

Report of the Joint Committee on
the Australian Capital Territory

December 1976

CANBERRA CITY WASTES

A long-term strategy for
collection and disposal

THE PARLIAMENT OF THE COMMONWEALTH OF AUSTRALIA

CANBERRA CITY WASTES

A Long Term Strategy for
Collection and Disposal

REPORT OF THE JOINT COMMITTEE
ON THE AUSTRALIAN CAPITAL TERRITORY

DECEMBER 1976

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TERMS OF REFERENCE

It is assumed there will be progressive difficulty in facilitating the collection and disposal of the City's wastes. There is a need for both new techniques and for a long term strategy for collection and disposal. In this context the Committee is to examine and report on the most desirable long term approach to waste collection and disposal having regard to:

- (a) the predicted city growth, its geographical spread and estimated future volumes of waste;
- (b) technical considerations, including existing practices and new Australian and overseas techniques, for disposal or for re-use and recycling of used material;
- (c) economic implications of currently used techniques and any feasible new procedures;
- (d) environmental qualifications;
- (e) social aspects including individual responsibility for waste collection and disposal (in particular litter in places generally open to the public); community group responsibility for waste collection and disposal and nuisance caused by waste and waste disposal; the effectiveness of local laws; and
- (f) the extent to which both management and labour practices can facilitate efficiency and economy.

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ABBREVIATIONS

A.C.I.	Australian Consolidated Industries
A.N.U.	Australian National University
A.P.M.	Australian Paper Manufacturers
A.W.U.	Australian Workers Union
C.T.H.C.	Capital Territory Health Commission
D.A.S.	Department of Administrative Services
D.C.T.	Department of the Capital Territory
M.W.D.A.	Metropolitan Waste Disposal Authority
N.C.D.C.	National Capital Development Commission
P.I.E.C.	Packaging Industry Environment Council
S.C.G.	Steel Can Group
S.S.R.S.	Society for Social Responsibility in Science
U.E.S.G.	Urban Environment Study Group

Acknowledgement

Material used for illustrations in this report came from the Department of the Capital Territory; Jaques (N.S.W.) and Henry Simon Australia. Design of recycling bins was prepared by Mr B.A. Fitzpatrick, Ainslie, A.C.T. Use of this material is acknowledged with thanks.

RECOMMENDATIONS

This Report makes recommendations concerning the system of waste collection and disposal for Canberra. It deals with the various aspects of the problem under particular chapter subject-headings. However, this summary gives the recommendations in an order which the Committee feels provides the framework for a possible future strategy for the handling of Canberra's wastes.

The Committee has placed particular emphasis on the need to find some alternative to the traditional system of collection and the landfill method of disposal which is itself costly and makes little provision for the recycling of important resources which are now lost. The Committee has stressed the need to preserve many resources such as metal, glass and paper which are often indiscriminately disposed of in the existing system of waste disposal. The Committee has therefore examined alternative waste collection methods, both for domestic and other waste materials, and has examined new technology available to separate resources before final disposal or to obtain energy from waste materials. The Committee considers it essential that these are kept under examination by planning authorities so that any future proposals for the introduction of new disposal techniques in the Capital Territory should be the most cost-effective available given the size of the Territory and the related region (which may be associated in this respect) and the need to recycle important resources. Accordingly, the Committee recommends that:

General

1. A Waste Authority should be established within the Australian Capital Territory based on the content of paragraph 279 of this Report.
(Paragraph 280)

2. A survey of the composition of the Capital Territory's wastes be undertaken and reviewed in order to facilitate the evaluation of the feasibility of alternative waste disposal methods. (Paragraph 12)

Laws and Regulations

3. The speedy enactment of the Air Pollution (Stationary Sources) Ordinance to monitor air pollution in the A.C.T. The legislation should include appropriate provisions relating to the control of domestic incineration. (Paragraph 36)
4.
 - . Public officials be appointed under Section 8 of the Litter Ordinance to act as litter enforcement officers; and
 - . a method of defraying costs for the removal of abandoned vehicles be devised. (Paragraph 108)
5. Funds be made available for an anti-litter campaign to increase public awareness of this problem and its cost to the community and that particular emphasis be placed on this issue in schools. (Paragraph 111)
6. Legislation be introduced to reduce the effect of packaging -
 - . on the environment;
 - . as a source of municipal waste; and
 - . as a cost component in the collection and disposal of waste. (Paragraph 98)

7. The Public Health regulations should be amended to make the occupier of each individual commercial premises responsible for the regular removal of garbage to a suitable place of disposal. Containers should be so identified that responsibility for each is clearly defined. (Paragraph 152)

8. Authorities involved in both general planning and waste management continue to review existing legislation which affects waste management practices, to ensure there are no health hazards or dangers arising from trade wastes which will adversely affect the quality of the environment in the Australian Capital Territory. (Paragraph 156)

9. The Commonwealth Government should seek the co-operation of State Governments in introducing uniform measures requiring minimum deposits on beverage containers. (Paragraph 116)

10. The Capital Territory Health Commission proceed immediately with the enactment of an Ordinance providing for the control and disposal of radioactive waste material. (Paragraph 162)

11. The Capital Territory Health Commission establish a register of personnel who are especially qualified to assist in an emergency involving radioactive waste material by reason of their training and experience in handling such material and, if necessary, form a special squad. A stock of decontamination equipment and special clothes should be provided and emergency services should be briefed on the appropriate measures to be taken should such an emergency occur. (Paragraph 164)

12. Garbage grinders which feed directly into the sewerage system, except in high-rise residential buildings and commercial premises, should be prohibited. (Paragraph 127)

The Commonwealth Government

13. All future planning of government built office space include provision for facilities which will increase the recycling potential of government waste paper. (Paragraph 52)
14. The Department of Administrative Services and all Commonwealth Government Departments and Authorities ensure that waste paper and cardboard is handled in such a way that it is, to the maximum feasible extent, recyclable. (Paragraph 48)
15. The Department of Administrative Services and its client departments using the automated vacuum system examine the feasibility of a method of waste paper collection which produces a potentially recyclable product. (Paragraph 46)
16. The Department of Administrative Services undertake to have all classified waste from Commonwealth Government Departments and Authorities in Canberra delivered to a central point for shredding and eventual recycling. (Paragraph 50)
17. The Office of the Australian Purchasing Commission assess the feasibility of stipulating packaging requirements in its contracts for purchase of goods. (Paragraph 100)

Education

18. The issues of waste collection and disposal, environmental implications, resources preservation and reclamation should be included in the curriculum for schools. (Paragraph 10)

Technological Developments

19. The National Capital Development Commission closely monitor technical advances in resources recovery with a view to the eventual establishment of a resources recovery system and the restriction of the landfill method of disposal in planning the future of Canberra's waste disposal operations and that transfer stations with suitable compaction equipment be established and located to provide optimum access for Canberra householders. (Paragraph 211)

20. The waste disposal authorities in the Australian Capital Territory study the pyrolysis process of waste disposal with a view to assessing the feasibility of establishing such a plant in the Australian Capital Territory. (Paragraph 225)

Collection and Disposal in the A.C.T.

21. A pilot household segregation and collection scheme for paper, glass and metal be implemented on the following basis -
 - . suitably marked containers for recyclable material be supplied to householders by the Department of the Capital Territory;

- . collections be done on a self-employed franchise basis with each collector being encouraged to collect all the materials at the one collection and that collections be conducted monthly;
 - . that the Department of the Capital Territory conduct a campaign using radio, television and the press to inform the public and secure its co-operation with the service;
 - . that the Department of the Capital Territory commission a pilot study to assess the success of the scheme and that a report be presented to the Minister for the Capital Territory and the A.C.T. Legislative Assembly. (Paragraph 254)
22. No change be made to the present form of garbage bins for the collection of domestic refuse, except that the use of metal bins should be encouraged by the waste disposal authorities. (Paragraph 24)
23. Upon the expiration of the present domestic collection contracts, all future waste collection should be undertaken by either community partnerships or employees of the Department of the Capital Territory observing all appropriate award provisions. Employees should be encouraged to remain in the industry through the provision of improved working conditions and appropriate clothing. (Paragraph 35)
24. The National Capital Development Commission contact all Commonwealth Departments and interest groups with a request to lodge objections to the proposed siting of future landfill areas in the A.C.T. and to take any

objections into consideration before the development of such sites proceeds.
(Paragraph 170)

25. Efforts should be maintained to reduce the unsightliness of existing and closed tips.
(Paragraph 179)
26. The Department of the Capital Territory widely disseminate for public education, information on sound domestic composting practices. (Paragraph 37)
27. The A.C.T. Milk Authority promote the benefits of and encourage the use of bottles as milk containers in the A.C.T. (Paragraph 67)
28. . The planning of all future buildings in the Australian Capital Territory in which waste oil will be generated incorporate storage facilities to hold that waste;

 . Feasibility studies be undertaken with a view to establishing whether it would be viable to establish in either the Australian Capital Territory or the South East Region of New South Wales a processing plant for oil generated in the area. (Paragraph 134)
29. Environmentally desirable methods of chemical and industrial waste disposal should become a requirement in the planning of all commercial and industrial development in the Australian Capital Territory to ensure that such waste is not disposed of through the sewerage system without adequate safeguards.
(Paragraph 130)

30. All waterways within the A.C.T. downstream from sewage treatment works be monitored by the responsible authorities in the A.C.T. and N.S.W. using internationally recognised water quality measurement techniques to ensure that the water quality does not fall below the highest accepted standards. (Paragraph 123)

31. Processes for the economic re-use of sewage should be investigated by the National Capital Development Commission with a view to their possible eventual adoption in the Australian Capital Territory. (Paragraph 128)

PART A - INTRODUCTION

CHAPTER I: SOME BASIC ISSUES

The Waste Problem

1. The rapid post-war improvement in the living standards of most Australians has seen a commensurate increase in the per capita generation of waste. With this improvement in living standards, there has also been a growing awareness of 'quality of life' issues. The collection and disposal of waste offers one such example. Many Australians are now concerned with the preservation of the quality of air, water and recreational land and are willing to accept some costs related to such improvements. Safeguards against pollution are beginning to be recognised as a fundamental interest of the whole community. Other matters related to waste disposal, which are attracting more attention, include the recycling of important raw materials, technical advances made in resource recovery, alternative energy sources from waste and the use of energy in resource recovery itself.

