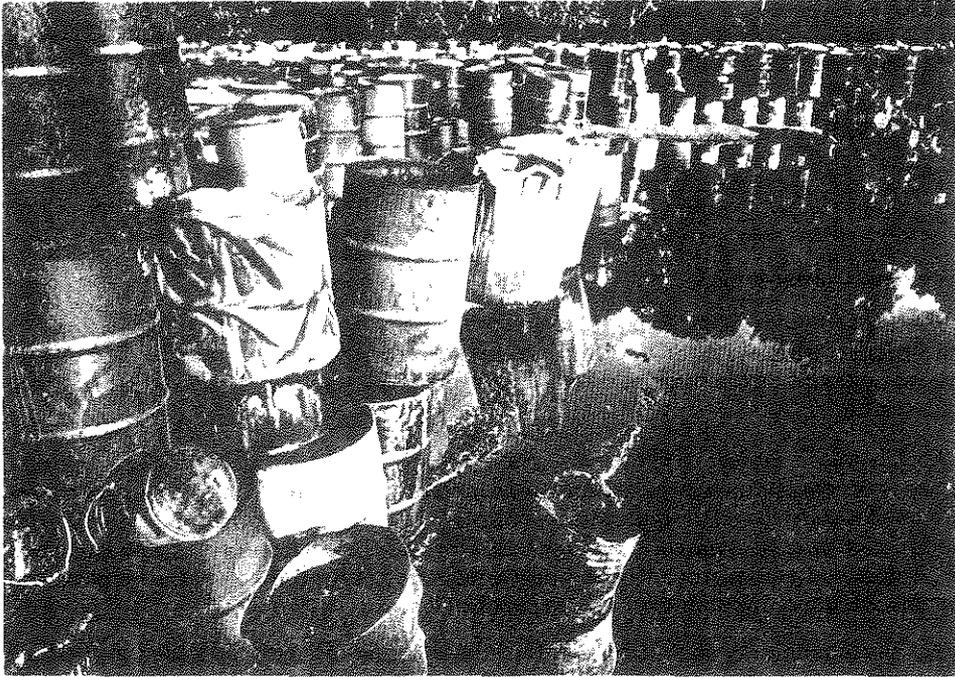
Community awareness

137. There would appear to be a greater community awareness of the dangers posed by hazardous wastes than there is of the hazards posed by chemicals generally. This awareness is no doubt due in large part to the publicity given to waste disposal disasters such as Love Canal.

138. Chemicals new or used are very much a part of modern life. Our high standard of living is dependent on a large number of chemicals. A small portion of chemical wastes are quite hazardous and require strict control. A larger number pose moderate hazards and require care in disposal if damage to health and the environment is to be avoided. Well designed equipment incorporating safety devices and fail-safe mechanisms can minimise the risk of public exposure to chemical hazards.

139. The community should be aware of the potential dangers that exist and ensure that safety precautions are observed in dealing with such wastes. Community concern for the safe handling of hazardous waste is proper and necessary. Community awareness is a two edged sword however and concern may reach a level where there is opposition to waste facilities regardless of their safety. Hazardous wastes already exist and

The products we use . . .	The potentially hazardous waste they generate . . .
Plastics	→ Organic chlorine compounds
Pesticides	→ Organic chlorine compounds, organic phosphate compounds
Medicines	→ Organic solvents and residues, heavy metals (mercury and zinc, for example)
Paints	→ Heavy metals, pigments, solvents, organic residues
Oil, petrol and other petroleum products	→ Oil, phenols and other organic compounds, heavy metals, ammonia salts, acids, caustics
Metals	→ Heavy metals, fluorides, cyanides, acid and alkaline cleaners, solvents, pigments, abrasives, plating salts, oils, phenols
Leather	→ Heavy metals, organic solvents
Textiles	→ Heavy metals, dyes, organic chlorine compounds, solvents



A United States Congress Report described toxic wastes carelessly stored or disposed of as 'ticking time bombs'

are being generated and stored at many places throughout the community. The hazards posed by these wastes need to be minimised by the provision of controls and the necessary disposal facilities.

140. The recent House of Lords Waste Disposal Report concluded that 'Public hostility to hazardous waste disposal facilities is common and is too important to be ignored'.²⁰ The Australian Environment Council, in its 1979 strategy outline stated: 'In view of the public concern expressed over waste disposal facilities, the development of a national strategy would be a positive step by government and would also assist industry'.

141. The Australian Chemical Industry Council believes that governments should be responsible for the operation of hazardous waste facilities, whether by private contractor or by a government instrumentality. It believes such facilities should be seen by the community to be fully under government control. For this to have the effect the Council intends, governments have to demonstrate their ability to have adequate facilities provided for safe disposal and devise and enforce safe procedures in association with those facilities.

142. People may remember past unsatisfactory arrangements with which governments may have been in some way associated. The House of Lords Committee Report observed 'Fears about hazardous waste disposal are obviously increased by, if not based on, past mistakes'.²¹

143. Waste disposal techniques have evolved considerably in the last decade. Currently available disposal techniques, while still capable of being improved, are now at a level that, if implemented properly, ensure a high degree of safety in intractable and other hazardous waste disposal. These facilities and procedures will offer a much higher degree of safety to public health and the environment than those currently in use.

144. The Committee believes that there is a strong case for a public education campaign linked with a firm national strategy for waste disposal so that the community can be informed on the necessity of facilities and of the safety of modern disposal procedures and facilities. The Canadian Government produced an information booklet last year describing the procedures available for waste disposal and seeking public cooperation. The community needs to be assured as to the safety of waste disposal facilities. Sound waste management strategies must ensure not only that assurances on safety can be given but that they are effectively made to the community as an integral part of the management strategy.

145. Nearly everyone agrees that proper waste disposal facilities are necessary but like prisons or airports, few want one near them. The location of facilities has become a highly emotional issue. While waste disposal site proposals should be subject to environmental impact statements and public examination, governments will invariably be faced with making decisions on location which are unpopular with a substantial number of residents in the vicinity of the proposed site. There would appear to be no way to eliminate such opposition altogether, but the greater the demonstrated safety of the proposal and the more informed the community is on disposal procedures, the less widespread opposition is likely to be to well-designed facilities.

Land-use planning

146. The Committee is aware that facilities handling hazardous chemicals are sometimes located far too close to residential areas. For example, the hazardous liquid waste disposal site at Tullamarine, like the nearby airport, was established some time ago in what was then an isolated location. Since then, housing and other industrial facilities have been built increasingly closer to the waste facility leading to some complaints from residents. The problem of later developments encroaching on hazardous chemical facilities is not confined to the Tullamarine facility nor to waste disposal facilities. The Committee believes that there is a clear need for a better zoning scheme whereby facilities in which hazardous chemicals are handled, particularly on a large scale, have a buffer zone around them, within which residential and similar developments are restricted. This should operate both ways in preventing housing encroaching on chemical facilities and in preventing hazardous chemical facilities being established too close to existing housing, schools and similar public facilities. The Committee intends to deal further with this matter in its final report.

147. Many of the disasters associated with hazardous waste disposal sites have occurred where sites have subsequently been used for other purposes and the previous use of the site is either unknown or ignored. The House of Lords Committee recommended that 'the title deeds of any land on which hazardous waste has been deposited should be endorsed with a general statement to that effect so that no successor in title can acquire the land without knowledge of the possible risks and liabilities involved'.²² The Committee believes such a measure is worthy of further consideration in the Australian context.

148. In evidence and during inspections the Committee was often told that the future use of individual waste disposal sites, while not decided on, would probably be for playing fields or recreation areas. This seems a common practice for closed municipal waste sites after a settlement period and is said to be quite safe. The Committee is concerned about the safety of closed hazardous waste landfill sites being used for such purposes. Evidence was given that playing fields often became inundated through irrigation and/or rainfall, and some upward movement of leachate could be expected. In addition care would be required in digging trenches for facilities and other earthworks associated with playing fields.

149. The Committee recommends that:

the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure the development of standards for the safety of waste disposal sites after closure, including appropriate future uses.

150. It would appear little is being done to locate old dump sites. One reason might be the likely cost to governments in cleaning up these old sites. Regulatory authorities seem to prefer to wait for adverse effects to become obvious rather than locate old sites, assess their hazard and, where necessary, recover or contain wastes before their effects are widespread. A recent United States Congressional survey showed that most of this past disposal occurred within living memory of people such as company employees or local government personnel and that their recollections might be used in locating old sites or determining the kinds of wastes disposed of. The Committee concludes that programs are required to identify sites of past hazardous waste disposal so that they might be assessed and any remedial action taken. Sites of old gasworks, for example, should be comparatively easy to locate.

151. *The Committee recommends that:*

the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure programs are developed to identify sites of past hazardous waste disposal so that they can be assessed and any necessary remedial action taken.

20. House of Lords Report, paragraph 185.1.

21. House of Lords Report, paragraph 119.

22. House of Lords Report, paragraph 145.

Avalon Waste Disposal Facility

152. The Victorian Environment Protection Authority last year released a Draft Strategy for the Disposal of Intractable Wastes together with a feasibility study of Incineration Facilities for Industrial Liquid Waste Disposal. On 3 March 1981 the Member for Corio, Mr G. G. D. Scholes, M.P., presented a petition to the House of Representatives expressing concern at a proposal in the EPA Draft Strategy that a facility for the disposal of intractable chemical wastes be established on a site at Avalon adjacent to the Government Aircraft Factory. Following the presentation of the petition, the then Acting Minister for Home Affairs and Environment asked the Committee to look at this matter.

Location

153. The proposed site at Avalon is located only 1.5 kilometres from Corio Bay. It is comparatively isolated from residential development but is less than one kilometre from the Government Aircraft Factory facility at Avalon where 550 people are employed. The Department of Industry and Commerce, which operates the Government Aircraft Factory, has advised that the number of personnel at the Avalon workshops is likely to increase to around 750 in the near future. The area designated for possible future expansion of the workshops on the Government Aircraft Factory master plan is between the present hangars and the proposed waste disposal site. This would decrease the projected limited buffer zone between the two facilities.

154. A large proportion of the proposed disposal site is subject to inundation during heavy rain. The portion of the site on which the disposal facility is to be constructed is slightly elevated and is claimed to be above flood levels. Aquifers are approximately 2 metres below the surface at the end of summer but could be assumed to be considerably higher during wet seasons. The EPA claims that ground water in the area is of poor quality and therefore little used. The flow pattern for ground and surface water is towards Corio Bay. The Committee does not believe that low groundwater quality is a justification for further degradation of either the aquifer or Corio Bay.

155. The Committee believes the Avalon site is geologically poor for hazardous chemical operations and as such poses unnecessary environmental risks. These risks could be avoided by better siting. The site is therefore totally unsuitable for the establishment of a hazardous waste disposal facility. In describing the application of its site selection criteria the Landfill Sub-committee said 'The geological uniformity of this region makes the geotechnical criteria relatively unimportant, leaving the final selection to be made on social and political grounds'.²³ The Committee believes that geotechnical considerations, such as maximising natural safeguards against waste migration, should be an important part of site selection. The Committee is not convinced that more geologically and geographically suitable sites could not be found for the facility. Additional containment systems and other safeguards will be necessary for safe handling and disposal of any hazardous chemicals on the site. The Study notes that \$65,000 of the \$150,000 estimated secure landfill cost would be to bring impermeable clay onto the site.

156. There are three separate proposals for the site at Avalon. These are (i) a secure landfill site, (ii) a hazardous waste storage area, and (iii) the possibility of a high-temperature incinerator.

Secure landfill

157. The design of the above ground landfill facility is consistent with current international thinking on the design of such facilities. It is far in advance of any existing public landfill facility in Australia in that it is specially designed to take the more intractable wastes. The criteria for wastes to be deposited at the site are:

- the waste must be solid or semi-solid;
- no liquid or gas must be spontaneously formed during storage upon compaction;
- the waste must be chemically unreactive under expected storage conditions;
- chemically fixed or encapsulated wastes must have a low migration rate, resistance to leachate, and be physically robust; and
- waste must have a high flashpoint and/or low combustibility.²⁴

158. Waste categories which would be excluded from the landfill are:

- all liquids;
- readily combustible organic wastes;
- radioactive wastes;
- wastes which can be chemically destroyed (e.g. cyanides) or easily immobilised;
- wastes which are acceptable to other sites; and
- highly reactive, corrosive or explosive wastes.²⁵

159. The design features of the landfill are:

- the facility is constructed on an impermeable clay base;
- a synthetic membrane and underdrains to collect leachate are provided for the unlikely event of liquid being generated;
- only solid or semi-solid wastes are to be admitted, with wastes to be as insoluble as can reasonably be achieved;
- a heavy cover of soil over the waste prevents rainfall infiltration; and
- ground water monitoring detects any contamination of an underlying aquifer.²⁶

160. The Environment Protection Authority claims that despite being located on geologically unsuitable ground, the lack of liquid or gases from the waste, a drainage system, together with an impermeable base and top to the waste provides a 'belt and braces' approach with a high degree of safety. Provided the operator ensures wastes to be deposited at the site are of the low mobility specified and rainwater is excluded then there should be no leachate and little or no risk to health or the environment after material has been landfilled. Despite the assurances of the Environment Protection Authority the Committee considers that the poor geology of the site increases the environmental risk of mishaps which might occur off the impermeable pad, or if wastes are deposited which are not in accordance with the specifications in the previous paragraphs.

Storage

161. The Environment Protection Authority Draft Strategy recommends that a secure waste storage area should be included at the secure landfill site.²⁷ The Landfill Subcommittee in its final report states 'the facilities and infrastructure available on the recommended [landfill disposal] site make it a reasonable proposition to use it also for interim storage of some wastes The only modifications needed to the design

would be a larger storage pad, and perhaps re-drumming facilities'.²⁸ No special design details are provided for the storage facilities.