2. Figures supplied to the Committee by the National Capital Development Commission (N.C.D.C.) give an indication of the extent of the generation of waste in Canberra. Canberra is currently producing solid waste, which consists of domestic refuse, trade waste, litter, City Parks waste and builders' refuse (in contrast to oil and sewage) at the rate of approximately 1.2 kg/person/day, (or approximately 240 tonnes per day). This quantity comprises:

Domestic	0.47 kg/person/day
Trade waste	0.17 kg/person/day
All other	0.56 kg/person/day
 	<hr/>
Total	1.20 kg/person/day
	<hr/>

3. The annual total of various classes of refuse generated in 1975 was summarised as follows:¹

	<u>Tonnes</u>
Domestic Refuse Collection (by contract)	30 000
Domestic Waste (delivered to tips by private individuals)	8 000
Trade Waste (D.C.T. collection)	14 000
City Parks Administration	12 000
Public Litter and Street Sweepings	2 000
	<hr/>
Builders' Refuse	66 000
Recyclables	15 000
	4 000
	<hr/>
Total	85 000
	<hr/>
	<u>Litres</u>
Waste Oil	1 300 000
	<hr/>
	<u>Number</u>
Tyres	115 000

4. The total weight of solid waste in the A.C.T. for 1975 for disposal at landfill sites was approximately 85,000 tonnes for a population of 197,000. The quantity of domestic waste privately delivered to household tips is estimated at 8,000 tonnes or about one-quarter of that collected by

1. Evidence, p.5.

contract. Assuming that the rate of generation remains the same, N.C.D.C. estimates that by 1985 when the population is projected to be 294,000 persons, the community will be generating 127,000 tonnes of waste a year.

5. One of the most important issues related to waste is that of health. The Capital Territory Health Commission (C.T.H.C.) informed the Committee that the basic principles in waste disposal, from the health point of view, were that the discarded waste should not -

- . cause or predispose any increase in communicable diseases;
- . pollute the community's environment; or
- . detract from the physical environment.²

6. The N.C.D.C. informed the Committee that it was becoming difficult to find alternative landfill sites acceptable to the public at a convenient distance from the urban area. There was a need for a new refuse planning strategy, though still based upon landfill. In view of the rapidly changing technology in refuse management and possible trends in resource recovery, N.C.D.C. favoured a time scale of 10 years for implementing its strategy. The Department of the Capital Territory (D.C.T.) also considered this to be an appropriate time scale. The Committee has, however, expressed some reservations (see Chapter V) about the appropriateness of this time scale. The population figures for the growth of Canberra by districts (Table 1), and the possible increase in the generation of waste also suggest the need for a long-term strategy for the collection and disposal of the City's waste.

2. Evidence, p. 95.

TABLE 1

BROAD GUIDELINES FOR FUTURE PLANNING PURPOSES ONLY - NOVEMBER 1976
POPULATION GROWTH OF CANBERRA BY DISTRICTS : 1977-1987 : EXPECTED PROJECTION

AT 30 JUNE	CANBERRA NORTH	CANBERRA SOUTH	WODEN VALLEY	WESTON CREEK	TUGGERANONG	BELCONNEN	OTHER*	TOTAL CANBERRA
1977	43,500	22,700	35,000	27,600	14,700	63,100	2,400	209,000
1978	42,600	22,300	34,700	28,200	20,300	68,500	2,400	219,000
1979	41,900	22,400	34,700	28,700	24,400	74,500	2,400	229,000
1980	41,700	22,700	34,500	28,900	28,700	80,100	2,400	239,000
1981	41,800	23,100	34,700	28,700	32,700	85,600	2,400	249,000
1982	42,200	23,500	35,000	28,400	37,700	89,800	2,400	259,000
1983	42,600	23,800	35,800	27,700	46,200	91,500	2,400	270,000
1984	43,200	24,100	36,900	27,000	56,100	92,300	2,400	282,000
1985	43,600	24,400	38,200	26,400	66,600	92,400	2,400	294,000
1986	44,100	24,700	39,600	25,900	77,800	92,500	2,400	307,000
1987	44,700	25,000	40,300	25,500	89,800	92,300	2,400	320,000

* Includes Hall, Harman, Oaks Estate, Fairbairn.

SOURCE: National Capital Development Commission.

Education and the Community

7. The need for awareness among the public of the high cost of waste collection and disposal, the need to conserve scarce resources and to create an awareness of resource conservation became increasingly evident to the Committee during its Inquiry.

8. Resources conservation is not a new idea. As long as materials were cheap compared with other manufacturing costs, there was comparatively little pressure to use them frugally. But the increasing difficulties in obtaining materials that are now foreseen will be translated into increased prices of materials, and this in itself will be a signal to resources suppliers and users to manage materials more carefully. It is frequently argued that shortages are only temporary because the new effort stimulated by the associated price rise restores supply-demand equilibrium. It should be accepted that most resources are finite, though our knowledge of their limits is imprecise.

9. It is important that scientific and technological skills be used to develop and apply knowledge effectively to raw materials conservation. The boundaries of most of the technical questions arising in the materials-energy-environment system, whether long range or short range in their research implications, do not neatly coincide with the boundaries of the traditional scientific and engineering disciplines. Most of the problems will be satisfactorily solved only through interdisciplinary co-operation. There is also a need for careful consideration of economic issues as they relate to such conservation or reclamation. The Committee considers that there is a need for educational institutions to extend the means of meeting the challenge of resources conservation.

10. The Committee agrees with a suggestion of the C.T.H.C. and recommends that the issues of waste collection and disposal, environmental implications, resources preservation and reclamation should be included in the curriculum for schools.

Data Needs

11. The Committee was given figures of the estimated waste quantities collected in Canberra (see paragraph 2). Detailed figures on the actual composition of Canberra's wastes were not available. Several witnesses brought to the Committee's attention the necessity for more precise data on the composition of Canberra's wastes before detailed planning can be undertaken on waste collection and disposal, particularly by recycling or more technical processes. There is a need for such data in predicting as accurately as possible when such systems might be economically feasible and for the extended period over which they would be operational.

12. The fact that N.C.D.C. was unable to supply a breakdown of the composition of the Capital Territory's waste in its "strategy" obscures the case for recycling and resource recovery and to this extent the Committee found that N.C.D.C.'s strategy remained open to question. The Committee therefore recommends that a survey of the composition of the Capital Territory's wastes be undertaken and reviewed in order to facilitate the evaluation of the feasibility of alternative waste disposal methods.

Role of the Local Authorities

13. The current planning and management of Canberra City wastes is carried out primarily by N.C.D.C. and D.C.T. N.C.D.C. is concerned with development and planning, including

the recommendation of suitable disposal sites and ensuring that location and development of sites is compatible with surrounding land use and is acceptable to the community. D.C.T. is responsible for the management and operation of refuse collection and disposal. The Committee found inadequacies in the present system of waste management. It noted particularly some lack of co-ordination between authorities responsible for waste disposal and those responsible for planning methods of waste disposal.

14. The Committee concluded that in the presentation of its strategy, N.C.D.C. was predisposed to the landfill method of disposal and did not fully discuss other methods as viable alternatives. For example, methods of resource recovery (discussed in Chapter V) were considered in the context of methods for bulk reduction for landfill and not as economically feasible alternatives of waste disposal in themselves. The reasons given for proposing a landfill strategy, as mentioned in paragraph 6 above, are considered by the Committee to be narrowly based, particularly taking into account the ten-year period.

15. The Committee considered that the Department of the Capital Territory's submission did not adequately canvass important issues such as industrial relations and control of litter.

16. The Committee was concerned that it was not kept informed by N.C.D.C. and D.C.T. about developments taking place in waste disposal during the Committee's Inquiry. These included proceedings in industrial disputes, developments relating to West Belconnen and Pialligo sites, particularly planning deficiencies at Pialligo (see paragraphs 168-170) and problems of sewage overflow from Queanbeyan into Lake Burley Griffin which came to the Committee's attention.