162. Liquid wastes for storage would breach several of the design and safety criteria of the secure landfill area, such as excluding liquids, thereby negating the 'belt and braces' safety approach. The Draft Strategy indicates that there will be no facilities for the treatment of leachate or spilled materials at the site.²⁹ A secure hazardous waste storage area is needed but the poor geology of the site means that there would be an intolerably high risk to ground water and Corio Bay. The Committee is strongly opposed to the construction of such a facility at the Avalon site.

Incinerator

163. The construction of an incinerator is conditional on the failure of Victoria to gain access to the proposed incinerator in New South Wales. If constructed the incinerator would be of the rocking-drum type. The incinerator and its storage facilities would be contained within a building built for the purpose. The safety provisions detailed in the proposal should minimise the possibility of escape of gases to the surrounding environment. Given the poor geology of the site, complete containment of liquids within the structure, including the delivery area, is necessary. This is in addition to the provision of the impermeable clay pad.

164. Although when operating properly the incinerator will safely dispose of highly toxic chemicals with little or no danger to health or the environment there are potential hazards from stack emissions and incinerator and scrubber residues. The recent House of Lords Select Committee report on Hazardous Waste Disposal stated 'chemical . . . incinerators are subjected to very aggressive operating conditions; design imperfections are therefore readily identified and long periods of commissioning are required'.³⁰ Care will be required both during commissioning and during normal operation of any incinerator to minimise the chance of pollution in the event of equipment malfunction. This is especially so in the case of the proposed incinerator as the rocking-drum type has not been built on this scale before. The proximity of the Government Aircraft Factory facilities would mean that the 500 to 750 employees there could be exposed to hazardous emissions in the event of equipment malfunction. This risk is not acceptable.

Conclusion

165. The Department of Industry and Commerce, which is responsible for the occupational health of its employees has been unable to gain substantial assurances from the EPA that the health of its employees at Avalon will not be adversely affected by the proposed waste facility. In the absence of such assurances and given the poor geology of the site the Committee strongly opposes the construction of the waste facility on the site proposed at Avalon. It is a pity that the much needed construction of such an advanced facility as the secure landfill, which should be located together with any storage and incinerator facility, is jeopardised by poor location.

23. Victorian Draft Strategy, p. A-12.

24. Victorian Draft Strategy, p. A-9.

25. Victorian Draft Strategy, p. A-10.

26. Victorian Draft Strategy, p. A-11.

27. Victorian Draft Strategy, p. 10.

28. Victorian Draft Strategy, p. A-13.

29. Victorian Draft Strategy, p. A-12.

30. House of Lords Report, paragraph 25.

Transport of Hazardous Wastes

Introduction

166. The proper management of the transport of hazardous wastes is an integral part of the proper management of waste disposal. While the general question of hazardous chemical transport will be dealt with in the final report, there are problems associated with the transport of hazardous wastes which are not common to the transport of other hazardous chemicals.

167. In the transport of new materials, the owners of the material, and consequently the transporters, have a clear interest in ensuring the material arrives at its destination in its entirety and uncontaminated. Depending on the nature and value of the material, modern well-equipped and often specially designed vehicles are used for its transport. Hazardous waste generally has a negative value with the owner having to pay for its disposal as well as for transport to the disposal site. While many waste carriers operate up-to-date, properly maintained vehicles there is a tendency for some operators to use older dilapidated vehicles and to skimp on their maintenance given the worthless nature of the loads involved.

168. Within the road transport industry, competition is very strong. It was put to the Committee that generators in an unregulated environment call for tenders for waste disposal cartage and accept the lowest tender. In such circumstances generators consider their responsibility for the waste ends with consignment to the carrier. With a highly competitive industry and an absence of safeguards in the management of hazardous wastes, illegal dumping is likely. Illegal dumping of loads by some carriers gives them an unfair economic advantage over carriers disposing of wastes properly and consequently encourages more carriers to break the law.

169. While generators justifiably seek to minimise the cost of waste disposal the Committee believes that generators should maintain some responsibility for a hazardous waste product until it reaches a proper disposal site. Carriers should bear certain responsibilities for the safe carriage and delivery of wastes but they should not, at the time the wastes are in their custody, have sole responsibility for their safe disposal. Carriers cannot be expected to have as full and detailed a knowledge of the nature of the waste as does the generator. For generators to end their responsibility by handing the waste over to a carrier and paying a fee, is to invite malpractice by both carriers and generators.

Regulatory mechanisms

170. While regulation should be kept to a minimum, certain basic safeguards are necessary to minimise malpractices. The Committee is aware that if the regulatory process is too onerous then operators will be encouraged to dump hazardous waste illegally. Not all wastes are acceptable at all disposal sites and site operators must have some means of ensuring the wastes they receive are correctly described. The Committee believes

wastes and their generators should be registered before disposal. A multiple docket system similar to the ones in use in New South Wales, Victoria and the United States offers a high degree of regulation with a minimum of cost to generators, carriers, disposal site operators and governments. The paperwork in such a system is little, if any, more than would be required in normal transport transactions. Any additional costs should be small and be more than justified in minimising the high costs to the community of the improper disposal of hazardous waste.

171. The Committee heard evidence of ways in which the docket system could be abused. Such abuses could be minimised by a well designed computer check system of the books issued and the dockets received by the regulatory agencies. The development of such a system would appear to be a project most economically undertaken at the national level by the National Advisory Committee on Chemicals of the Australian Environment Council.

172. The Committee recommends that:

the Minister for Home Affairs and Environment seek the adoption by the Australian Environment Council of measures to ensure the development of an effective multiple docket system for the regulation of the movement of hazardous wastes.

Such a system should be suitable for use by each regulatory authority with minimal operating costs to the authority, to generators, carriers and disposal site operators.

173. As some interstate transport of hazardous wastes is necessary docket systems will need to cover such transport. The legal opinion at Appendix VII indicates that Federal legislation may be necessary to control interstate waste transport.

174. Drivers of vehicles carrying hazardous wastes should be familiar with the hazards of the materials they carry and procedures for their safe handling, including the provisions of the code for the transport of dangerous goods. In Chapter 4 the Committee recommended that all operators, which would include carriers involved in the handling of hazardous wastes, be licensed. A licensing system would identify carriers, ensure compliance with a docket system and ensure safe handling procedures are known and observed. The recommendations for inspections and enforcement in paragraph 133 apply to all operators including those transporting wastes.

175. As mentioned in Chapter 3 the Committee heard evidence on several occasions of waste generators not disclosing the nature of hazardous waste to carriers or to disposal site operators and of the mixing of wastes by generators or, more usually, by carriers. To minimise the cost of safe disposal of a hazardous waste and to ensure the safety of drivers and disposal site personnel, disposal site operators must know the nature of the waste. This is assisted by not mixing different wastes. Information on the nature of the waste is best provided by the generator. Some generators refuse to disclose the nature of their waste as they consider the composition of the wastes confidential. They believe disclosure would reveal trade secrets and could be used to advantage by competitors. The Committee cannot accept this argument for non-disclosure. Public safety in transport and disposal requires that the nature of the waste be disclosed.

176. The Committee views with concern the practice of some carriers of mixing loads of hazardous wastes. Dangerous reactions may occur, the nature of the resultant mixture is not known, and consequently treatment is made more difficult and expensive. To enable treatment to be carried out effectively and at the least cost, different waste types should be segregated by generators and by carriers transporting them to disposal sites. Licensing systems should ensure that the mixing of different waste types is not permitted.

Dangerous goods transport code

177. The *Australian Code for the Transport of Dangerous Goods by Road and Rail* was agreed to by the Australian Transport Advisory Committee in July 1980. It was published in the form of a Commonwealth of Australia *Gazette* in December 1980 and is currently being adopted in legislation by the States and Territories. The Code was revised on 24 February 1982 as part of the regular updating process envisaged by the Code. So far the Code has been implemented in New South Wales and South Australia. It is believed that the other States are close to adopting the Code. The Committee welcomes this cooperative venture between Commonwealth, State and Territory Governments and the transport, chemical and petroleum industries to achieve a high standard of control over the transport of dangerous goods together with uniformity of legislative controls throughout Australia. The Committee will address itself further to the Code in its final report.

178. While the Code has an extensive index of dangerous goods, it does not cover the transport of hazardous waste. The hazardous nature of a transport load is determined by its effects on man and the environment rather than its commercial value or chemical purity. Emergency services need to know quickly the appropriate action to be taken at the scene of transport accidents involving hazardous wastes. If vehicles are placarded in accordance with the Code the Hazchem code number will give this information.

179. Hazardous wastes fall within the 9 classes of dangerous goods used by the Code. Because they tend not to be pure chemicals and their full chemical nature is unknown or variable it is appropriate that a number of general categories of hazardous wastes be provided. The United Kingdom transport regulations classification of hazardous materials includes sixteen categories of hazardous wastes and provides a Hazchem emergency action code for each. An extract from the U.K. regulations covering those sixteen categories is Appendix V.

180. The Committee concludes that the omission of hazardous wastes from the index and therefore from ready coverage by the Code is a serious one. Certain hazardous waste loads, like some other dangerous goods loads, should have their access to localities such as shopping centres and tunnels restricted. The Committee concludes that the standards for vehicles, containers, their marking and the transport procedures contained in the Code should be utilised to ensure the safe transport of hazardous waste.

181. The Committee recommends that:

- **If State Governments have failed to incorporate the Australian Code for the Transport of Dangerous Goods by Road and Rail into legislation by 1985 the Commonwealth should legislate to enforce the Code to the fullest extent of its power; and**
- **the Minister for Transport seek through the Australian Transport Advisory Council the development of categories of hazardous wastes for incorporation in the Index of Dangerous Goods within the Australian Code for the Transport of Dangerous Goods by Road and Rail.**

Inspection

182. The Committee heard evidence of difficulties in policing present legislation against improper dumping of hazardous wastes. One of the major difficulties is the number of separate State government instrumentalities involved and the limited coordination between them.

183. A typical outline of the departmental fragmentation is as follows. When waste is generated in the factory it is under the jurisdiction of a Department of Labour. If discharged to the sewer it becomes the responsibility of the relevant sewerage authority. If carried out of the factory gate by road it becomes a road transport responsibility and possibly an environment one. Waste disposed of to land or waterway becomes an environment department responsibility and possibly the responsibility of a waterways authority or fisheries department. The Health Department is involved at several of these stages.

184. While the registration of wastes, generators and carriers and the placarding of vehicles will go a long way towards reducing improper practices there will always be a minority of operators who will disregard these public safety measures. Policing of these measures is essential to their effectiveness. For example, sewerage system authorities cannot take action unless they can catch someone in the act of illegally discharging waste to a sewer point. If the waste is discharged into a waterway different authorities would be involved in apprehending offenders. Environmental authorities do not appear to have the power to stop and check a tanker suspected of carrying unregistered waste. The regulation of waste transport and disposal will be of limited effectiveness if the policing of disposal practices remains as fragmented as at present.

185. Even where jurisdiction is clear apprehending offenders is not easy. The Chief Health Surveyer of the Brisbane City Council said in evidence:

Liquid wastes are being disposed of illegally, we are told. It is very difficult to catch these people. We have stationed health surveyors in various places to try to catch tanker drivers disposing of wastes illegally but so far we have not been successful.³¹

186. The Committee concludes that to ensure the effectiveness of a docket system and other controls for the transport of hazardous waste then either coordination of inspectorates or the creation of an inspectorate to police the range of disposal operations, and which crosses departmental boundaries, is necessary. The Committee believes that environment authorities should be responsible for policing all aspects of hazardous waste operations either directly or in close liaison with other authorities.

31. Transcript, p. 1192.

Other Disposal Problems

Radioactive wastes

187. While the regulation of radioactive substances is seen as primarily a State responsibility and is exercised in Australia by health authorities, there exists a mix of State and Commonwealth legislation covering the area. The Commonwealth has legislation covering matters such as uranium mining and milling codes and the Australian Atomic Energy Commission. The Committee is concerned that the disposal of radioactive wastes be well controlled along with the disposal of other hazardous wastes. Some radioactive wastes are toxic as well and even when their radioactivity has declined to a safe level they remain hazardous and require proper disposal. It is essential that environmental authorities work in close cooperation with health authorities to ensure that the disposal of radioactive and infectious wastes, which are health responsibilities, is coordinated with the disposal of other hazardous wastes. The Committee to date has not received as much evidence on the adequacy of the control of radioactive substances as it would like and will deal further with the matter in its final report. Despite this some discussion of radioactive waste disposal is possible.

188. Radioactive substances are being increasingly used in industry, commerce, medicine, research and in the home. Small volumes of radioactive wastes may contaminate large volumes of less hazardous waste. Recently a quantity of recycled scrap metal was returned to Western Australia from Singapore because a radioactive monitoring device had been melted down with the waste.

189. In the past, costly mistakes have been made in the disposal of radioactive waste. A prime example is the presence of several thousand tonnes of contaminated soil under a residential area of Hunters Hill in Sydney. The waste material is from a radium processing factory which previously stood on the site and which ceased operation in 1916. The waste was rediscovered in recent years after houses had been built in the area. It will be a costly project to purchase affected properties to allow removal of the contaminated soil. The removal and disposal of the material is the responsibility of the N.S.W. Government, but the Commonwealth has promised assistance. Two properties have been purchased, and negotiations are proceeding for purchase of a third.

190. Recent discoveries in the Byron Bay area of New South Wales and at Capel in Western Australia of problems relating to radioactive monazite wastes from sandmining operations demonstrate the cost of inadequate handling and disposal of known radioactive materials. In the case of Byron Bay several areas have been identified as having higher than acceptable radiation levels and several hundred tonnes of tailings will have to be removed from a school site and from the shopping centre. The Committee is concerned that such facilities were ever allowed to be built on sandmining residues without radioactivity levels being checked first, when the radioactivity of monazite has long been known. Some other types of mine tailings have high levels of radioactivity and pose similar problems.

191. Most of the radioactive material used for medical purposes has a very short half-life and as a consequence ceases to be hazardous within a week. If not chemically hazardous it can then be safely disposed of to landfill or to the sewer. Low level waste with a longer half-life is usually kept in secure storage until it reaches a safe level for disposal. Adequate facilities for the storage of hazardous long-lived radioactive wastes appear to be lacking.

Commonwealth involvement

192. The Department of National Development and Energy has primary responsibility for radioactive wastes in the Commonwealth sphere and is currently in the process of developing a philosophy on a national basis for dealing with the more hazardous radioactive wastes.³² The Department consults with the States on the management of radioactive wastes. The Department is involved in developing a code of practice for the management of uranium mining and milling waste.

193. In 1975 the National Health and Medical Research Council recommended the establishment of a central repository for storage of hazardous long-lived radioactive waste materials, other than those arising in the generation of nuclear power. In September 1979 the Prime Minister wrote to the Premiers and the Chief Minister of the Northern Territory seeking co-operation in the development of coordinated policies on the management of radioactive wastes arising from medical, industrial and research use of radioisotopes. The proposed cooperation has been supported by all parties. A Commonwealth/State consultative committee chaired by the Department of National Development and Energy has been established to review current practices, and assess quantities of waste produced in order to gauge the requirement for a national repository or repositories for radioactive waste. The Committee has met twice, and has been asked to report to both State and Commonwealth Ministers on areas for improvement or new developments.

194. The Department of National Development and Energy has advised that the safe management of radioactive materials used by Commonwealth organisations 'is met by Commonwealth compliance with State and Territory regulations for the safe use or disposal of radionuclides'. Despite its primary responsibility for wastes in the Commonwealth sphere and its membership of the Consultative Committee reviewing current practices, the Department failed to mention that the Australian Capital Territory has no legislation to control radioactive materials. This is a serious omission given the responsibilities of the Department. The situation in the A.C.T. is discussed further in Chapter 9.

Miscellaneous wastes

195. For most of the report the wastes dealt with have been those generated by industry usually as byproducts or residues from manufacturing or mining processes. These wastes comprise the major part of the hazardous waste stream. There are however a number of other hazardous wastes which do not fall within the management strategies already described. These can arise in the disposal, particularly by those not generally regarded as chemical waste generators, of unused materials such as pesticides, wood preservatives, epoxy resins and solvents or the empty containers that these materials were sold or used in. Most of these products are sold in their own containers and safe disposal instructions should be included on container labels. These measures are an integral part of an overall chemical management strategy and will be dealt with in the Committee's final report. The policing of the disposal of small, irregular quantities of hazardous chemicals is extremely difficult and public education on the necessity of safe disposal would, together with adequate labelling, appear to be the most effective control measure. Legislation involving penalties is necessary to reinforce these measures.

Mine tailings

196. Hazardous wastes in the form of mine tailings pose problems where leachate enters waterways or where houses have been built on tailings. At Wittenoom in Western Australia

and Baryulgil in New South Wales health authorities have recommended closure of whole townships because of the widespread disposal of asbestos tailings around the towns. Tailings from abandoned mine sites such as Rum Jungle in the Northern Territory and Captains Flat in New South Wales have polluted waterways to an extent that governments have had to step in to alleviate the problem. As mentioned above inadequately disposed of sandmining residues containing monazite are creating radiation hazards where schools or houses have been built over them.

197. There has been increasing concern in the United Kingdom where houses have been built on the sites of old gasworks. Residues from the gasworks on which the houses have been built contain toxic chemicals and in addition give off mutagenic and carcinogenic gases.

Incineration

198. Some materials become hazardous in their disposal if burnt. Copper-chrome-arsenic (CCA) treated timber is safe while in service as the chemicals are firmly fixed in the wood. Should the timber be burnt the smoke contains significant amounts of arsenic oxides. Incidents of poisoning have occurred when people have unwittingly used offcuts for barbecues or in home fireplaces. These logs or planks require burial for safe disposal. Public education and adequate labelling of the dangers of burning this wood is needed.

199. The House of Lords Report referred to earlier expressed concern at some disposal by incineration: 'Special attention ought to be given to the incinerators installed in hospitals, veterinary and pathology departments, which may not, as usually operated, effectively destroy the active constituents in the wastes they consume and which often do not have scrubbing equipment to deal with their increasing burden of plastics and PVC'.³³ The Capital Territory Health Commission said in evidence that it does not monitor emissions from hospital incinerators in the Australian Capital Territory for these toxic emissions.

200. As suitable sites for municipal land fill disposal become scarcer, incineration is being increasingly used as a method of disposal for household garbage as well as industrial wastes. These incinerators operate at a lower temperature than the special incinerators that deal with intractable wastes. Ordinary municipal garbage contains a substantial proportion of various types of plastics. Burning plastics gives off some harmful particles and gases including various dioxins. It is not certain that sufficient monitoring of municipal incinerators takes place to ensure that the gases and fly-ash emitted are not dangerous. The Committee believes this area warrants further investigation.

32. Transcript, p. 1034.

33. House of Lords Report, paragraph 25.

Commonwealth Responsibilities

Australian Capital Territory

201. Regulation of waste disposal in the ACT is the responsibility of four separate authorities: the Department of the Capital Territory, the National Capital Development Commission, the Capital Territory Health Commission and the Department of Housing and Construction. The National Capital Development Commission is responsible for the siting of waste disposal facilities. The Department of the Capital Territory is responsible for the regulation of waste generators, carriers and disposal to land or water. The Capital Territory Health Commission is responsible for public health matters generally and for the control of radioactive substances including disposal. The Department of Housing and Construction operates the sewerage system and regulates the chemical wastes disposed of by this means.

202. The Department of the Capital Territory in its submission to the Inquiry acknowledged that the ACT lacks adequate legislation for the control of hazardous chemicals. The Department operates municipal waste landfill disposal sites in the ACT and provides a facility for the supervised burial of some waste chemicals. Chemicals declared unsuitable for burial must be stored by the generator. The need for a safe storage area for intractable waste is currently being evaluated. A Water Pollution Ordinance and an Air Pollution (Stationary Sources) Ordinance have yet to be introduced. Their drafting is well advanced and it is expected they will be introduced shortly.

203. Until adequate legislation is in place some control of waste discharge standards is being exercised over new industrial leases through the lease covenants. This does not cover most existing leases. The Joint Committee on the Australian Capital Territory in its 1979 report on Planning Procedures in the ACT found disturbing the non-enforcement of lease provisions by the Department. That Committee recommended that lease provisions be enforced with substantial penalties for breaches.³⁴ This Committee does not consider the primary control of hazardous wastes through lease covenants to be a satisfactory arrangement.

204. The Department of the Capital Territory is only now developing firm proposals to introduce the comprehensive legislative control required over the storage, transport, registration, use and disposal of chemicals potentially hazardous to health and the environment. In its submission of March 1981, the Department of the Capital Territory commented that:

The Territory does not have comprehensive or up-to-date environmental protection legislation . . . Appropriate legislative protection is being sought through new or amended legislation but these matters are afforded low priority on the list of legislation requiring drafting.

In a supplementary submission in October 1981, in answer to a query from the Committee as to why such essential measures were accorded low priority, the Department said:

The number of industrial establishments using hazardous chemicals in the ACT is low and the need for specific controlling legislation has not been a matter of urgency.

Increased industrial activity and policies designed to attract more industry to the ACT are creating conditions under which both industry and the management authorities would function better under the guidance of legislation controlling use and discharge of chemicals.

Consequently DCT has initiated work on an Air Pollution (Stationary Sources) Ordinance and a Water Pollution Ordinance which have now higher priority for legislative attention.

Drafting instructions are also being prepared for legislation relating to Fertilizers, Dangerous Loads and Consumer Affairs.

205. The Australian Capital Territory is not a highly industrialised area but it already generates quantities of hazardous wastes. Increased chemical usage by existing industry together with current efforts to attract more manufacturing industries to Canberra will undoubtedly increase hazardous waste generation. The ACT lags behind all States in hazardous chemicals regulation. It is irresponsible for authorities to await some tragedy before considering legislation, and its consequent enforcement, to be urgent.

206. The Commonwealth Government, through the Department of Transport assisted by the Attorney-General's Department, has given a high priority to the implementation across Australia of the *Australian Code for the Transport of Dangerous Goods by Road and Rail*. The Code is intended to replace existing disjointed State laws. The ACT still has no ordinance to regulate the transport of the majority of dangerous goods, including the transport of hazardous waste.

207. In response to a query from the Committee the Department advised in October 1981:

Consideration is being given to the incorporation of this code into a proposed Dangerous Goods Ordinance. However, there are some inconsistencies between the NSW regulations and the Code. The Department has formed a working group to resolve these inconsistencies and to recommend the inclusion of appropriate provisions in the ACT Dangerous Goods Ordinance.

208. The New South Wales Government introduced legislation in 1975 adopting in its regulations the Model Code for the Transport of Dangerous Goods by Road issued by the Australian Transport Advisory Committee in 1973. It did this to avoid leaving the problem unregulated until the revised Code was agreed to by all States and the Commonwealth. It was always the intention of the New South Wales Government to adopt the new Code and it has now done so.³⁵ Given the efforts the Commonwealth has made to gain uniformity of this legislation across Australia, it is difficult to comprehend that implementation of the Code as gazetted was only being given 'consideration' by the Department. In recent evidence the Department said that the Code would be adopted in a Dangerous Goods Ordinance modelled on the New South Wales legislation.

209. The Committee concludes that legislative controls on hazardous waste disposal in the ACT are grossly inadequate. The Committee recommends that:

the Department of the Capital Territory prepare a hazardous waste disposal strategy as a matter of urgency.

210. The Committee further recommends that:

legislation to effectively regulate the notification, transport and disposal of hazardous wastes in the Australian Capital Territory be prepared and introduced as a matter of urgency.

Legislation to regulate hazardous waste disposal should include the provisions recommended earlier in the Report at paragraphs 87, 100, 106, 133, 149, 151 and 172.

211. The Capital Territory Health Commission is responsible for the regulation of radioactive materials including disposal. There are no regulations governing the use or disposal of radioactive materials in the ACT. Model regulations for the control of radioactive substances were prepared by the National Health and Medical Research Council in 1957 and were passed into legislation by the States between 1959 and 1965.

212. In 1976 during its inquiry into Canberra City Wastes the Joint Committee on the Australian Capital Territory was told by the then Minister for Health, that a draft ordinance was being prepared by the Capital Territory Health Commission providing for the control and disposal of radioactive waste material. In its report of the same year the Committee stated that there was no justification for further delay in finalising the legislation, as well-trying, internationally established regulations had then been in force for many years in the States. That Committee viewed the proposed ordinance as having the utmost priority and recommended that its enactment be proceeded with immediately.³⁶

213. In a letter to the Joint Committee on the Australian Capital Territory, dated 24 August 1977, the then Minister for Health stated that 'territorial legislation to control the use and disposal of radioactive material is presently being prepared by the Capital Territory Health Commission as a matter of priority'. In a letter to this Committee, dated 3 June 1981, the present Minister for Health stated that 'a proposed Radiation Ordinance to be administered through the Commission by the Minister for Health is at an advanced stage of development'.

214. It is hard to believe that an ordinance that was 'being prepared' in 1976 and was 'a matter of priority' in 1977, is still only at an 'advanced stage of development' in 1981 when model regulations were available in 1957. The Committee believes that there is no reason why an ordinance could not be introduced immediately. Accordingly, the Committee recommends that:

an ordinance relating to the control and disposal of radioactive materials in the Australian Capital Territory be introduced within six months of this Report being presented and that in the event of this not occurring the Minister for Health make a statement to the House explaining the failure to do so.

215. The Department of Housing and Construction operates the sewerage system on behalf of the Department of the Capital Territory. Discharge of chemicals into the sewerage system is regulated by Regulations 62 and 63 of the Canberra Sewerage and Water Supply Regulations. The provisions are somewhat antiquated and should be brought up to date. Radioactive materials are not specified but the Committee has been told that they are totally prohibited by the Sewerage Engineer using the discretion allowed under Regulation 62. Despite this, the guidelines for disposal that the Department of the Capital Territory says it follows, and an Australian National University handbook on handling radioactive materials, provide for certain radioactive wastes to be disposed of down the sink. The Capital Territory Health Commission said in evidence that it disposed of low-level radioactive wastes to the sewer and did not consult with the sewerage authority on these or on other wastes it discharged to sewer. The Committee believes that government authorities must be bound by legislation protecting health and the environment.

216. The Committee recommends that:

- **standards for chemical effluent discharge to the sewer in the Australian Capital Territory be developed and incorporated in the Sewerage Regulations.**
- **dischargers of chemical waste to the sewerage system be required to register the nature and volumes of the waste with the relevant authority.**

217. The National Capital Development Commission advised that it:

does not have any particular involvement or expertise in the management or storage of hazardous chemicals, and will not be making a submission to the Committee.³⁷

The Commission is responsible for planning, development and the government component of construction in Canberra. This includes siting and construction of public hazardous waste facilities, the siting and construction of Commonwealth buildings where hazardous chemicals are used and the siting of non-government facilities where hazardous chemicals are to be used, stored or disposed of. The Commission has prepared environmental standards to be included in the lease provisions of sites where hazardous chemicals are to be used, such as copper-chrome-arsenic wood preservative. The Commission had consultants prepare an interim planning statement on the disposal of radioactive waste in the A.C.T. which was completed in 1980. In addition to these functional responsibilities the Commission has its own graphic, printing and plan-developing facilities where care is required to protect the health of employees from the chemicals they use, and the wastes require proper disposal. The Commission's advice to the Committee was wrong and shows a lack of awareness of its own responsibilities.

Marine dumping

218. The Department of Transport is responsible for the control of pollution of the sea from ships and has a section within the Department to administer the National Plan for the Prevention of Pollution of the Sea by Oil. In the Oil Spills Report this Committee recommended that the possibility be investigated of extending the National Oil Spills Plan to cover pollution by other hazardous substances.³⁸ Discussions have been held to extend the scope of the plan to cover pollution by other noxious substances but the Department advised that little advanced planning can be done due to the large number of hazardous chemicals being imported. None of these are in sufficient quantities to undertake chemical-specific planning other than to keep up to date on the chemicals involved and the appropriate hazard responses.³⁹

219. Where pollution, or a threat of a pollution incident, exists the *Protection of the Sea (Powers of Intervention) Act* 1981 empowers the Minister for Transport to take any appropriate action on the high seas or in territorial waters in regard to Australian or foreign ships. This Act is part of a package of Acts passed in 1981 to implement international conventions on the protection of the seas. These Acts have yet to be proclaimed.