PART B - WASTE AND ITS COLLECTION

CHAPTER II: DOMESTIC REFUSE

Introduction

17. Domestic refuse is that generated in a household and which is either collected by the municipal collection system or privately delivered to a landfill site. D.C.T. and N.C.D.C. informed the Committee that no analysis of the composition of Canberra's domestic waste is presently available. However, a recent report by van den Broek and N.Y. Kirov on the composition of municipal solid waste for Sydney contained the following weight composition percentages:

<u>Material</u>	<u>Percentage</u>
Ashes and dirt	3
Mixed paper	35
Putrescible matters and garden waste	35
Metal	6
Glass	16
Miscellaneous rags and plastics etc.	5
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Source: Evidence, p. 63.

This analysis could be taken as a reasonable guide to the composition of Canberra's solid waste.

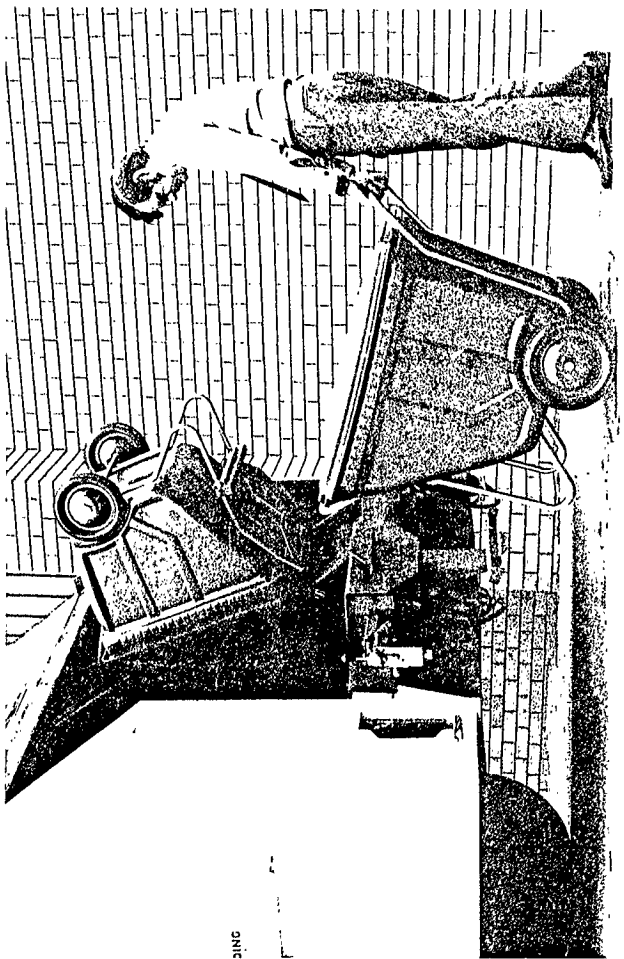
Domestic Refuse Containers

18. In its submission, N.C.D.C. suggested to the Committee that a pilot program to assess a total collection system using large mobile bins (Figure 1) with a capacity of approximately $6\frac{1}{2}$ times the standard garbage bin should be tried in Canberra. The use of these larger containers might overcome the difficulty confronting many householders of disposing of waste not handled by the present domestic system, following the

closure of some domestic tips, e.g. Kingston in January 1976, O'Connor and Deakin in April 1976. These wastes include garden cuttings, lawn clippings and minor builders' refuse. Another advantage of these larger bins would be that they could be mechanically emptied (Figure 2) by a simple modification to the equipment on the fleet of refuse collection vehicles recently purchased by D.C.T.

19. The Committee was informed by N.C.D.C. that the annual cost (or hire charges) of these mobile bins would be approximately \$500,000 as against the private ownership and replacement cost of ordinary bins used in the present system (which excludes garden refuse and bulky items) of \$220,000. Despite the difference of about \$280,000, N.C.D.C. suggested that savings would be made by householders who now take refuse to domestic tips which, owing to closures, are in many instances located further from many households than in the past.

20. The Municipality of Kuring-gai in Sydney undertook an experiment with the mobile bins to determine their suitability for use in conditions similar to those in Canberra. The pilot survey showed an acceptance rate by householders of over ninety percent. However, the number of mechanical failures of the bins during the 3-month trial period in Sydney (9) was in excess of problems experienced in Florida, U.S.A., where only five bins have been damaged in the eight year period of use.



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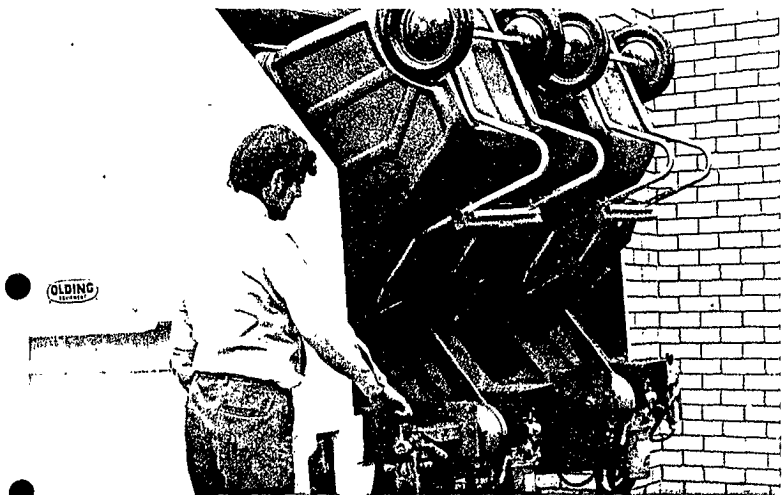


Figure 2

Automatic emptying of mobile bins.

21. The suitability of such bins for Canberra, with many sloping and stepped blocks which could cause difficulty in manoeuvrability for elderly, particularly the frail aged, and handicapped householders, together with the greater width of the mobile bins which could create storage problems for many householders, are matters which concerned the Committee. Other areas of concern are health and safety. For example, the lack of counterweight on the lid to ensure that it closes when left unattended may lead to flies breeding in the waste and the possibility of children playing in the bin and perhaps being injured (e.g. by broken glass) while doing so. In addition, the bins do not offer a "total" collection in that they cannot be used for disposal of oil, acid, paint, heavy garden or builders' refuse or bulky items such as household "junk".

22. If a pilot project using the mobile bins was undertaken, it would be necessary to conduct such a survey in an area offering as many practical difficulties as would be encountered through a Canberra-wide use of the bins. Even if the bins operated successfully, the economics of the scheme would require careful consideration before introducing the bins throughout Canberra. The initial capital cost is estimated (on 1975 prices) to be in excess of \$2¹/₂m, which represents \$50 per household.

23. The present system involves the use of metal and plastic bins. Evidence was presented to the Committee that plastic bins are more prone to spill or to being knocked over by dogs than are metal bins. Both these problems pose potential health risks to the community. In high winds, empty plastic bins and their lids may also blow on to roads causing traffic hazards. The suggested total collection system also has the added disadvantages that it does not encourage household composting or household segregation of recyclables and, in fact, may deprive local charities of a source of revenue (see paragraphs 259-261).

24. On the basis of the foregoing, the Committee recommends that no change be made to the present form of garbage bins for the collection of domestic refuse, except that the use of metal bins should be encouraged by the waste disposal authorities.

Collection

25. The Committee considered a number of alternative collection systems suggested by N.C.D.C. (see Table 2 for costs). These schemes involved maintenance of the existing system; the use of transfer stations (the Ainslie "hopper" arrangement) located in various areas of Canberra; the use of extra conventional bins, using the present method of collection; the large mobile bins referred to above; placement of 3 cubic metre bins in suburbs (e.g. shopping centres) as a supplement to the existing system; a scheme of periodic bulk waste collection as a supplement to the existing system; or a combination of existing arrangements and the large mobile bins.

26. The Committee, following an apparent conflict of evidence on estimates supplied by N.C.D.C. and the Society for Social Responsibility in Science (S.S.R.S.) concerning the value of recyclable material which could be salvaged from Canberra waste, requested that N.C.D.C. forward a revised estimate providing figures for annual costs of segregated collection systems (see Table 3 on page 16).

27. The Committee gave particular attention to a segregated collection scheme (i.e. the collection of materials such as paper, metal and glass as separate items). The Committee noted from the figures outlined in Table 3 that the cost of the suggested alternative collection schemes varied between a base nett figure of \$1,860,000 and \$2,180,000. The Committee observed that the most expensive form of collection would be a segregated collection scheme using the mobile collection bins. The cheapest would be a system involving a once-weekly collection of mixed refuse with a limit of two bins and a once-weekly collection for glass, paper

TABLE 2
ANNUAL COST OF ALTERNATIVE COLLECTION SCHEMES³

Component	Annual Cost of Scheme (\$)						
	A Existing System	B Transfer Stations	C Extra Bins	D Weekly Bulk Waste Collection	E Containers Within Suburbs	F Mobile Household Bins	G Partial Mobile Bins
1. Domestic Collection	1,000,000	1,000,000	1,233,000	1,280,000	1,391,000	910,000*	1,005,000
2. Private Individual Delivery	300,000	300,999	50,000	50,000	50,000	50,000	180,000
3. Annual Junk Collection	150,000	190,000	190,000	190,000	190,000	190,000	25,000
4. Major Landfill	225,000	..	..	..	..	..	190,000
5. Minor Landfill Sites	..	..	180,000	180,000	180,000	180,000	180,000
6. Builders' Tips	75,000	350,000	..	..	..	..	55,000
7. Transfer Stations	110,000	110,000	220,000	110,000	110,000	490,000	245,000
8. Private Garbage Cans	..	..	..	..	..	..	..
9. Mobile Bins	..	..	..	..	..	..	..
Total	1,860,000	1,950,000	1,923,000	1,810,000	1,921,000	1,870,000	1,880,000
Private Costs for House- holder (item 2, 8 & 9)	560,000	410,000	270,000	160,000	160,000	50,000-	235,000-
						540,000	480,000

* Several options for total collection have been studied such as the use of:

- (a) Large capacity vehicles (e.g. Garwood 1925¹) on single shift
 - (b) Large capacity vehicles (e.g. Garwood 1925¹) on double shift
 - (c) Small capacity vehicles (e.g. Garwood 1725¹) on single shift
- Collection costs vary by as much as \$100,000 and the most economical appears to be option b.

Source: Evidence, p.21

- 3. Scheme A - Existing Collection System and private delivered Household refuse to Tips.
- Scheme B - Existing Collection System with Transfer Stations replacing Household Tips
- Scheme C - Total Domestic Collection using Additional Bins
- Scheme D - Total Domestic Collection using an Additional regular Bulk Waste Collection
- Scheme E - Total Domestic Collection using Additional Containers for Bulk Waste
- Scheme F - Total Domestic Collection using Mobile Bins
- Scheme G - Total Domestic Collection partially using Mobile Bins

TABLE 3

ESTIMATED ANNUAL COSTS OF SEGREGATED COLLECTION SYSTEMS
\$ AT 1975

Component	Total collection schemes		Segregated Collection Schemes				
	Scheme A	Scheme C	Scheme F	Scheme H	Scheme J	Scheme K	Revised Scheme L
	Existing system	Extra bins	Mobile bins	Once weekly collection of refuse. Once weekly collection of recyclables on 3 week rotation, using compactor truck	Segregated Scheme A	Segregated Scheme C	Segregated Scheme F	Segregated Scheme C
1. Domestic Collection	1,000,000	1,233,000	910,000	1,200,000	1,500,000	1,210,000	1,390,000
2. Private Individual Delivery	300,000	50,000	50,000	300,000	50,000	25,000	50,000
3. Annual Junk Collection	150,000	50,000	50,000	130,000	50,000	50,000	50,000
4. Major Landfill Sites	225,000	190,000	190,000	225,000	175,000	175,000	175,000
5. Minor Landfill Sites							
6. Builders tips							
7. Transfer Stations	75,000	180,000	180,000	75,000	180,000	180,000	180,000
8. Private Garbage Bins	110,000	220,000	490,000	300,000	300,000	220,000	300,000
Total	1,860,000	1,923,000	1,870,000	2,230,000	2,255,000	2,350,000	2,120,000
Value of recyclables	(33,000)	(33,000)	(33,000)	170,000	170,000	170,000	170,000
Nett cost	1,860,000	1,923,000	1,870,000	2,060,000	2,085,000	2,180,000	1,950,000

Source: Evidence, p.325.

and metals on a three-weekly rotation basis, using compaction vehicles for all collections.

28. As waste collection and disposal has traditionally been an area in which money has been spent for no return upon the service provided, the Committee believes it is desirable to attempt to reduce some of the cost of the service. It considers therefore that some form of collection service involving household segregation of waste is desirable, e.g. revised Scheme "L" in Table 3 where open truck collection is used. An increased density of material can be achieved by efficient stacking. The cost of this service would be \$80,000 per annum more than the large mobile bin system (Scheme F) would cost. However, by franchising private operators to collect recyclable material rather than collection being undertaken by D.C.T., the community would have the advantage of saving at least part of the cost of waste collection and disposal through the collection of the recyclable material at the collector's own cost.

29. The Committee has been advised by representatives of the paper, glass and iron and steel industries that they are willing to discuss, on a long-term commercial basis, the utilisation of potentially recyclable material from Canberra (see paragraphs 56, 73 and 82).

30. To achieve most benefit from such a scheme, it would be necessary to ensure a high degree of householder co-operation in sorting materials before collection. The Committee, in Chapter VI, proposes in some detail the method of collection of ordinary household waste and its separate recyclable components.

Labour Relations

31. The domestic garbage collection service in Canberra has encountered problems which have led to industrial action and irregularity of collections. Some of the problems have been caused by the relatively short-term nature of collection contracts

so that contractors have attempted to use the cheapest possible trucks and compaction units for the service. This use of inadequate equipment has been compounded by difficulties in recruiting an adequate workforce of persons prepared to remain in the industry.

32. Since July 1976, the responsibility for collection of domestic waste has been in the hands of seven "community partnerships" on the north side of Canberra and one contractor on the south side. The north side service appears to be operating smoothly. The contractor who assumed responsibility for the south side in July 1976 was faced with an industrial dispute which resulted in the service operating at approximately half its expected capacity. Subsequently a new contractor was appointed on similar terms. This service is now operating.

33. The Transport Workers' Union (T.W.U.) in evidence to the Committee disclosed that when D.C.T. assumed control of the trade waste collection service in January 1975, the performance of employees formerly on the payroll of the private contractor improved dramatically. The Committee believes that one solution to the present problem might be for D.C.T. to provide the labour for the waste collection service in the A.C.T. Alternatively, if the experience with community partnerships proves to be successful, then all future collection contracts could be let on that basis. Any contracts of employment should comply with relevant industrial awards.

34. The Committee considers it imperative to achieve some continuity of employment for the maintenance of a satisfactory collection service. In order to achieve that goal, measures to ensure dignity for the employees should be introduced. Methods of creating this environment would include the provision of regularly cleaned winter and summer clothing, including gloves and boots to protect collectors from possible injury. Industrial awards should be regularly reviewed and working conditions and

facilities regularly inspected. The Committee believes that even if costs were marginally increased through these improvements, the community would receive a more assured continuity and effectiveness of garbage collection service.

35. The Committee therefore recommends that upon the expiration of the present domestic collection contracts, all future waste collection should be undertaken by either community partnerships or employees of the Department of the Capital Territory observing all appropriate award provisions. Employees should be encouraged to remain in the industry through the provision of improved working conditions and appropriate clothing.

Domestic Incineration

36. Apart from regulations relating to fire hazard there are, at present, no restrictions on the use of domestic incinerators in the A.C.T. In evidence, D.C.T. stated that they could not see any immediate pollution problem from domestic incineration but recognised that the situation should be kept under observation. Other witnesses warned of some potential health hazard from air pollution as a result of inversion layering. Domestic incineration could add to this problem. In March 1975, a former Committee on the A.C.T. sought the introduction of the Draft Air Pollution (Stationary Sources) Ordinance.⁴ The Ordinance has not yet been promulgated. The Committee's strategy recommended in this Report places heavy emphasis on recycling and should limit the need for much domestic incineration. It may be considered an invasion of personal liberties to prohibit domestic incineration, but the practice is offensive to those who must suffer the effects of it. The Committee therefore recommends the

4. In its Report on Proposals for Variations of the Plan of Layout of the City of Canberra and its Environs (Sixty-Second Series) (Parliamentary Paper No. 297), tabled in Parliament on 10 November 1976, the Committee proposed that the enactment of the Ordinance be expedited (paragraph 59).

speedy enactment of the Air Pollution (Stationary Sources) Ordinance to monitor air pollution in the A.C.T. The legislation should include appropriate provisions relating to the control of domestic incineration.

Domestic Composting

37. As the National Capital has been developed as a garden city, the Committee is of the opinion that domestic composting should be actively encouraged as a means of sustaining and improving soil fertility. The fostering of composting of garden and organic domestic waste would reduce the demands on the refuse collection and disposal system and reduce costs of fertiliser for the home gardener. At the same time this would make a contribution towards the conservation of limited fertiliser resources. As the Committee has recommended the restriction of domestic incineration, composting provides an appropriate means of disposal for organic garden waste. The Committee therefore recommends that the Department of the Capital Territory widely disseminate for public education, information on sound domestic composting practices.

38. The Committee was informed that special bins for domestic composting are available for purchase in Australia but that a sales tax of 15 percent is imposed. The Committee believes that consideration should be given to removing this sales tax to make the bins more readily available to householders and to contribute to achieving the goals mentioned in the previous paragraph.