220. With the proclamation of the *Environment Protection (Sea Dumping) Act* 1981, Australia will be in a position to ratify the International Convention on the Prevention of Marine Pollution of Dumping of Wastes and Other Matter (the London Dumping Convention). The Convention prohibits dumping of specified substances and places conditions on the dumping of substances of low toxicity. The Act formalises previous voluntary arrangements dealing with dumping by:

- prohibiting the dumping of certain specified substances (which include organohalogens, mercury and cadmium compounds, persistent plastics, hydrocarbons and high level radioactive waste);
- regulating, through the prior issue of special permits, the dumping of other specified substances including bulky objects, wastes containing significant amounts of heavy metals and low-level radioactive material;
- regulating the dumping of all other wastes or matter through prior issue of a general permit; and

- ensuring the condition of the sea is properly monitored for the purposes of the London Dumping Convention.

The Annexes to the Convention which detail these provisions are Appendix VI of this Report.

221. The Act makes provision for the States and the Northern Territory to control dumping in coastal waters under their own legislation implementing the provisions of the Dumping Convention if they so desire. When a State or the Northern Territory enacts its own legislation the Minister may, under section 9, declare that the Commonwealth Act does not apply to that State or Territory. If, at a later date, the Minister does not believe the State or Territory legislation is giving full effect to the Convention, the Minister may revoke the declaration. As well as providing penalties for dumping, loading or incineration of wastes not in accordance with a permit, where the Commonwealth has incurred expenses in remedying any condition caused by dumping in contravention of the Act, the person convicted of the offence is liable for these expenses. The proclamation of the Act appears to be held up while the States are deciding whether to enact their own legislation. The Department of Home Affairs and Environment is responsible for regulating dumping in accordance with the Convention and for providing the International Maritime Consultative Organisation with annual returns of dumping and with results of monitoring of consequential pollution levels in the ocean.

222. The Department examines applications and determines appropriate dumping conditions based on the nature and amount of the substance and the proposed dumping location. Ocean incineration is considered to be a form of dumping for the purposes of the London Convention. Assessments are generally undertaken in consultation with the State concerned. An important aspect taken into consideration in the assessment of marine dumping proposals and required under Annex 3 of the Convention is the extent to which alternative forms of waste disposal, such as reprocessing, recycling or land disposal, have been examined.

223. The Committee is concerned that sea dumping might continue to be used by reason of its convenience with insufficient effort being made to find more appropriate alternatives. An instance is the present trial dumping into Bass Strait of black liquor from a paper mill. Apart from its use as a wetting agent or as feedstock the Committee has been told of its use by a paper mill in the Latrobe Valley as a supplementary boiler fuel. Such alternatives should be canvassed by the Department of Home Affairs and Environment before any approvals are given for sea dumping. Because the Act has yet to be proclaimed the black liquor dumping is carried out with voluntary compliance to the Sea Dumping Convention.

224. In 1979 the Commonwealth granted approval to a chemical company to use the incinerator vessel *Vulcanus* for incineration of organochlorine wastes but for commercial reasons this operation did not eventuate. The types of wastes that can be incinerated at sea are limited by the requirements of the London Dumping Convention and by the design of the incinerator vessels presently in operation.

225. The Australian Government Analytical Laboratories investigates the dumping of waste products off the continental shelf of south-eastern Tasmania. Surveys of fish, zooplankton, sediments and water are made to determine the effect of ocean dumping on the marine environment. Analyses of jarosite waste from the Risdon plant of the Electrolytic Zinc Company of Australasia Ltd is also carried out.

226. In September 1981 the House of Representatives unanimously reaffirmed its commitment to the basic objectives of the United Nations Conference on the Law of the

Sea 'in working for the conclusion of a comprehensive and widely-accepted Convention of the Law of the Sea which would lay down a balanced and equitable regime, both for the use of the seas by all people for all legitimate purposes, and for the management and use of the resources of the seas and the seabed'.⁴⁰ Articles 210 (5) and 216 (1) of the draft Law of the Sea recognise the right of a coastal state to control dumping in waters above its continental shelf. Section 41 of the Environment Protection (Sea Dumping) Act allows for an extension, by regulation, of the area covered by the Act. It is anticipated that with the adoption of the Law of the Sea Convention by Australia, the area covered will be extended from the present 3 mile limit to the 200 mile limit.

227. The Committee concludes that with: the adoption of the Law of the Sea Convention; the exercise of proper control over land based sources of marine pollution; and the proclamation of the package of sea protection legislation passed in 1981, considerable progress will have been made in the control of the marine dumping of hazardous chemicals.

Staffing of NACC secretariat

228. The National Advisory Committee on Chemicals (NACC) of the Australian Environment Council is made up of representatives of each State, Territory, the Commonwealth, the National Health and Medical Research Council and the Australian Agricultural Council. The Commonwealth provides the secretariat of the NACC which is responsible for research, development of standards and the preparation of policy documents. The secretariat receives some assistance from State government officers and has had until recently a full time staff of five. As well as the development of control measures for waste disposal the five staff of the NACC secretariat have been developing control measures for other stages in the life-cycle of hazardous chemicals, including developing and implementing a notification and assessment scheme for new chemicals and establishing a national register to provide data on hazardous chemicals.

229. In evidence to House of Representatives Estimates Committee 'C' on 29 August 1980 a representative of the then Department of Science and the Environment stated that the staffing of the secretariat was to be increased by four. This increase did not occur.

230. In October 1981 the NACC commenced operation of an interim voluntary notification scheme for new chemicals. It has been estimated that between 10 and 15 staff would be required for the operation of the scheme. This is in addition to the existing five staff. After the introduction of the scheme the staff of NACC was increased to eight with four working on the notification scheme and four working on the remainder of the functions. While the Committee is not in a position to comment on the overall staffing or priorities of the Department of Home Affairs and Environment the staffing of the NACC secretariat is obviously inadequate. It is worth noting that the House of Lords Committee found that the eleven staff members researching and producing U.K. *Waste Management Papers* were 'at full stretch to keep up with their job'.⁴¹ The problem of the safe disposal of hazardous wastes is an Australia-wide one and is acknowledged by governments, industry and the community to be a serious one. The costs of failure are high. The Committee believes that the allocation of adequate resources to the NACC is essential to allow prompt development at the national level of effective management techniques to deal with the problem. The very purpose of the NACC is to make the best use of a small number of staff and prevent duplication of these functions in each State and Territory. To skimp on the staffing of NACC is false economy and defeats the purpose of the NACC.

231. The Committee recommends that:

staffing of the secretariat to the National Advisory Committee on Chemicals be substantially increased to meet its responsibilities.

Other Commonwealth Responsibilities

232. Other areas of Commonwealth responsibility include waste disposal by Commonwealth Departments and disposal on Commonwealth lands. Hazardous wastes have the effect they do regardless of who disposes of them or who owns the land where they are disposed. Commonwealth departments and instrumentalities should be obliged to conform with the requirements of the State or Territory in which the wastes are being handled. Equivalent controls are required over all Commonwealth lands.

233. In its report on *The Commonwealth Government and the Urban Environment*, of May 1978, this Committee recommended:

- all Commonwealth departments and instrumentalities comply with State and local government laws, regulations and schemes; and
- non-compliance on the grounds of overriding national interest should only occur where the Commonwealth Government departments or instrumentalities involved are specifically exempt by act or regulation.⁴²

234. While that report was primarily concerned with planning implications it is quite relevant in the context of ensuring a comprehensive, uniform management of waste disposal across Australia.

235. In its response to that recommendation the Commonwealth Government said:

Government policy is to conform to local government laws, regulations and schemes as far as possible and wherever appropriate in a spirit of co-operation. Clearly there are cases where overriding national priorities and community-wide interests must take precedence over local considerations.⁴³

A policy of conforming with State or Territory laws on hazardous waste disposal without legal obligation would be ineffective. Commonwealth departments and instrumentalities should be subject to legislation for precisely the same reason as other operators handling hazardous wastes should be. If Commonwealth bodies cannot be made subject to State or Territory legislation then there needs to be Commonwealth legislation to bind the Crown. Overriding national priorities and community-wide interests would in effect be protected by the legislation and there would be no need for exemptions. Similarly the Committee believes State Government departments and authorities should be bound by State legislation on hazardous waste management.

236. Another reason for imposing legislative controls over the disposal of waste from Commonwealth sources is the lack of awareness by some government agencies of their responsibilities for hazardous chemicals. A number of departments from which the Committee sought submissions advised, in the first instance, that they had little or no dealings with hazardous chemicals when this was not the case. These included the Departments of Defence, Housing and Construction and Home Affairs and the National Capital Development Commission.

237. Accordingly the Committee recommends that:

- **all Commonwealth departments and instrumentalities comply with relevant State, Territory or Commonwealth legislation concerning hazardous waste;**
- **for Commonwealth authorities not bound by State or Territory legislation, the Commonwealth develop a set of standards for the regulation of waste disposal**

consistent with the standards developed by the Australian Environment Council and that there be statutory requirements for those Commonwealth departments and authorities to comply with these standards.

It is essential that Commonwealth waste control machinery is coordinated with State or Territory manifest control schemes.

World War II chemicals

238. The Committee heard evidence of World War II chemical weapons having been stored and possibly remaining in the Blue Mountains area of New South Wales. The chemicals were mustard gas, phosgene and possibly lewisite. If these chemicals were still buried, leachate entering water supplies could be having an adverse effect on health. It is known that at the end of the war most of these stored weapons were removed and destroyed. It is less certain that leaking cylinders which were buried during the war were fully recovered and destroyed. Defence records are incomplete but efforts by defence authorities to locate buried cylinders have been unsuccessful. Some ex-servicemen have been taken to the site by the Defence authorities to assist in locating buried containers.

239. One area in Newnes State Forest which was used for destroying mustard gas by incineration remained littered with residue and metals until 1979. The State Pollution Control Commission, following an inspection, stated there was no likelihood of leachate emission from this site.

240. The chemicals were buried in what, at the end of the war, were isolated areas and at a time when the long-term effects of buried chemicals were little known. From the evidence given, the Committee cannot be certain that all buried chemicals were removed. The Committee is concerned that should traces of mustard gas or the breakdown products of lewisite find their way into catchment waterways they could pose a threat to community health. The Committee disagrees with the Department's claim that 'arsenical poisoning could only occur if large quantities of lewisite decomposition products were to be eaten'. This ignores the carcinogenic effects of arsenic. The Committee believes that chemical warfare materials, like other hazardous chemicals under Commonwealth control, should be rendered harmless to health and the environment before disposal. Alternatively, they should be properly stored pending safe disposal but they should never be dumped without treatment. The Commonwealth has a responsibility in this matter to fully test surface and ground water entering waterways in catchment areas, from these general locations. Current analytical techniques should ensure the detection of any hazardous leachate entering waterways and justify an intensive search for the waste should the tests prove positive. Should any clean-up be necessary the work should be carried out in consultation with State health and environment authorities. Accordingly, the Committee recommends that:

the Department of Defence test ground and surface water flowing from World War II chemical weapon storage and disposal sites for the presence of chemical leachate.

Imports and exports

241. Recent experience in Europe has shown the problems that can occur when waste is exported in order to avoid proper disposal. Since the discovery of the disaster at Lekkerkerk, the Netherlands has introduced very strict controls over the disposal of hazardous waste to landfill. In the United Kingdom a very small import/export company abandoned 28 000 tonnes of phenol wastes from the Netherlands in dockside storage tanks before going bankrupt in 1981. The company, with only £ 100 share capi-

tal, was paid around £25 per tonne to take the waste but the cheapest disposal in Britain is £110 per tonne. The tank owners, who were left holding the waste, face the £110 per tonne cost of incineration and have sought approval to dump the waste at sea.

242. This and other incidents where wastes have been exported to countries without adequate disposal facilities or where the responsibility for disposal has been avoided through the bankruptcy of the shipper, are sufficient warning that similar situations could occur in Australia. Australia's distance from major hazardous waste generation areas reduces the risk of wastes being dumped in Australia. There remains a sufficient risk to require Customs Regulations prohibiting such imports.

243. Australia has already exported hazardous waste. For example, in 1978 a load of PCB waste was sent to France for destruction in a high-temperature incinerator. The Committee believes there should be some manifest system to ensure that wastes exported reach their final destination and that their nature is fully disclosed to the importing country. This would be in accordance with the United Nations Environment Protection decision outlined in paragraph 47.

244. The Committee recommends that:

- **Customs (Prohibited Import) Regulations be introduced to prevent the dumping of hazardous waste from overseas;**
- **Australia seek international machinery to regulate the shipping of hazardous waste between countries and in the meantime notify any countries to which hazardous wastes from Australia are to be exported; and**
- **in no circumstances should hazardous waste be exported to countries which do not have the facilities required to safely dispose of the waste.**

Commonwealth powers over hazardous wastes

245. A number of areas have been discussed where the Commonwealth has clear constitutional responsibility for hazardous wastes. The Committee's concern over the lack of effective control of wastes in some States, despite the problem having been obvious for some time, led to its seeking several legal opinions as to the limits of the Commonwealth's power in this area. The Committee sought an opinion from Professor Geoffrey Sawer which is incorporated as Appendix VII. The Committee believes that State environment agencies are the best bodies to regulate hazardous waste management if they have effective management strategies in place and their activities are coordinated with other State functions such as health and motor transport. If however, the enactment of effective State legislation is taking too long then the Commonwealth could introduce legislation to have effect until such time as each State has its own legislation in place in a similar way to the *Environment Protection (Sea Dumping) Act 1981*. Should the Australian Environment Council not undertake a major public education campaign as part of a national waste disposal strategy then this should be undertaken by the Commonwealth.

246. Professor Sawer's opinion points to two important powers through which the Commonwealth could act to control wastes, being the Corporations Power, Constitution section 51 (xx) and the Interstate Trade Power, section 51 (i). The opinion states:

The Corporations Power has the advantage of applying to both interstate and intrastate transactions, and the disadvantage of not applying to individual or partnership as distinct from corporate activity. The Interstate Trade Power has the advantage of applying to all

persons, natural and corporate, and the disadvantage of not applying to intrastate activities. However, there is no reason why relevant legislation should not be drafted so as to exercise both powers (and indeed other and more marginal powers such as Territories, Commonwealth Places, Commonwealth instrumentalities, etc.).

The Commonwealth has extensive power to regulate the generation, transport, recycling and disposal of most of the hazardous waste in Australia. Opinions received from the Attorney-General and the Parliamentary Library support this interpretation.

247. The Committee recommends that:

if State Governments fail to introduce effective waste disposal strategies by 1985, the Commonwealth legislate to control hazardous wastes to the fullest extent of its power.

Effective strategies would include public education campaigns.

J. C. HODGES
Chairman
9 March 1982.

34. Joint Committee on the Australian Capital Territory, *Planning in the A.C.T.—procedures, processes and community involvement*, Canberra, March 1979, paragraphs 70 and 75.

35. Transcript, p. 536.

36. Joint Committee on the Australian Capital Territory, *Canberra City Wastes, A Long Term Strategy for Collection and Disposal*, Canberra, December 1976, paragraph 162.

37. Transcript, p. 3136.

38. House of Representatives Standing Committee on Environment and Conservation, *Oil Spills. Prevention and Control of Oil Pollution in the Marine Environment*, Canberra, September 1978, paragraph 238.

39. Transcript, p. 971.

40. *Hansard*, 17 September 1981, pp. 1474-1476.

41. House of Lords Report, paragraph 76.

42. House of Representatives Standing Committee on Environment and Conservation, *The Commonwealth Government and Urban Environment. Formulation and Co-ordination of Policies*, Canberra, May 1978, Paragraph 255.

43. *Hansard*, 17 September 1980.

APPENDIX I

CONDUCT OF THE INQUIRY

1. On 21 February 1980, the previous Committee resolved to inquire into and report on:
 - the management of chemicals potentially hazardous to health and the environment, particularly:
 - (a) the adequacy of existing Commonwealth and State legislative arrangements;
 - (b) research, assessment and dissemination of information; and
 - (c) international cooperation.

The Committee resolved that a Sub-committee be appointed to conduct the Inquiry. At the dissolution of the Thirty-first Parliament, the Sub-committee had held three public hearings.

2. Upon the re-appointment of the Committee in the present Parliament, the Committee decided to resume the Hazardous Chemicals Inquiry and to conduct the Inquiry as a full committee.

3. The Committee and the former Sub-committee have to date taken evidence from 163 witnesses representing Commonwealth and State Government departments and instrumentalities, local government bodies, industry, community and environmental groups, academics, universities, and from individuals appearing in a private capacity. A list of witnesses who have appeared before the Committee to date is at Appendix II. The Committee has yet to complete its program of public hearings. The Committee has received 154 submissions and taken 3,352 pages of evidence at public hearings to date. Evidence given at public hearings is available for examination in *Hansard* form at the National Library and at the Committee Office of the House of Representatives. Public hearings have been held in Canberra, Sydney, Melbourne, Brisbane, Adelaide, Perth, Darwin and Wollongong. The Committee has conducted inspections in Sydney, Port Kembla, Melbourne, Geelong, Perth, Kwinana, Brisbane, Gladstone and the Northern Territory.

4. The Committee acknowledges the cooperation and assistance received from all those who have made submissions, assisted with inspections and to those witnesses who have given verbal evidence to the Committee to date.

5. Although some of the evidence was taken by the Sub-committee in the Thirty-first Parliament, the conclusions and recommendations are those of the present Committee. The Committee appreciates the contribution made to the Inquiry by Mr M. Baillieu, and Mr J.F. Cotter, who were members of the Hazardous Chemicals Sub-committee in the Thirty-first Parliament.

APPENDIX II

LIST OF WITNESSES

Allan, Mr P. B.	Acting First Assistant Secretary, Agriculture and Food Services Division, Department of Primary Industry
Allen, Ms L.	Executive Member, Queensland Conservation Council
Attwood, Ms P.	Coordinator, Environment Group, Women's Electoral Lobby (South Australia)
Austin, Mr M. R.	Executive Director, South Pacific Asbestos Association
Barry, Ms M.	Member, Botany Bay Sub-Region Community Advisory Committee
Belcher, Mr R. S.	Chief Chemist, Division of Agricultural Chemistry, Department of Agriculture (Victoria)
Berry, Mrs M.	Post-graduate student, School of Australian Environmental Studies, Griffith University
Bisby, Dr J. A.	Environmental Health Adviser, Member, Health Committee, Australian Chemical Industry Council
Bissaker, Mr B. A.	Assistant Secretary, Customs Inspection and Controls, Department of Business and Consumer Affairs
Blackmore, Mr H. N.	Chief Inspector of Dangerous Goods, Dangerous Goods Branch, Department of Industrial Relations (New South Wales)
Blair, Mr W. D.	Secretary, Vehicle Builders Employees Federation of Australia (Victorian Branch)
Bolton, Lieutenant Colonel J. C.	Senior Executive Officer (Environment), Department of Defence
Bonsey, Ms V. J.	Acting Director, Law Revision Branch, Department of the Capital Territory
Bray, Mr J. W.	Representative, Local Government Association of Queensland
Brett, Mr B. B.	Executive Director, Agricultural and Veterinary Chemicals Association of Australia
Broomby, Chief Superintendent I.	Australian Federal Police
Brownlea, Professor A.	School of Australian Environmental Studies, Griffith University
Bryce, Mr F. E.	Secretary-Treasurer, New South Wales Fire Brigade Employees' Union
Button, Mr J. C. E.	Private Citizen, and Chief, Health and Safety Division, Australian Atomic Energy Commission
Caddy, Mrs Y. D.	Member, Environment Group, Women's Electoral Lobby (South Australia)
Cann, Mr B. H.	Assistant Government Printer—Technical Services, Department of Administrative Services
Carlisle, Mr R. D.	Private Citizen
Carr, Captain N. R.	Director, Ports and Marine Operations, Department of Marine and Harbours
Carr, Ms T. E.	Craftsman, Crafts Council of Western Australia

Carruthers, Mr I.	Director, Hazardous Chemicals Section, Environment Assessment Number 2 Branch, Department of Science and the Environment
Christiansen, Mr B. F. Clark, Dr P. D.	Principal Chemist, Capital Territory Health Commission Health Services Coordinator, South Australian Health Commission
Cole, Mr D. A.	Executive Member, Conservation Council of South Australia Inc.
Conacher, Mrs J. L. Cooke, Mr H. D.	Organic Growers Association W. A. (Inc) Dean, Faculty of the Arts, Adelaide College of the Arts and Education
Cordner, Mr J. P.	Member, Environment Sub-committee, Australian Chemical Industry Council
Cranswick, Mr M. A.	First Assistant Secretary, Trade Practices and Consumer Affairs Division, Department of Business and Consumer Affairs
Creighton, Dr W. B. Crowe, Dr A. J.	Faculty of Law, University of Melbourne Adviser in Occupational Health, Capital Territory Health Commission
Cummings, Mr B. J. Cumpston, Dr A. G.	Project Officer, Queensland Conservation Council Medical Liaison Officer, Occupational Health Section, Social Health Branch, Department of Health
Dash, Mr R. M.	Acting Coordinator of Public Health Services, Health Commission of New South Wales
Davies, Dr R. E.	Chairman, Health Committee, Agricultural and Veterinary Chemicals Association of Australia
Dawson, Mr P. J.	Assistant Secretary, Policy Development, Purchasing Division, Department of Administrative Services
Deacon, Ms S.	Research Officer, Clothing and Allied Trades Union of Australia
Dunn, Mr R. J. Jnr	Director, Environment Protection Section, Department of the Capital Territory
Dyer, Mr L. W. H.	Director, Policy Secretariat, Strategic Planning and Resource Allocation Division, Department of Transport
Eccles, Mr P. B.	First Assistant Secretary, Coastal Services Division, Department of Transport
Elliott, Mr R. R. F.	Chief Marine Surveyor, Marine Standards Division, Department of Transport
England, Dr J. D. F. Erickson, Miss D. Faichney, Mr G. D.	Private Citizen President, Crafts Council of Western Australia Assistant Commissioner, Policy and Planning, Capital Territory Health Commission
Francis, Mr T. W. Freeman, Mr W.	President, Asbestos Diseases Society, Inc. Chief Executive Officer, Australian Chemical Industry Council
Gandevia, Professor B.H.	Associate Professor in Thoracic Medicine, Prince Henry Hospital, University of New South Wales
Gascoine, Mr D. F.	Assistant Secretary, Environment Assessment Number 2 Branch, Department of Science and the Environment
Gilmour, Mr J. J.	Executive Officer, Environment Unit, Northern Territory Conservation Commission
Gilmour, Mr L. A.	Director, Policy Projects, Purchasing Division, Department of Administrative Services
Gray, Dr D. A.	Post-graduate student, School of Australian Environmental Studies, Griffith University
Grayson, Mr H. A.	Federal President, Royal Australian Chemical Institute

Gude, Mrs E. M.	Research Officer, Local Government Association of Western Australia
Hedley, Mr A. R.	Acting First Assistant Secretary, Legislation and Policy Co-ordination, Department of the Capital Territory
Henry, Dr M. P.	Private Citizen
Hill, Mr D. G.	Deputy Director, Australian Conservation Foundation
Hillier, Mrs N.	Member, Botany Bay Sub-Region Community Advisory Committee
Hollingworth, Mr G. A.	Chairman, Environment Sub-committee, Australian Chemical Industry Council
Hosking, Dr J. W.	Chairman, Safety Committee, Western Australian Branch, Royal Australian Chemical Institute
Howe, Dr R.	Group Chief Medical Officer, Australian Iron and Steel Proprietary Limited, Hoskins Kembla Works (Port Kembla)
Hughes, Mr H.	President, Western Australian Branch, Royal Australian Chemical Institute
Humphry, Dr N. F.	Honorary Secretary-General, Australian and New Zealand Society of Occupational Medicine
Jablonski, Mr R.	Secretary, National Consultative Committee on Occupational Safety and Health, Department of Science and Technology
Johnson, Mr G. W.	Assistant Secretary, Trade Practices Operations, Department of Business and Consumer Affairs
Jones, Mr A. T.	Assistant Secretary, Regular Public Transport Branch, Flying Operations and Airworthiness Division, Department of Transport
Jones, Mr R.	Second Officer, Industrial Hygiene Branch, Division of Occupational Health and Radiation Control, Health Commission of New South Wales
Kalafatis, Mr A.	Health and Safety Officer, Amalgamated Metal Workers and Shipwrights Union, New South Wales State Office
Keary, Mr J. D.	First Assistant Director, Awards Division, Industrial Relations Bureau
Kelly, Mr W.	Office Coordinator, Friends of the Earth (Sydney)
Kilmartin, Mr J. P.	Director of Hazardous Materials, Department of Minerals and Energy, (Victoria)
Kilpatrick, Dr D. J.	Industrial Scientist, Workers' Health Centre (Victoria)
Knight, Mr J. W.	Assistant Secretary, Standardisation and Cataloguing, Department of Defence
Kusnik, Mr J.	Ceramic expert, Crafts Council of Western Australia
Langsford, Dr W. A.	First Assistant Director-General, Public Health Division, Department of Health
Lavey, Mr N. J.	Senior Assistant Engineer, Darwin City Council
Learoyd, Dr B. M.	President, New South Wales Branch, Doctors Reform Society
Leggo, Mrs J.	Counsellor, Nursing Mothers' Association of Australia
Lewis, Dr J. E.	General Superintendent Coke Ovens, Australian Iron and Steel Proprietary Limited, Hoskins Kembla Works (Port Kembla)
McCalman, Ms V.	Branch Organiser, Federated Miscellaneous Workers' Union of Australia (Victorian Branch)
McCullagh, Dr P. J.	Private Citizen
McCullagh, Dr S. F.	President, Australian and New Zealand Society of Occupational Medicine
MacDonnell, Mr J. H.	Acting Assistant Secretary, Property Directorate, Department of Administrative Services

McGregor, Mr E. M.	Chief Investigations Officer, Environment Protection Authority, (Victoria)
McGuffog, Mr D. R.	Director and Chairman, Agricultural and Veterinary Chemicals Association of Australia Clearance and Registration Committee
McIntyre, Mr A. W. D.	Solicitor, Australian Iron and Steel Proprietary Limited, Hoskins Kembla Works (Port Kembla)
McLauchlan, Mrs J.	Councillor, Nursing Mothers' Association of Australia
McLean, Mr I. R.	Assistant Superintendent Industrial Relations, Australian Iron and Steel Proprietary Limited, Hoskins Kembla Works (Port Kembla)
McMillan, Mr W. T.	Lawyer Advising, Queensland Conservation Council
MacPhee, Dr D. G.	Private Citizen
McWhirter, Dr W. R.	Chairman, Childhood Malignancy Committee, Queensland Childhood Malignancy Registry, Queensland Cancer Fund
Magee, Professor R. J.	Professor of Chemistry, La Trobe University, and Chairman, University Safety Committee, La Trobe University
Makeham, Mr P. M.	Acting Assistant Secretary, Road Transport Branch, Land Transport Policy Division, Department of Transport
Marks, Mr S.	Workers Compensation Officer, Amalgamated Metal Workers and Shipwrights Union (Victoria)
Martin, Mr R. S.	Director, Industrial Safety, Department of Mines and Energy (Northern Territory)
Mathews, Dr J.	Research Officer and Director of the Australian Council of Trade Unions—Victorian Trades Hall Council Occupational Health and Safety Unit
Mawer, Mr G. A.	Acting Assistant Secretary, Policy Secretariat, Department of Defence
Merton, Mr J. R.	Assistant Secretary, Food Services Branch, Agriculture and Food Services Division, Department of Primary Industry
Micallef, Mr E.	Occupational Health and Safety Officer, Amalgamated Metal Workers and Shipwrights Union (Victoria)
Miller, Mr G. J.	Member and Scientific Adviser, Queensland Conservation Council
Moore, Mr J. W.	Acting Assistant Secretary, Operations Branch, Transport and Storage Division, Department of Administrative Services
Morgan, Mr A. J.	Member, Toxic Substances Committee, Royal Australian Chemical Institute
Morison, Mr I. W.	Assistant Secretary, Radioactive Materials Branch, Department of National Development and Energy
Murray, Mr R. J.	Director, City Parks Administration, Department of the Capital Territory
Newman, Mr A. B.	Supervisor, Willawong Liquid Waste Disposal Pty Ltd
Nicol, Mr T. D.	Vice President and Acting Secretary, United Pest Control Association (New South Wales)
Nihill, Mr F.	Director, Technical, Agricultural and Veterinary Chemicals Association of Australia
Norris, Mr R. C.	Australian Government Analyst, Department of Science and the Environment
Nossar, Dr G.	Consultant, Friends of the Earth (Sydney)
Ogilvie, Mr R.	Senior Scientific Officer, Division of Inspection Services, Department of Industrial Relations (New South Wales)
Olsson, Mr J. E.	Project Officer, Department of Industrial Affairs and Employment (South Australia)
Palmer, Mr A. R.	Deputy Secretary, Department of Administrative Services