CHAPTER III: THE COMPONENTS OF WASTE

Government Waste Paper

Present Disposal Methods

39. As Government is the major "industry" in Canberra, government waste paper constitutes a significant proportion of waste in the A.C.T. The collection and disposal of unclassified waste material from Commonwealth Government offices is, with some exceptions, an aspect of the property management role of the Department of Administrative Services (D.A.S.). The pickup points are normally serviced daily. It is estimated that this service, including the hire of vehicles and reimbursement of wages paid to D.C.T., cost D.A.S. some \$150,000 in 1975-76. However, this was only part of the total cost of collection and disposal of government waste in Canberra.

40. Office waste collected in Canberra includes such items as used stationery, carbon paper, newspaper, food containers, paper towelling, ashtray refuse and discarded food. This mixture of material makes the recovery of paper for recycling difficult. Approximately 170 tonnes of office waste is collected each week under the existing arrangements, increasing at the rate of approximately 10 percent per annum.

41. Unclassified office waste in most office buildings is collected by cleaning contractors employed under contract to D.A.S. This waste is transferred to a central point each day, bagged for collection and then buried at the Pialligo tip.

42. Classified waste is collected for destruction by the department concerned. The arrangements for this process are at present internal and can involve several processes. Some facilities for destruction of classified waste are provided in government buildings. Use is also made of the incinerators at

Fyshwick and Queanbeyan. Approximately 20 tonnes of classified waste is destroyed each week.

43. A schedule showing the nature of disposal of waste paper by Commonwealth Government Departments and Authorities in the A.C.T. is set out in Appendix E.

Automated Vacuum System (AVAC)

44. A recent development in waste collection, an automated vacuum system (AVAC) was described to the Committee. The system has recently been installed, at a cost of over \$1¹/₂m in the Cameron Offices at Belconnen. Diagrams explaining its operation are on page 23. The system removes all waste by means of vacuum to a point where it is automatically baled in 400 kg. blocks. The system has a capacity 3 times greater than its present level of use. Eventually it will cater for the West Belconnen Offices and some town centre refuse. One of the main advantages of the system, apart from convenience, is that only two persons are required to maintain and operate it. This considerably reduces labour costs, a significant component of waste disposal costs.

45. Some baled waste from the Cameron Offices is currently dumped at Pialligo. The Committee was informed by the distributors of the AVAC system that, subject to the individual requirements of the user, some waste paper from the unit could be fed into a recycling stream. It is possible to collect different types and quality of waste paper with the one unit. This is done by organising the program and timing of the machine to empty outlets at certain times. D.A.S. informed the Committee that some of the paper was at present unsuitable for recycling because other waste (e.g. food waste, carbon paper etc.), included with the baled paper, was costly to separate. This made the recycling of this paper uneconomical. However, cleaners were separating paper wherever possible for baling and collection by the paper recycling agent.

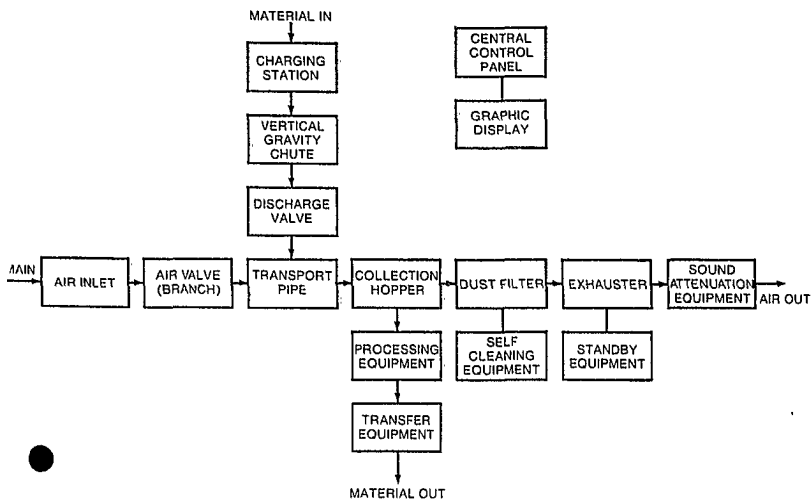


FIGURE 3

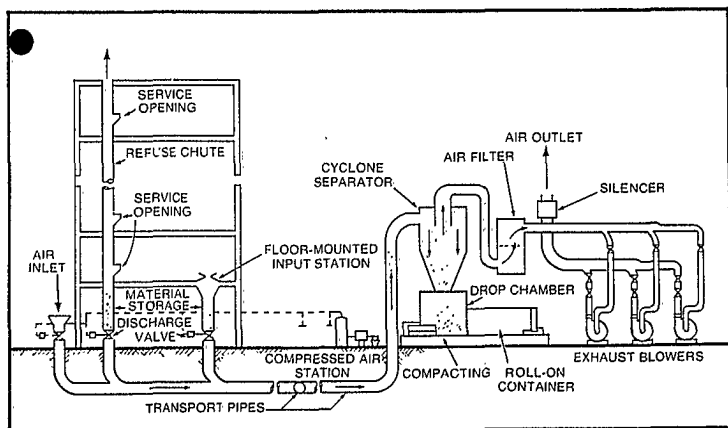


FIGURE 4

46. The Committee considers that the money received for baled recyclable paper from the AVAC system could assist in offsetting costs of disposal. For this reason, continued efforts should be directed at putting the paper into a recyclable form. The Committee therefore recommends that the Department of Administrative Services and its client departments using the automated vacuum system examine the feasibility of a method of waste paper collection which produces a potentially recyclable product.

Future Methods of Disposal

47. The D.A.S. has found the use of contractors to collect recyclable materials to be unsatisfactory. Following an undertaking given to the Committee in 1975, the Department called tenders to collect and recycle paper, cardboard and computer printouts from nominated government offices. The invitation to tender specified that the tenderer should pay the Department for waste paper. No tenders were received. The Department thereupon reverted to a previous arrangement with Canberra Paper and Cardboard Recycling Company for collection without payment to the Department.

48. The Committee is satisfied with the Department's efforts to sell waste paper in an attempt to reduce the overall costs of its disposal. Waste paper appears not to be an economic purchase for recycling purposes. However, the Committee believes all possible encouragement should be given to facilitating private collection at no charge to the collector as this will reduce the cost of disposal for D.A.S. The quantity of newspapers and magazines purchased by Government Departments and Authorities in Canberra each year (e.g. one department alone purchases 45,000 issues) gives scope for the development of a substantial government waste paper recycling program. The Committee recommends that the Department of Administrative Services and all Commonwealth Government Departments and Authorities ensure that waste paper and cardboard is handled in such a way that it is, to the maximum feasible extent, recyclable.

49. The Committee was further informed by D.A.S. that the provision of a more efficient incinerator system for the destruction of classified material is being discussed with N.C.D.C. When design for this facility is complete, it is proposed that a special duty vehicle will be equipped and manned to operate with it. On the other hand, the proprietor of Canberra Paper and Cardboard Recycling Company informed the Committee that if a centrally located destructor shredder was installed for treating confidential waste, much of that waste could be recycled rather than burnt as is the present and foreshadowed practice.

50. The Committee regards the incineration of classified waste as described by D.A.S. and N.C.D.C. as undesirable. It wastes resources, adversely affects the environment through smoke emissions and involves a high capital cost, particularly if the incinerator is adapted to minimise emissions. The Committee therefore recommends that the Department of Administrative Services undertake to have all classified waste from Commonwealth Government Departments and Authorities in Canberra delivered to a central point for shredding and eventual recycling. The AVAC system at Cameron Offices might be considered as the central point for shredding.

51. In planning major Government office complexes, D.A.S., in consultation with N.C.D.C., is proceeding with a policy of -

- . manual horizontal collection (by floor) of waste;
- . automatic vertical delivery to a central collection point; and
- . compacting of waste for either destruction or sale (recycling).

As an aspect of this policy, D.A.S. has been collecting samples of government waste and examining categories of waste that are either

recyclable or destructable. On the basis of this study, D.A.S. will be better able to determine the most appropriate methods of collection and disposal.

52. The Committee considers that in planning for disposal of government waste paper, due emphasis should be given to reducing costs and that efforts to put waste paper in a recyclable form should be given priority. The Committee therefore recommends that all future planning of government built office space include provision for facilities which will increase the recycling potential of government waste paper.

Non-Government Waste Paper

Introduction

53. Unused waste paper is the largest single component of all municipal refuse and represents about 35 percent of total annual refuse. In the A.C.T. probably about 30,000 tonnes of waste paper each year is discarded mainly at landfill sites. N.C.D.C. informed the Committee that of this quantity about one-third could be easily separated at the source and recovered. A disposal saving of \$1.50/tonne could be achieved. It would be difficult however to do this without some form of incentive. The amount of paper obtained would be much less if a total rather than a segregated system of collection was adopted.

54. Australian Paper Manufacturers (A.P.M.) told the Committee that the demand and prices for waste paper fluctuates. If paper and cardboard can be separated before entering the waste stream, recycling becomes a more viable economic proposition.

55. Apart from the fluctuations in demand for waste paper, N.C.D.C. informed the Committee of other limitations -

- de-inking facilities required for newsprint are not available at all plants;

- paper pulp is generally cheaper than waste paper;
- location of plants in relation to available wastes often creates transport cost.

Proposals for Recycling Waste Paper in Canberra

56. A.P.M. has for some time obtained a regular supply of waste paper from its collector in Canberra (Canberra Paper and Cardboard Recycling Company) and from time to time from charitable organisations. In total, collections from Canberra have been of the order of 2,000 tonnes per annum. Because of the forecast growth in long-term waste paper demand, there is the potential to increase clean waste paper collections from Canberra households. The collection of householders' paper will directly benefit the Canberra community. The quantity of solid waste requiring disposal by the public authority, and consequently the cost of disposal, will be reduced. A.P.M. estimates that intensive collections from homes will provide some 8,000 tonnes per annum of clean waste paper.

57. An alternative method of obtaining this waste paper would be to extract it from the municipal solid waste stream at some central processing plant. A.P.M. did not favour this approach because -

- quality will normally be that of the lowest component as the waste paper would become extensively mixed;
- contamination would mean that the quantity of paper suitable for recycling that A.P.M. could use from this source would be less than the quantity it could absorb through taking the individual components segregated at source;
- the community would be involved in additional capital cost of such a plant; and
- the domestic garbage service would be required to collect a greater weight and volume of waste than if a collector arranges separate collections of waste paper from households.

A.P.M. therefore supports segregation at the source as the better practice to aim at, from both the user and community viewpoints.

58. The use of large open wire mesh bins or hoppers at collection points such as shopping centres was, in A.P.M.'s experience, unsuitable. Contaminants are placed in the hoppers unless they are supervised. The yield is also low in comparison with house-to-house collection. D.C.T. and various interested groups have experimented with the collection of waste paper at shopping centres (e.g. Waramanga and Manuka). Large quantities of paper were collected by this method, but D.C.T. had difficulties at the time finding a market owing to the ad hoc nature of the experiment. Consequently, D.C.T. was involved in the cost of removing paper and storing it with no guarantee of its disposal. Whilst the placement of hoppers at convenient localities such as shopping centres may encourage recycling of paper, it also creates litter problems and attracts the dumping of some household waste, particularly when domestic collections are affected by industrial disputes. The proper role for such bins should be to supplement a general collection service.

59. A.P.M. have discussed with D.C.T. the feasibility of linking the collection of segregated waste paper to the domestic garbage collection service. This was not developed further. The waste paper collector is now making plans for intensive household collection in Canberra.

60. These household waste paper collections as planned will operate continuously on a cycle of about six weeks. Cycles of less than four weeks are generally considered uneconomic. Trials are being conducted by the collector in the Weston Creek area. The success of the collection is largely dependent on the co-operation of the householder. Results of a survey conducted by S.S.R.S. on the acceptance of the scheme by householders are discussed in paragraph 243 of the Report. In addition to domestic collections, the waste paper collector is also seeking

a regular supply of waste paper from industrial and commercial sources. Recent changes in laws permit commercial enterprises to leave waste paper and cardboard, properly bundled, outside their premises for collection. Schools are also being encouraged to collect paper and make it available for recycling. A.P.M. considers that within five years these activities could draw 10,000 tonnes per annum or more from the Canberra community.

61. The D.C.T. indicated to the Committee that it was willing to co-operate with the contractor by advertising the service and, if necessary, sending letters to each of the householders in the suburbs to be serviced. The Department has made available a block of land at Fyshwick for storage and baling. Facilities are provided for depositing paper at the Kambah and Long Gully tips. The land at Fyshwick has been leased by Canberra Paper and Cardboard Recycling Company which obtains paper for recycling for A.P.M.

62. Despite notification of collections to householders, to date, only 20 percent of householders have responded to the pilot domestic waste paper collection service. However, the survey (see Appendix F) undertaken by S.S.R.S. in the area indicated that three-quarters of householders would make use of the service if aspects of it were improved.

63. The present response compares unfavourably with 60-65 percent recovery rate which is required to make such a project viable. In Brisbane a success rate of 93 percent is obtained principally because of easy access to houses, and the provision by A.P.M. of drums in which householders can store newspapers. These drums are accessible to collectors and there is no need for the householder to put them out on the street. The Committee notes the success of the Brisbane experience and has proposed a method of storage and collection it believes suitable for Canberra.

64. The Committee commends Canberra Paper and Cardboard Recycling Company and A.P.M. for their initiatives and considers that, in future, discussions between these parties, D.C.T. and others concerned should concentrate on encouraging greater co-operation with Canberra Paper and Cardboard Recycling Company.

Milk Cartons

65. The use of cartons as milk containers has increased rapidly in the last few years. Some concern was expressed as to the most suitable method of disposal of milk cartons. Claims were made that incineration led to the release of potentially dangerous gases into the atmosphere. The marketers of Canberra's milk cartons, J. Gadsden Pty Ltd, informed the Committee that although Pure-Pak cartons were not recyclable after use, they did provide an important ingredient in the development of combustible fuels which could be processed in high temperature incinerators or pyrolysis plants. They were also acceptable in landfill, either in the shredded or unbroken form. In many cases they provided a container for other kitchen refuse. The Company claimed the by-products of incineration of cartons are mostly carbon dioxide and water vapour. The amount of carbon monoxide produced is insignificant in the natural cycle of these substances.

66. J. Gadsden Pty Ltd estimated that on present milk consumption rates, the quantity of milk cartons to be disposed of in compacted form is approximately 3,000 cubic metres (approximately 718 tonnes) per annum. The rate of consumption cannot however be expected to remain static. Increased consumption will obviously lead to a greater quantity of cartons requiring disposal. In view of this increase and because of conflicting evidence concerning the potential health risks through unchecked incineration, the Committee believes that the more environmentally attractive possibility in terms of reduced collection and disposal costs was the recyclable bottle.

67. The Committee recommends that the A.C.T. Milk Authority promote the benefits of and encourage the use of bottles as milk containers in the A.C.T.

Household Bottles and Glass Waste

68. After use, there are two ways in which glass can be recycled. It can be directly re-used as is the case with milk bottles, or as glass waste (cullet) in the manufacture of glass itself. It is feasible to use quantities of cullet in manufacture and still produce a high quality product. N.C.D.C. commented, however, that as raw materials used in the manufacturer of glass are abundant, the economic incentive to use cullet is not great.

69. Australian Consolidated Industries (A.C.I.), Australia's principal glass manufacturer, submitted that N.C.D.C.'s figures on the value of glass returned to Sydney were not accurate. The cost of recycled cullet was comparable with the cost of raw materials. A.C.I. informed the Committee that because they can return cullet from Canberra to Sydney at no more than the cost of raw materials it has been worthwhile to establish the Company's recycling project at Fyshwick.

70. Within the A.C.T. over the last three years, glass recovery and recycling centres have been established by A.C.I. in collaboration with D.C.T., the A.C.T. Bottle Exchange and the N.S.W. Bottle Company. Areas have been set aside at Canberra's tips (except Pialligo) and at the Ainslie Hopper for the collection of glass. Community groups are being paid to sort bottles for sale to bottle merchants. The bottles are then returned either to beverage manufacturers for refilling or to A.C.I.'s subsidiary in Sydney for recycling. A.C.I. considers that the depots at tips have not been as successful as they had hoped because the sorting arrangements have not been satisfactory.

71. From mid-1973 recycling centres for glass, cans and paper were progressively established at a number of shopping centres but were discontinued when the public used them for other waste.

72. As a result of the earlier experiences, A.C.I. established a drive-in glass recycling centre near the Fyshwick market. An advertising campaign has been mounted but no inducement is offered to bring bottles to the centre. Reliance is placed on the public's "environmental motivation". If the Fyshwick depot proves satisfactory, A.C.I. is prepared to provide similar facilities in other areas.

73. Under the existing system of glass recovery in the A.C.T. 45 tonnes per month are being recovered and road-freighted to the A.C.I. plant at Waterloo, Sydney, for recycling. A.C.I. believes that with better facilities and an effective public education program, this recovery rate could be substantially increased, possibly doubled. This volume is in addition to the large numbers of refillable bottles being returned to beverage manufacturers.

74. Company research indicates that where glass separation and collection are allied to normal household garbage collection, the glass recovery rate is much higher. A.C.I.'s view was that, if the A.C.T. introduced a scheme whereby garbage collectors could collect and handle bottles already separated by the householders, very little glass would find its way into the tips and a greater volume of glass would go back for refilling or recycling.

75. The N.C.D.C. suggested to the Committee that more bottle and glass recycling could be achieved if householders could arrange disposal more easily. This could be done on a systematic basis by -

- . establishing depots or facilities that have easier access and not requiring special trips;
- or

- arranging for bottles to be collected from houses as part of the overall domestic refuse collection contract.

If depots, as in the first option, are franchised to local community groups under strict control, there is no serious environmental threat. The second option is, however, more convenient and may result in more bottles/glass being recycled. However, there was some risk of broken glass on nature strips which may be dangerous to pedestrians and collectors.