Panizza, Mr D. J.	Superintendent, South Australian Fire Brigade
Peacock, Mr M. J.	Private Citizen
Peters, Dr F. E.	Executive Committee Member, Canberra Consumers, Inc.
Pollak, Dr J. K.	Member of Toxic and Hazardous Chemicals Committee of the Total Environment Centre
Porter, Mr W. E.	Health Surveyor, City of Canning, Local Government Association of Western Australia
Pratt, Dr B. H.	Director, Conservation and Agriculture Branch, Department of the Capital Territory
Pratt, Mr B. T.	Scientific Officer, Research Unit, Country Fire Authority (Victoria)
Quickenden, Dr T. I.	Department of Physical and Inorganic Chemistry, University of Western Australia
Quinn, Dr J. V.	Assistant Secretary, Environmental Health Division, Northern Territory Department of Health
Quinn, Mr S. M.	State Organiser, Amalgamated Metal Workers and Shipwrights Union, and District Secretary, Wollongong Branch of the Amalgamated Metal Workers and Shipwrights Union
Roberts, Mr G. H.	President, Port Kembla Branch, Federated Ironworkers Association
Rogers, Mr P. L.	Brisbane Organic Growers Group
Rooke, Mrs S. M.	University Safety Officer, La Trobe University, and Secretary, University Safety Committee, La Trobe University
Rosen, Dr R.	Radiation Protection Officer, University of New South Wales
Rowe, Mr R. C.	Senior Superintendent, Fire Control Division, South Australian Fire Brigade
Ruschena, Mr L. J.	Senior Occupational Hygienist, Occupational Health Division, State Electricity Commission of Victoria
Sampson, Mr L. H.	Post-graduate student, School of Australian Environmental Studies, Griffith University
Savage, Mr G. W.	Deputy Chief Health Surveyor, City of Canning, Local Government Association of Western Australia
Scanlan, Mr P. G.	Group Manager, Chemical and General Technology Section, Standards Association of Australia
Scott, Dr R. J.	Private Citizen
Smith, Mr B. A.	Post-graduate student, School of Australian Environmental Studies, Griffith University
Smith, Mr C. H. G.	Technical Consultant, Australian Chemical Industry Council
Smith, Mr I. D. B.	Post-graduate student, School of Australian Environmental Studies, Griffith University
Smith, Mr S. W. C.	Principal Chemist, Toxicology Section, Environmental Health Branch, Department of Health
Smoker, Mr D. R.	Radiation Safety Officer, Capital Territory Health Commission
Snelson, Mr J. T.	Pesticides Coordinator, Pesticides Agricultural Chemicals and Veterinary Drugs Section, Food Services Branch, Agriculture and Food Services Division, Department of Primary Industry
Staunton, Mr I.	Secretary, Council of Australian Pest Control Associations, United Pest Control Association (New South Wales)
Stehbens, Mr I. R.	Post-graduate student, School of Australian Environmental Studies, Griffith University
Storie, Mr J. V. T.	Private Citizen

Suckling, Mr G.	University Safety Officer, University of New South Wales
Thirwell, Mr J. A.	Manager Personnel, Australian Iron and Steel Proprietary Limited, Hoskins Kembla Works (Port Kembla)
Thistlethwaite, Dr R. J.	Assistant Secretary, Technical Services Division, Department of Primary Production (Northern Territory)
Thomas, Mr D. R.	Technical Manager, Metropolitan Waste Disposal Authority (New South Wales)
Thompson, Mr K. E.	First Assistant Secretary, Environment Division, Department of Science and the Environment
Thorne, Mrs K. P.	Assistant Secretary, Royal Australian Chemical Institute
Toovey, Mr D. R.	Assistant Secretary, Physical Working Environment Branch, Working Environment Division, Department of Science and Technology
Trew, Mr R. N.	Post-graduate student, School of Australian Environmental Studies, Griffith University
Voce, Mr L. A.	Chief Inspector, Machinery, Department of the Capital Territory
Watson, Mr J. A.	Safety Manager, Consolidated Fertilizers Ltd
Weaver, Mr D. R.	Administrative Assistant to the Dean, Faculty of the Arts, Adelaide College of the Arts and Education
Webb, Mr B.	Operations Manager, Transport Division, Department of Transport and Works (Northern Territory)
Weedman, Mr D. E.	Registrar of Pesticides, Department of Agriculture (New South Wales)
Westerman, Professor H. L.	Chairman, Botany Bay Sub-Region Community Advisory Committee
Williams, Mr J. W.	Research Worker, Workers Health Centre (Lidcombe)
Wilson, Mr H. O.	Senior Chemist, Water Division, Department of Transport and Works (Northern Territory)
Wood, Mr C. K.	Deputy Director, Industrial Relations Bureau
Woodhouse, Mr P. W.	Executive Secretary, Royal Australian Chemical Institute
Yates, Mr P. B.	Principal Engineer, Water, Wastes and Chemicals Branch, State Pollution Control Commission (New South Wales)
Young, Ms P.	Research Officer, Workers' Health Centre (Victoria)

APPENDIX III

LIST OF SUBMISSIONS

Persons and organisations who have made submissions but who have not appeared at public hearings to date

A.C.T. Fire Brigade
Agricultural Technologists of Australasia
Anti Cancer Council of Victoria
Australasian College of Dermatologists
Australian Community Health Civil Rights Association
Australian Fire Protection Association Ltd
Australian Institute of Petroleum Ltd
Australian National Line
Australian National Railways Commission
Australian Pharmaceutical Manufacturers' Association
Baker, Dr R. S. U., Lane Cove, N.S.W.
Barker, Mr J. D., Camp Hill, Qld
Beacroft, Mr D. F., Page, A.C.T.
Bureau of Sugar Experiment Stations
Burrows, Mr F., Lidcombe, N.S.W.
Carroll, Ms B., Murwillumbah, N.S.W.
Centre for Environmental Studies, University of Adelaide
Commonwealth Scientific and Industrial Research Organisation
Community Action on Science and the Environment
Corke, Mrs J., East Hawthorn, Vic.
Crafts Council of the A.C.T.
Crawford, Dr P. J., Paris, France
Department of Housing and Construction
Doddrell, Professor D. M., Griffith University
Esso Australia Ltd
Federated Moulders (Metals) Union of Australia (N.S.W. Branch)
Federated Municipal and Shire Employees Union of Australia, Victoria Division
Flick, W. A. and Co.
Geelong Church of England Grammar School
Gillies, Ms R., Pennant Hills, N.S.W.
Haslem, Ms A., Innisfail, Qld
Heathcote Citizens Action Committee
Jeffrey, Mr B., Maroochydore, Qld
Keen Pour Industries
Kodak (Australasia) Pty Ltd
Lara Environment Action Group
Latrobe Valley Water and Sewerage Board
Leeder, Professor S., University of Newcastle
Lees, Mr J. J., McDowall, Qld
Lowe, Mrs A. M., Lowther, N.S.W.
Lower Burns Bay Road Association
Major, Mr G., Wahroonga, N.S.W.

McGrath, Ms A., Lisarow, N.S.W.
Mentone and Cheltenham Residents Action Group for Clean Air
Mills, Mr L., Nowra, N.S.W.
Minister for Education
Minister for Immigration and Ethnic Affairs
Minister for Industry and Commerce
Minister for Post and Telecommunications
Morice, Dr R., New Town, Tas.
National Council of Women of Australia
National Farmers Federation
Nationwide Recovery Systems Pty Ltd
Nazer, Mr C. J., Page, A.C.T.
Nedlands College of Advanced Education
Non-Smokers Movement of Australia
Opit, Professor L., Monash University
Poyser, Ms D., Hawthorn, Vic.
Preston Institute of Technology
Qantas Airways Limited
Sheedy, Mr T. J., Department of Science, Newcastle College of Advanced Education
Shire of Corio
Sibatani, Dr A., North Ryde, N.S.W.
South Australian Country Women's Association Inc.
Technical Service Guild of Australia
Telecom Australia
The Cancer Institute, Peter McCallum Hospital
Thornely, Mr A. T., Kerang, Vic.
Thorpe, Mr K. J., Dee Why, N.S.W.
Trans-Australia Airlines
United Firefighters Union, Victorian Branch
University of Queensland
Victorian College of Pharmacy
Waid, Professor J. S., La Trobe University
Webster, Professor I., University of New South Wales
Wells, Ms V. V., Altona, Vic.
Western Australian Institute of Technology
Wide Bay ---Burnett Conservation Council

APPENDIX IV

Summary of Wastes Generated and Stored on Trade Premises in Victoria

Waste type	‡IDC Totals		Present production rate (1980)	Anticipated production rate (1990)	Existing stockpiles (1980)
	Annual rate	Stored			
	litres	litres	litres	litres	litres
1. Polychlorinated biphenyl (PCBs)	17 000	60 000	5 000	5 000	†254 000
2. Solvent bearing and flammable					
(a) Dirty solvent	..	558 000	430 000	410 000	581 000
(b) Sludge	45 000	465 000	205 000	220 000	30 000
(c) Solvent recovery still bottoms	..	202 000	116 000	100 000	9 000
(d) Waste paints	205 000	473 000	300 000	275 000	212 000
(e) Raw materials	192 000	504 000	105 000	100 000	120 000
(f) Other flammable liquid wastes	230 000	540 000	110 000	120 000	157 000
3. Chlorinated hydrocarbons	1 063 000	1 500 000	562 000	280 000	1 438 000
4. Miscellaneous chemicals					
(a) Pesticides	..	19 000	19 000
(b) Brine sludge	200 000	1 400 000	200 000	*200 000	1 400 000
(c) Pressure pack cans	..	11 000	11 000
(d) Phosphorous muds	2 000	4 000	2 000	*2 000	4 000
(e) Arsenic wastes	2 000	18 000	2 000	*2 000	18 000
(f) Other chem. oddities	..	16 000	16 000
Totals	1 956 000	5 770 000	2 037 000	1 714 000	4 269 000

* not surveyed

† 85 000 litres in stockpiles; 170 000 litres in service

‡ Interdepartmental Committee Report Totals (1979).

Source: Environment Protection Authority, *Disposal of Intractable Wastes in Victoria—a draft strategy*, East Melbourne, January 1981, p. 16.

APPENDIX V

Extract from United Kingdom transport regulations classification of hazardous materials

1	2	3	4
Name of substance	Substance identification number	Emergency action code	Hazard warning
Hazardous waste, liquid, containing acid	7006	2WE	Other hazardous substance
Hazardous waste, solid or sludge, containing acid	7007	2WE	Other hazardous substance
Hazardous waste, liquid, containing alkali	7008	2WE	Other hazardous substance
Hazardous waste, solid or sludge, containing alkali	7009	2WE	Other hazardous substance
Hazardous waste, flammable liquid, flash point below 23°C	7010	3WE	Other hazardous substance
Hazardous waste, flammable liquid, flash point 23°C to 60.5°C	7011	3W	Other hazardous substance
Hazardous waste, flammable, solid or sludge, n.o.s.	7012	3WE	Other hazardous substance
Hazardous waste, solid or sludge, n.o.s.	7014	2X	Other hazardous substance
Hazardous waste, liquid, n.o.s.	7015	2X	Other hazardous substance
Hazardous waste, solid or sludge, toxic, n.o.s.	7016	2X	Other hazardous substance
Hazardous waste, liquid, toxic, n.o.s.	7017	2X	Other hazardous substance
Hazardous waste, liquid, containing inorganic cyanides	7019	4X	Other hazardous substance
Hazardous waste, solid or sludge, agrochemicals, toxic, n.o.s.	7020	3WE	Other hazardous substance
Hazardous waste, liquid, agrochemicals, toxic, n.o.s.	7021	4WE	Other hazardous substance
Hazardous waste, containing isocyanates, n.o.s.	7022	4WE	Other hazardous substance
Hazardous waste, containing organolead compounds, n.o.s.	7023	4WE	Other hazardous substance

n.o.s. not otherwise specified.