76. The N.C.D.C. stated that house-to-house bottle collection would not be viable if the strategy of collection was the system of total collection advocated by the Commission. The Municipality of Mosman, for instance, pays \$25,000 a year to a Company to collect bottles. It would only be viable in the A.C.T. in the context of segregated rubbish collection: a policy N.C.D.C. did not favour. The technical difficulties of segregating glass from mixed municipal rubbish and the capital cost involved, ruled out that option. N.C.D.C. concluded that the easiest method of glass recovery was for the householder to segregate the glass products for collection apart from the total collection system.

77. The Committee is of the view that separation of recyclable bottles and glass by the householder, and house-to-house collection would, in the manner proposed in paragraphs 242-246 of the Report, increase the amount of glass available for re-use, resulting in an economically and environmentally acceptable operation.

Metal

78. Non-ferrous metals such as copper, bronze, lead, zinc and aluminium, constitute less than one percent of municipal waste. The material is sufficiently valuable to warrant hand-sorting and only insignificant amounts are believed to go into landfill. Aluminium occurs in sufficient quantities in refuse to make recovery worthwhile. While aluminium cans are currently being

recycled economically, this operation could be promoted further by facilitating the return of cans by the public (see paragraphs 245-246).

79. Ferrous metal makes up approximately 7 percent of municipal wastes. Over 5,000 million cans are produced annually in Australia and of this number about one-fifth are used as beverage containers. The Steel Can Group (S.C.G.) told the Committee that the production of steel from scrap consumes approximately half the quantity of energy required to produce the equivalent quantity from iron ore. The energy balance is therefore strongly in favour of resource recovery.

80. The N.C.D.C. informed the Committee that recycling of steel cans was not a major operation in Canberra because -

- . no recycling facilities exist in Canberra at present and it would require a plant of a minimum size beyond that viable for Canberra;
- . facilities outside Canberra handling steel cans have only a limited capacity;
- . steel can recycling is not economically attractive to industry because of haulage costs; and
- . disposal facilities are not readily available to the public.

81. The S.C.G. said that it would not be possible to recycle steel scrap within Canberra because there are no local facilities for steel smelting. The closest steel-works is at Port Kembla, a distance of approximately 250 kilometres from Canberra. It was said that the economics of transporting steel scrap this distance could pose considerable problems. Transport costs from Canberra to Port Kembla are in the order of \$17 a tonne.

82. Whilst acknowledging that recycling of metal in Canberra itself is not feasible, the Committee received information that it could be feasible under certain conditions to recycle steel removed from a collection point in Canberra to Port Kembla cost free to the local community. Simsmetal (a leading Australian scrap metal merchant) informed the Committee that they had offered their services free of charge to canning companies to receive cans and transport them on their behalf from Canberra back to Sydney. The canning companies had, however, expressed no interest.

83. If it becomes feasible to transport scrap steel from Canberra to Port Kembla for recycling, the question then arises as to the most appropriate method of collection. S.C.G. suggested that cans should be taken to a central point where there is sufficient volume and economies of scale. S.C.G. have established 60 centres in Australia for people to leave cans but have found these to be unreliable as a significant source.

84. To see another method of segregation, the Committee visited a shredder operated by the Canterbury Municipal Council in Sydney. In this process all municipal garbage is pulverised by a shredder, after which all ferrous metal is magnetically separated. Through the magnetic separator at Canterbury, 98 percent of cans in the garbage are recovered. The S.C.G. advised that over a 12-month period the amount of ferrous scrap recovered from the Canterbury project amounted to 1,272 tonnes which is estimated to contain 16 million steel cans and 217 tonnes of other ferrous scrap. This scrap is transported to Australian Iron and Steel at Port Kembla.

85. As regards house-to-house collections, S.C.G. were of the view that there were not enough people prepared to segregate their rubbish and put it out, even for charities. In comparison, the magnetic separator at Canterbury can recover over 110 tonnes of steel scrap in less than 15 days of operation. It was anticipated that the system at Canterbury will regularly recover

95 percent of the ferrous material contained in the Council's solid wastes. This is a far greater percentage than any other recovery system operating in Australia.

86. Whilst the Committee readily agrees that the magnetic separator produces the best results as far as recycling steel cans and other ferrous scrap are concerned, there are reasons why such a method would not be suitable for Canberra (see paragraph 231). The Committee considers that properly organised, regular household separation of recyclable scrap metal would return a high quantity of potentially recyclable cans and other metals (see paragraphs 242-246).

87. The Committee also notes that the introduction of deposits on beverage containers in Oregon in the U.S.A. had the effect of encouraging the use of glass as beverage containers which is easier and more economical to recycle (see paragraph 114).

Car Bodies

88. The Committee was informed that Brambles Industrial Services had recently agreed with D.C.T. to remove car bodies from the A.C.T. Under the terms of the contract, Brambles will remove vehicles from a depot at Fyshwick and freight them to Port Kembla at no charge to the community. Whilst there is no stipulation as to storage time, the Committee considers that efforts should be made to keep it to a minimum to prevent pest infestation and other possible undesirable environmental effects. This new arrangement together with methods suggested to encourage delivery of vehicles to the collection point should reduce the overall cost to the community of the removal of abandoned vehicles.

Plastics

89. Dr F. Peters, the Australian Government Analyst, expressed the view that, if trends over the last 10 years continue, by 1980 bottles and cans may well be replaced by plastic because of the lack of material to make the other containers. Utilisation of plastics and polymer materials is increasing yearly at the expense of recyclable containers such as bottles and plastics are becoming a major component in municipal and industrial waste. Recycling of plastic is a very complex problem, mainly because of the large number of different plastic compounds that are available. Because there has been a lack of financial incentive to recycle plastics there has been little work done on the subject. Common plastics in everyday use include -

- . Polyvinyl chloride (PVC) has been identified as causing the most serious solid waste disposal problem because of its release of hydrogen chloride gas, which is corrosive and poisonous, on burning. This gas, under the present system of disposal, is released into the atmosphere through low temperature incineration. The Committee was informed that the only environmentally efficient means of disposal for PVC is by high temperature incineration combined with procedures to reduce emissions i.e. effectively recovering all hydrogen chloride gas.
- . Polyethylene is the major plastics component which finds its way into garbage. Carbon monoxide, which presents a toxic hazard, is the main low combustion product and could be controlled using efficient high temperature incineration.
- . Polyurathenes, which are normally used as packing materials, produce a different kind of problem although the solution is essentially the same as for PVC. Combustion of polyurathenes may result in the production of toxic materials. Whilst not expected to form into significant quantities of toxic materials during proper incineration, large quantities can form during open low temperature burning.

90. The C.T.H.C. said that there had been no evidence of persons being affected to date by low temperature burning of plastics. However, Dr Peters expressed an opinion that it may take up to 30 years of exposure to fumes from burning plastic at tips and in low temperature incinerators to discover any links by such burning with say, cancer. A witness from J. Gadsdens Pty Ltd stated that if milk cartons were burnt at the right temperature no health hazard should ensue. The Government Analyst suggested a temperature of 750°C was needed for the combustion of milk cartons because of the polyethylene content and that pyrolysis or high temperature incineration are the only methods presently capable of efficiently treating plastic waste. Another form of treatment for disposal of plastic waste, at present in the formative stage, is the burning of plastics, along with other micro-organisms, in vats to produce fertilizer.

91. The Committee considers that the problems associated with disposal of plastic waste could be reduced by restricting the use of domestic incinerators (see paragraph 36) and by preventing fires at tips (see paragraph 181). Given the rapid growth of Canberra's population and the attendant increase in the amount of garbage for disposal, it may be necessary in future to instal equipment for high temperature disposal of plastic waste. Development of technology in this field should be watched.

Packaging

92. The evolution of more sophisticated advertising techniques, the advent of self-service stores and changes in life style has led to a tremendous increase in packaging so that goods can be put in "marketable" form for the consumer. Every day, consumers are confronted with many items which are sold pre-packed rather than loose.

93. Packaging industry representatives in their evidence to the Committee defended current practices in regard to packaging goods. It was claimed that packaging standards merely reflected

consumer expectation and demand. It was asserted that -

- . packaging is a means of protecting and identifying consumer goods, and of facilitating the distribution of products;
- . there are no alternatives to current packaging practices acceptable to modern consumers; and
- . a complete reversal of community values would be involved in any movement back to more austere standards of presentation.