APPENDIX VI

CONVENTION ON THE PREVENTION OF MARINE POLLUTION BY DUMPING OF WASTES AND OTHER MATTER

ANNEX I

1. Organohalogen compounds.
2. Mercury and mercury compounds.
3. Cadmium and cadmium compounds.
4. Persistent plastics and other persistent synthetic materials, for example, netting and ropes, which may float or may remain in suspension in the sea in such a manner as to interfere materially with fishing, navigation or other legitimate uses of the sea.
5. Crude oil, fuel oil, heavy diesel oil, and lubricating oils, hydraulic fluids, and any mixtures containing any of these, taken on board for the purpose of dumping.
6. High-level radio-active wastes or other high-level radio-active matter, defined on public health, biological or other grounds, by the competent international body in this field, at present the International Atomic Energy Agency, as unsuitable for dumping at sea.
7. Materials in whatever form (e.g. solids, liquids, semi-liquids, gases or in a living state) produced for biological and chemical warfare.
8. The preceding paragraphs of this Annex do not apply to substances which are rapidly rendered harmless by physical, chemical or biological processes in the sea provided they do not:
 - (i) make edible marine organisms unpalatable, or
 - (ii) endanger human health or that of domestic animals.

The consultative procedures for under Article XIV should be followed by a Party if there is doubt about the harmlessness of the substance.

9. This Annex does not apply to wastes or other materials (e.g. sewage sludges and dredged spoils) containing the matters referred to in paragraphs 1-5 above as trace contaminants. Such wastes shall be subject to the provisions of Annexes II and III as appropriate.

ANNEX II

The following substances and materials requiring special care are listed for the purposes of Article VI (1) (a).

- A. Wastes containing significant amounts of the matters listed below:

arsenic	}	and their compounds
lead		
copper		
zinc		

organosilicon compounds
cyanides
fluorides
pesticides and their by-products not covered in Annex I.

- B. In the issue of permits for the dumping of large quantities of acids and alkalis, consideration shall be given to the possible presence in such wastes of the substances listed in paragraph A and to the following additional substances:

beryllium }
chromium } and their compounds
nickel }
vanadium }

C. Containers, scrap metal and other bulky wastes liable to sink to the sea bottom which may present a serious obstacle to fishing or navigation.

D. Radio-active wastes or other radio-active matter not included in Annex I. In the issue of permits for the dumping of this matter, the Contracting Parties should take full account of the recommendations of the competent international body in this field, at present the International Atomic Energy Agency.

ANNEX III

Provisions to be considered in establishing criteria governing the issue of permits for the dumping of matter at sea, taking into account Article IV (2), include:

A—Characteristics and composition of the matter

1. Total amount and average composition of matter dumped (e.g. per year).
2. Form, e.g. solid, sludge, liquid or gaseous.
3. Properties: physical (e.g. solubility and density), chemical and biochemical (e.g. oxygen demand, nutrients) and biological (e.g. presence of viruses, bacteria, yeasts, parasites).
4. Toxicity.
5. Persistence: physical, chemical and biological.
6. Accumulation and biotransformation in biological materials or sediments.
7. Susceptibility to physical, chemical and biochemical changes and interaction in the aquatic environment with other dissolved organic and inorganic materials.
8. Probability of production of taints or other changes reducing marketability of resources (fish, shellfish, etc.)

B—Characteristics of dumping site and method of deposit

1. Location (e.g. co-ordinates of the dumping area, depth and distance from the coast), location in relation to other areas (e.g. amenity areas, spawning, nursery and fishing areas and exploitable resources).
2. Rate of disposal per specific period (e.g. quantity per day, per week, per month).
3. Methods of packaging and containment, if any.
4. Initial dilution achieved by proposed method of release.
5. Dispersal characteristics (e.g. effects of currents, tides and wind on horizontal transport and vertical mixing).
6. Water characteristics (e.g. temperature, pH, salinity, stratification, oxygen indices of pollution—dissolved oxygen (DO), chemical oxygen demand (COD), biochemical oxygen demand (BOD)—nitrogen present in organic and mineral form including ammonia, suspended matter, other nutrients and productivity).
7. Bottom characteristics (e.g. topography, geochemical and geological characteristics and biological productivity).
8. Existence and effects of other dumpings which have been made in the dumping area (e.g. heavy metal background reading and organic carbon content).
9. In issuing a permit for dumping, Contracting Parties should consider whether an adequate scientific basis exists for assessing the consequences of such dumping, as outlined in this Annex, taking into account seasonal variations.

C—General considerations and conditions

1. Possible effects on amenities (e.g. presence of floating or stranded material, turbidity, objectionable odour, discolouration and foaming).
2. Possible effects on marine life, fish and shell fish culture, fish stocks and fisheries, seaweed harvesting and culture.

3. Possible effects on other uses of the sea (e.g. impairment of water quality for industrial use, underwater corrosion of structures, interference with ship operations from floating materials, interference with fishing or navigation through deposit of waste or solid objects on the sea floor and protection of areas of special importance for scientific or conservation purposes).
4. The practical availability of alternative land-based methods of treatment, disposal or elimination, or of treatment to render the matter less harmful for dumping at sea.

APPENDIX VII

Opinion of Professor Geoffrey Sawer on Commonwealth powers in relation to hazardous waste management

1. I am asked for advice on Commonwealth powers relating to the 'safe transport, storage, treatment and disposal of hazardous waste' resulting from the operations of persons, organizations and corporations (I assume both non-governmental and governmental) which involve 'chemicals hazardous to health and the environment'. The Committee further indicates that it has in mind positive regulation and licensing of relevant operators and operations. The general question of Commonwealth competence in such fields has until recently received little attention from the Courts or from legal writers, partly because until recently 'environmental protection' as a distinct legal topic has hardly existed, and partly because neither that topic as a whole nor the traditional legal categories entering into it (land use, public and private nuisance and related torts, factory regulation etc.) appear among the listed constitutional powers of the Commonwealth, a government of defined powers, and are therefore presumed to be among the powers 'reserved' to the States under sec. 107 of the Constitution, i.e. Clause 9 of the *Commonwealth of Australia Constitution Act 1900*. The first considerable treatment of the subject of which I am aware appears at pp. 207 ff. of the Hope Report on the National Estate, 1974 (Parliament of the Commonwealth, Parliamentary Paper 1974 No. 195). Incidental references appear in a number of general papers on environmental matters, but so far as I know the only published paper directly dealing with the topic is *Commonwealth Power to Regulate Industrial Waste*, H. Opie, (1976) 10 M.U.L.R. 577. The Committee has kindly provided me with a copy of an unpublished paper by the Attorney-General's Department titled *Constitutional and Legal Position of the Commonwealth in relation to Environmental Protection*, dated 31 July 1979. This paper evidently owes something to the Hope Report; like the Report, that paper omits reference to what I consider a major possible source of Commonwealth power in this field, namely the Corporations power, Constitution sec. 51 (xx), and also omits from the Commonwealth's possible sources of inducement the Bounties power, Constitution sec. 51 (iii). The Opie article deals at some length with both the Corporations and the Bounties powers.

2. The Committee informs me that it is sufficiently aware of the sources of direct authority in the relevant fields derived from the Federal Territory power, Constitution sec. 122, the Commonwealth places power, Constitution sec. 52 (i), Commonwealth powers in marine waters derived from Constitution sec. 51 (xxix) (External Affairs) and possibly from 'national government' implications, and Commonwealth control of its governmental authorities derived from Constitution sec. 52 (ii) and 51 (xxxix) and possibly again from 'national government' implications. However it should be pointed out that the sources mentioned above may not give an adequate account of the Commonwealth's powers in marine waters, because they rather stress the power derived from international conventions and rather suggest that beyond territorial waters to the edge of the continental shelf, the power is confined to the solum. But in *Seas and Submerged Lands* (1975) 135 C.L.R. 337, a clear majority of the High Court—*Barwick C.J., Mason, Jacobs and Murphy JJ.*—placed the authority of the Commonwealth in those areas squarely on a new doctrine of *physical externality*, quite independent of international law whether customary or conventional, and this gives the Commonwealth an authority having the same juristic force as its authority in Federal territories, at least to the edge of the continental shelf, in the waters as well as the solum. Furthermore, the development of both international conventions and received customary international law in the past decade has resulted in doctrines of the patrimonial sea and of economic zones extending at least two hundred nautical miles from the beaches, which similarly extend Com-

monwealth authority to the waters as well as the solum. The upshot is that the Commonwealth has the most ample authority to deal with all aspects of the 'chemical wastes' problem in the areas mentioned. I should also mention the question raised in the paper by the Attorney-General's Department, concerning the effect of the legislation by which the Commonwealth has in various respects readmitted the States to a share in the control of the Territorial Sea and its solum, and in some respects in waters beyond, and has vested substantially the same powers in the States as they would have had if the dissenting opinions in *Seas and Submerged Lands* had prevailed. It is my opinion that the *Coastal Waters (State Powers) Act* 1980 is not supported by sec. 51 (xxxviii) of the Constitution, and so like the other Acts in this group can be repealed or amended without any reference to the States, and that even if it is so supported it can be repealed (though not amended) without any such reference. I mention this merely to emphasize that as a matter of constitutional law the Commonwealth is supreme in the Territorial Sea and beyond, and can carry out in that area any policy it pleases on the subjects of concern to the Committee, including policies which are at variance with applicable international conventions or which go further than such conventions require. The politics of such actions are quite another matter.

3. The Report and papers mentioned above draw attention to the many ways, mainly fiscal, in which the Commonwealth can provide inducements to behaviour relevant to the matters of interest for the Committee, or can in effect inflict monetary penalties for failure to perform accordingly; conditional grants to States under sec. 96 of the Constitution, and conditional bounties under sec. 51 (iii), and conditional taxes or remission of taxes under sec. 51 (ii) are the most prominent. The *Environment Protection (Impact of Proposals) Act* 1974 provides a more generalised method of using Commonwealth administrative decisions generally as levers with which to affect relevant behaviour, and the working of the Act is explained and illustrated in two High Court decisions—*Murphyores* (1976) 136 C.L.R. 1, and *Australian Conservation Foundation* (1980) 28 C.L.R. 257. The difficulty with most of these schemes is that they fail to exert direct legal pressure on the relevant persons and corporations to behave in the manner desired; if the offered payment or relief from tax or the grant or refusal to grant some other advantage (e.g. the permission to export in *Murphyores*) does not induce the desired behaviour, then so far as federal authority is concerned that is the end of the matter. Thus if in *Murphyores* the plaintiff mining company had subsequently found a profitable market for Fraser Island minerals in Australia, the Commonwealth could not have prevented the treatment of the sands from proceeding, since this would have been lawful under the only laws directly applicable—those of Queensland. Many schemes could be designed, and the Hope Report and the Opie article outline several, by which inducements or threats based on Commonwealth powers could be associated with regulatory and even licensing requirement, but they would be exceedingly expensive in both the offered advantages or in revenue foregone, and administratively, and partial in results, because of the dimension and cost of the operations required in programs for the management of deleterious industrial wastes. I doubt whether any inducement program would be satisfactory except one depending on conditional grants under sec. 96 which induced the States to enact and administer the necessary laws. I assume that for political and economic reasons differing from State to State, it would be difficult to ensure the acceptance of such a scheme by all States more or less simultaneously. Even better, notwithstanding some technical difficulties, would be reference of the necessary powers to the Commonwealth by all States under sec. 51 (xxxvii) of the Constitution; again I assume that for political and economic reasons this would be difficult to obtain. The main technical difficulty is the unresolved question whether a State can revoke such a reference and thereby end the operation of relevant laws in that State; my opinion is that it cannot, but in any event I should think that if a uniform and more or less simultaneous set of references could be procured, it would be politically unlikely that revocation would be attempted at all soon. The stress on universality, uniformity and simultaneity in the above is based on economic, not legal considerations. It is quite possible that a reference-based scheme operating in less than all States would be feasible in relation to particular industries, if this created no competitive difficulties between States, and this is constitutionally possible. It may be thought that the prohibition of preferences among States in sec. 99 of the Constitution would be an obstacle. However, it is likely that the High Court will adhere to the narrow conception of a preference within the meaning of sec. 99 which it adopted in *Elliott*, (1936) 54 C.L.R. 657; this requires that the Commonwealth

law (which I assume would be regarded as a 'regulation of trade') gives a positive, specific, measurable advantage to some States over others, and there would be the same difficulty in identifying who was preferred, the regulated or unregulated State, as there was in *Elliott*, in which case sec. 99 would not be infringed. Both a scheme depending on State cooperation induced by sec. 96 grants and one depending on reference under sec. 51 (xxxvii) would be subject to the inhibitions of the guarantee of freedom of interstate trade under sec. 92 of the Constitution, whose operation is further discussed in the next paragraph. Note however that in the case of a sec. 96 scheme, there would be a strong case for using Commonwealth power as to interstate trade, Constitution sec. 51 (i), in order to deal with the interstate transport component of the total scheme, because in the present confusion of doctrines concerning sec. 92, there is a possibility that uniform Commonwealth law of a regulatory character is more likely to be held valid than similar and potentially varying State laws; see the discussion of the authorities in Zines, *The High Court and the Constitution*, p. 116 ff.

4. The two most promising bases for Commonwealth action in the geographic area of the States, where most of the relevant industrial operations are likely to occur, and not depending on inducements or pressures of an indirect sort, are the Corporations Power, Constitution sec. 51 (xx), and the Interstate Trade Power, sec. 51 (i). The Corporations Power has the advantage of applying to both interstate and intrastate transactions, and the disadvantage of not applying to individual or partnership as distinct from corporate activity. The Interstate Trade Power has the advantage of applying to all persons, natural and corporate, and the disadvantage of not applying to intrastate activities. However, there is no reason why relevant legislation should not be drafted so as to exercise both powers (and indeed other and more marginal powers such as Territories, Commonwealth Places, Commonwealth instrumentalities etc.). The first version of the federal Trade Practices Act was held invalid by the High Court in *Concrete Pipes* (1971) 124 C.L.R. 468 because it was based on several constitutional heads of power, and the Court held that the draftsman had not provided a sufficient basis for 'severing' invalid from valid exercises of those powers; this has provided the federal draftsmen with ample advice and practice in overcoming such difficulties and the amended Trade Practices Act has not again been challenged on such grounds. It would be desirable to treat a federal waste-disposal Act in a similar fashion, because the legal doubts and difficulties attending the use of the two major sources of power — corporations and interstate trade — are different, and the circumstances of particular parties who might challenge the application of such legislation to them might require more emphasis on one power or the other in accordance with the circumstances. However, I would expect the Corporations Power to be the more important source, except in relation to the special problem of the high temperature incinerator. I now turn to these two powers.

- (a) Corporations Power. Sec. 51 (xx) of the Constitution gives the Commonwealth power with respect to 'Foreign corporations, and trading or financial corporations formed within the limits of the Commonwealth'. As to foreign corporations, there is no direct authority but it is highly probable that the High Court would hold valid any regulation of any activity of such corporations, subject only to the restraints of sec. 92, so that all the special concerns of the Committee could be attended to. This, however, is of little practical significance since probably the Court would treat as a 'foreign corporation' only a corporation formed under a non-Australian country's law which then proceeded to do business in Australia in accordance with the foreign corporation provisions of the various State and Territory Companies Acts. Few foreign corporations are likely to do this; they prefer to procure the separate incorporation in Australia, under Australian law, of a subsidiary in which they own all or most of the shares, and they would certainly proceed to do this if in consequence the potential application of sec. 51 (xx) to their affairs was reduced. Such subsidiaries would probably not be treated by the High Court as 'foreign corporations'. Similarly we can ignore the reference to 'financial corporations', which are unlikely to engage in the production of chemical wastes. We are concerned only with 'trading . . . corporations formed within the limits of the Commonwealth'. As indicated, 'formed' has been assumed to mean brought into legal existence under the pro-

visions of Australian laws. Hence the problem is the ambit of 'laws . . . with respect to trading corporations'. Until *Concrete Pipes* (supra), it had been held or said in High Court judgements that this was a very restricted power, but the Court then decided that its former decisions and dicta should be overruled or disregarded. It adopted instead a simple literal approach to the section, according to which the Commonwealth could at least make laws regulating the trading activities of a trading corporation, in the particular case by prohibiting specified restrictive trade practices such as price maintenance. For political reasons, there has been an extraordinary dearth of Commonwealth Acts building on *Concrete Pipes*, the only significant decisions since being *C.L.M. Holdings* (1977) 135 C.L.R. 235, which inferentially held valid the consumer protection provisions of the Trade Practices Act —also clearly within the notion of regulation of trading activity — *St. George County Council* (1974) 130 C.L.R. 533 and *Western Australian Football League* (1979) 23 A.L.R. 439 (both concerned with restrictive trade practices). Hence there has been no case directly involving production and its regulation by laws based on this power. In ordinary speech it is common enough for trade to be distinguished from production, and the distinction has at various times in the past been observed and applied in judicial decisions concerning 'trade', or 'trade and commerce'. The hazardous waste of concern to the Committee is, I presume, generated entirely or chiefly in the process of production or manufacture, not in the process of distributing, selling etc. the products in question. Hence an attempt at regulating or licensing the production and disposal of waste is likely to be met with the argument that it would not be law with respect to the trading activity of the corporations concerned and hence not validated by sec. 51 (xx). It certainly cannot be stated dogmatically that this argument is bound to fail, since the topic has been so little explored and the decisions do not directly cover it. Nevertheless, it is my opinion that the argument would be rejected by at least a majority of the High Court as now constituted, and possibly unanimously. The chief counter-arguments are as follows:

- (i) Generally, the High Court encourages broad rather than narrow approaches to the construction of positive grants of power. The dicta emphasizing a distinction between 'trade' and 'production' occur chiefly in relation to the restriction on power in sec. 92. See generally Lane, *Australian Federal System*, 2nd ed., pp. 175, 182-4, 1188-1195, and especially *Australian National Airways* (1945) 71 C.L.R. at 85, per Dixon J., and in relation to sec. 51 (xx) itself, *Barwick C. J. in Concrete Pipes* at 490.
- (ii) 'Transport is trade'—*Australian National Airways* (supra). To the extent that a corporation engages in the disposal of wastes as a business, it is trading and the disposal is subject to regulation under sec. 51 (xx). A corporate body producing waste and buying the service of disposal is also to that extent engaging in trade. Even non-corporate persons collaborating with such waste-producing or disposal corporations may also be reached; *C.L.M. Holdings* (supra). A corporate body merely transporting the waste for reward is trading, and a corporate body creating waste and engaging a non-corporate body to transport it for reward is trading.
- (iii) Before *Concrete Pipes*, some of the dicta suggesting exclusions from the reach of 51 (xx) had included manufacturing or producing corporations. Since then, the dicta suggesting exclusions have included governmental, educational and sporting corporations, but none have included manufacturing etc. corporations. Indeed, the relevant corporation in *Concrete Pipes* both manufactured and sold, and during argument Windeyer and Owen JJ. suggested disagreement with the earlier dicta on this point; see Lane ut cit. p. 184 n. 32. These considerations are not conclusive because although the power clearly extends to corporations which both make and trade, it may still be the case that only their trade can be regulated.
- (iv) The relation between making and trading in this context is quite different from that in the context of sec. 92. In the latter case, it is certain that any 'making' corporation will also trade, if only to the extent of selling to a distributor, but not at all certain (absent a contractual obligation) that it will sell interstate; hence the

justification in that context for refusing to treat the transaction of making as within sec. 92. But since all corporate makers will also be traders, and will make only for the purpose, immediate or ultimate, of disposing of the product in trade, the making and the trading can and should be treated as a single continuous operation, all within 51 (xx). Decisional support for bringing production within the scope of a 'trade' power when the production is thus tied to selling etc. comes from *Noarlunga* (1954) 92 C.L.R. 565 (Commonwealth may regulate processing of meat for export under sec. 51 (i)), and from *Western Australian Football League* (supra), dealing directly with 51 (xx). In the latter case the management and public exhibition of football games for reward by professional players was treated as within 51 (xx); see particularly the dicta of *Barwick C.J.* at 454, where he says also that professional theatrical production is trade. In such instances the coincidence of 'production' and 'sale' is manifest.

- (v) Even if not regarded as an inseverable part of an act of trade, production is necessarily incidental to it and either included in it on common law principles or under sec. 51 (xxxix). See generally Zines ut cit. chap. 4.
- (vi) Even if matters incidental to production are not treated as directly within 51 (xx), it would be open to the Commonwealth to exert strong 'indirect' pressure on producers by prohibiting the sale of specified products unless they are produced in ways complying with requirements for the safe and effective disposal of wastes. Such a law would operate directly in a field authorised by sec. 51 (xx) on the narrowest construction, and on the principles supported by *Murphyores* (supra), *Fairfax* (1965) 114 C.L.R. 1 and *Herald & Weekly Times* (1966) 115 C.L.R. 418, the circumstance that the prohibition is imposed by reference to considerations not directly within Commonwealth competence is irrelevant.

(b) *Constitution sec. 51 (i), 'Trade and Commerce . . . Among the States'*. The volume of cases on this power is large, and the general result is a doctrine giving the power a much narrower scope than the similar power in the U.S. Constitution has been given by the Supreme Court of that country. The High Court requires a highly specific relationship between the trading activity sought to be regulated and the crossing of a State border, before federal power is attracted. In recent years, the High Court has had little occasion for reconsidering the positive interstate trade power, which is capable of development; see Zines ut cit. chaps. 2 and 4. However, this is of little importance in the present context, since it is unlikely that the present High Court would change established doctrine so as to approximate the U.S. doctrine, under which the Commonwealth would have ample power to act as the Committee suggests in relation to industrial wastes. The High Court is likely to retain 51 (i) doctrines in which there is a distinct area of *intra-state* trade and commerce beyond federal reach so far as that head of power is concerned, and I would expect a great deal of industry and waste-disposal to remain within that area. Why, then, bother at all with sec. 51 (i) in the present context? Because, first, if contrary to my opinion the Corporations Power was not held to cover the matter as suggested in (a) of this paragraph, then at least interstate movement of wastes could be covered by federal law; second, similarly, to the extent that the Corporations Power failed to cover activities of natural persons and partnerships, at least their interstate activities could be covered by federal law; third, because if as the Committee suggests high temperature disposal is confined to a single State, federal law could cover that plant's interstate trade. The one clear doctrine emerging from the cases on sec. 51 (i) is that the crossing of State borders by any form of transport for any kind of commercial purpose is within sec. 51 (i) and subject to federal law.

(c) Both the Corporations and the Interstate Trade Powers are subject to the inhibitions of sec. 92 *'Trade, commerce and intercourse among the States . . . shall be absolutely free'*. The case law on this is extremely voluminous and current doctrine is in a state of considerable doubt and confusion; see Zines ut cit. chaps. 6, 7 and 8. The *Uebergang* case, which Professor Zines hoped would clear up some of these doubts, was abandoned before coming to trial. The Hope Report, and the Opie and Attorney-

General's papers, express a good deal of pessimism about the impact of sec. 92 on environment-protection legislation, but I think they exaggerate the difficulty. It is very well settled that sec. 92 permits reasonable regulation of trade to protect important public interests, such as health and safety. See Lane *ut cit.* pp. 809-812, and in particular the summary list of cases at p. 814. Thus, for example, the Court held valid a complex set of State Acts and Regulations governing interstate trucking activities in *Greutner and Sloman* (1960) 103 C.L.R. 177, and the general reasoning underlying such decisions was approved by the Privy Council in *Freightlines* (1967) 116 C.L.R. 1. It may well be that the more aesthetic or spiritual aspects of environmental protection would not be respected by the High Court, or a majority of its members, in the application of these doctrines, but the matters with which the Committee is concerned are self-evidently within the values which the Court will certainly regard as a sound basis for regulatory laws. Two things have to be avoided, on present doctrine governing these matters. First is any attempt at 'economic rationalisation' by imposing quotas on the number of licensed operators; any person or corporation who can meet the specified, objective conditions required to ensure safe handling and disposal must be entitled to a licence. Second is any considerable use of administrative discretions; this aspect of the doctrine may be relaxed by the present Court, but the only completely safe course is to draft the Acts and regulations so that final decision on questions of entitlement to licence and breach of requirements is left to the ordinary courts.

5. Some of the possible questions arising from the position as to a high temperature incinerator are mentioned above. If this was run as a commercial enterprise, charging for its services, then if (as is likely) it was run by a corporate body, whether private or governmental, it would be subject to federal regulation under the Corporations Power as indicated above. A federal law requiring the enterprise to accept material from all parts of Australia would certainly be valid, since sec. 92 has no impact on laws which protect or promote interstate trade. If, however, the incinerator were run on non-commercial lines by a State government department or corporation, then the general doctrine applied in *St. George County Council* (*supra*) would place the plant beyond the reach of sec. 51 (xx). It is true that in *Western Australian Football League* a majority of the High Court disapproved the reasoning and decision in *St. George County Council*, but they did not disagree with the proposition that a corporation which both in its current running and having regard to its charter of operation is substantially a governmental rather than trading corporation is beyond the reach of sec. 51 (xx). Even less would such a governmental operation be within sec. 51 (i). Hence if a State government did decide to build and operate such a plant in a manner removing it as far as possible from categorisation as a trading activity, the Commonwealth could influence the matter only by fiscal and other indirect means. However, I do not have sufficient instructions as to the courses of action which the Committee might wish to take, or the difficulties it anticipates in this field to say more at present.

6. More generally, questions may arise as to the power of the Commonwealth to apply laws bearing on this matter to the operations of State governments and governmental instrumentalities which might produce deleterious chemical wastes. *The Engineers' Case* (1920) 28 C.L.R. 129 firmly established a general doctrine that the Commonwealth can make its laws applicable to the States and their instrumentalities, subject to specific prohibitions such as sec. 99 (preferences) and 114 (tax on State property), and to the judge-made and possibly now abandoned rule about discrimination in *State Banking* (1947) 74 C.L.R. 31. On the assumption that the laws now contemplated are intended to apply generally to private and public enterprise, are regulatory, and do not include a taxation component, it is evident that they would be capable of valid application to State governments and instrumentalities. The only problem would be that inherent in the nature of the powers in question, in particular the meaning of the term 'trade' appearing in both and 'commerce' appearing in sec. 51 (i).

7. I should also make some specific observations on the last two matters mentioned in the Committee briefing.

- (a) Protection of those exposed to dangerous wastes 'through direct contact or environmental pathways'. The Corporations Power has so far been confined and may remain

confined by specific doctrine to the behaviour of corporations so far as it influences or affects the outside world — customers, competitors etc. Even in that field it may conceivably not be extended to include law governing the tort liability of corporations (private and public nuisance, dangerous products, defamation etc). My judgment, however, is that consumer protection is likely to be extended to more general protection of the community outside the corporation, at least so far as this is the consequence of the kinds of trade carried on. If so, then, for example, corporations producing hazardous wastes could be made strictly liable for injuries caused to an extent greater than they already are at common law. The question of the 'internal' relations of the corporation is completely uncertain and is disputed by commentators, but here again it is far from inconceivable that the High Court will extend the 51 (xx) power to all such relations, including employer liability. There is no problem here of competing power in sec. 51, as there is in the case of the question whether sec. 51 (xx) applies to banks. Given a basis of this sort in sec. 51 (xx), then it would also be within power to specify a liability for harm caused through 'environmental pathways', provided it could reasonably be said that the connection between harm and corporate conduct is sufficiently substantial to keep the law in the category of one with respect to 'trading corporations'. Questions of remoteness are bound to arise.

- (b) Public education campaign. Since no element of legal coercion enters into the matter, the sole question that could be raised is the unsettled one of a possible limit to the spending power of the Commonwealth — Constitution secs. 81 and 83. The *A.A.P. Case* (1975) 134 C.L.R. 338 leaves this problem in the same state of doubt as did the *Pharmaceutical Benefits Case* (1945) 71 C.L.R. 237. However, there being substantial authority for as well as against the view that the Commonwealth can spend its money as it pleases, I would strongly advise the Commonwealth to act on the positive view and await a challenge. It is difficult to believe that any State would challenge the education campaign suggested, certain that no individual would have standing to challenge it, and if any constitutional difficulty did arise, at least all printed matter could be printed in the A.C.T. under the shelter of the unlimited power in sec. 122 and distributed through the post under the shelter of the Postal Power, sec. 51 (v).

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7 Dec 1981