It was also claimed that small items in large containers reduced the likelihood of pilferage by making stolen goods more difficult to conceal. Modern retail methods depend on packaging. For instance, retailers would have to employ staff to cut and weigh goods for customers now sold in self-service outlets already cut, weighed and pre-packed. Convenient packaging also met special needs. Thus working people found it helpful and useful to purchase food packed and ready for cooking.⁵

94. Strong criticism of packaging practices and standards were voiced by other witnesses who stressed the contribution to the waste problem made by these practices. Critics of packaging were equally concerned with the impact on the environment particularly on resource conservation. It was argued that substantial changes in production technology, marketing practices and consumer taste were required if the problem was to be solved. These changes could only be brought about by educating both producers and consumers about the undesirable consequences of current packaging by -

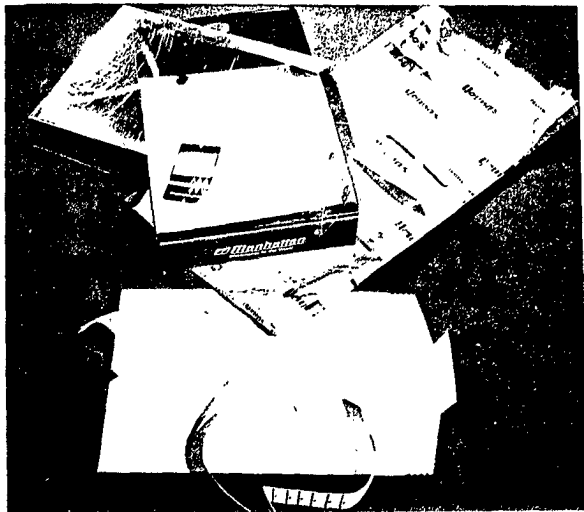
- . planning the disposal of the product and its packaging in the design stage;
- . encouraging the use of returnable containers;

5. Evidence, pp. 195, 221, 226, 227, 231.



Figure 5 Shirt Packaged for retail outlet.

Figure 6 Shirt Packaging.



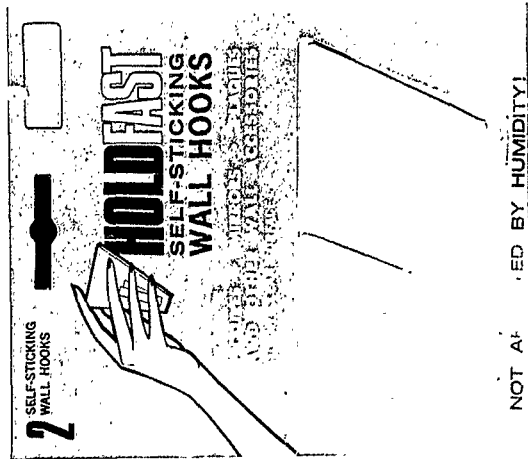


Figure 7 Goods in blister Packaging for retail outlet.

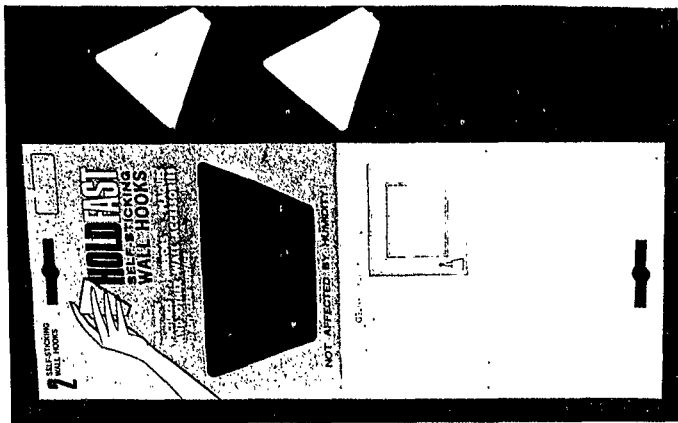


FIGURE 8 EXAMPLES OF BLISTER PACKAGING

- . providing inducements such as tax incentives to producers who adopted environmentally responsible practices; and
- . appropriate regulations (such as a system of deposits on containers to deter environmentally harmful effects).

95. The Committee notes that in a highly competitive marketplace, goods are packaged, advertised and marketed so as to attract consumers to the individual producer's goods. To this extent the consumer is conditioned to expect particular, and often excess, packaging. There is a need to consider the effects of such packaging not only on resources but its contribution to municipal waste.

96. The Committee believes that any legislation designed to stop the proliferation through packaging of waste would be better done on a nation-wide, rather than a territorial level. Any constraints imposed to lessen the impact of packaging should in this respect apply equally to all sections of the packaging industry so that no single producer is advantaged or disadvantaged compared with others.

97. The Committee is of the opinion that Government has a responsibility to introduce measures to reduce excessive packaging. Not only is it necessary to reduce costs to the consumer, who has to pay for packaging and advertising, but it is also necessary to reduce the ever increasing costs of collection and disposal which this practice causes.

98. The Committee therefore recommends that legislation be introduced to reduce the effect of packaging -

- . on the environment;

6. Evidence, pp.60, 78, 81, 405-7, 408.

- as a source of municipal waste; and
- as a cost component in the collection and disposal of waste.

99. The Committee notes that the Trade Practices Commission is currently undertaking an inquiry into matters affecting consumers, including packaging.

100. Besides enacting legislation for the limitation of packaging, Government, as a large consumer itself, could reduce its purchasing costs and subsequent disposal costs by including in all appropriate contracts a clause stipulating the maximum packaging to be used. The Committee therefore recommends that the Office of the Australian Purchasing Commission assess the feasibility of stipulating packaging requirements in its contracts for purchase of goods.

Litter

101. One of the inevitable results of excessive packaging, particularly take-away foods and drinks in disposable or non-returnable containers has been an increase in litter. D.C.T. informed the Committee that another source of litter was uncovered loads of waste being taken to tips or depots. The Steel Can Group said that cans constituted over 10 percent of all litter. The representatives of J. Gadsden Pty. Ltd. stated that plastic lined milk cartons were not a major litter component but that flavoured milk or juice cartons were a problem because they were a convenience pack bought as a take-away item.

102. In Canberra D.C.T. employs 28 day-time cleaners to collect litter deposited on roads, highways, unfenced playing fields, parks, picnic areas and unattended toilets. There are also thirty-five night-time cleaners who clean the City district and suburban shopping centres. D.C.T. and the Department of Construction both collect public litter using mechanised street

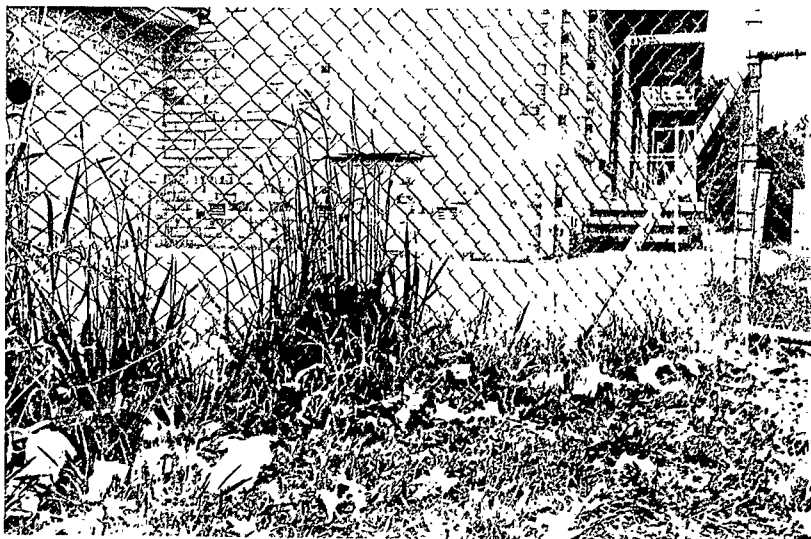
sweepers as well as groups of men and trucks to clear major streets. Work undertaken by the Department of Construction is accounted for in the municipal budget. Tenders have been invited for small mechanised cleaners for street sweeping. Departmental engineers are currently studying developments in mechanisation of city cleaning and D.C.T. has acquired some items of flushing, sweeping and vacuum based plant. One of these units is a flushing machine which has a high pressure spray broom on the front for washing waste from footpaths into the gutter. To complement this, D.C.T. are to purchase a road sweeper which picks up waste from the gutters. City parks waste consists mainly of tree clippings and prunings and some litter from park maintenance activity. Minor landfill sites such as Long Gully and Kambah are set aside specifically for the purpose of this type of waste disposal.

103. The Committee was informed by N.C.D.C. that the problem of dumping or "littering" was encouraged by the fact that there was much vacant crown land within the A.C.T. and this created a particular problem in some areas. The recent closure of some smaller, more accessible local tips (e.g. Deakin, O'Connor, Kingston) also resulted in more dumping on vacant crown land.

104. The Australian Workers' Union (A.W.U.), the union representing street cleaners, litter pickers and municipal tip attendants, generally maintains a good working relationship with D.C.T. The Committee was informed by the A.W.U. witness that whilst the closure of some of the smaller municipal tips had not resulted in any retrenchments, there had been no increase in the number of people engaged in cleaning for some years with the result that the cleaning services provided are not up to the standards which formerly applied and employees are being told to do the best they can.



FIGURES 9 & 10 LITTER IN CANBERRA



105. The Committee considers that because Canberra is the National Capital and, as such, a major tourist centre, this situation is cause for some concern and D.C.T. should ensure that low cost, efficient methods are used to keep Canberra litter free. Witnesses from D.C.T. pointed out that the present litter legislation in the A.C.T. is fragmented and ineffective. There are in existence some 20 provisions in a number of Ordinances which relate to litter and litter control. The main restriction on the effectiveness of the law was its unenforceability. For example, culprits must be caught in the act of littering, something which, in practice, is difficult to achieve. The police cannot give this law a high priority of enforcement and other resources are not available to enforce it. This difficulty of apprehending offenders and securing convictions therefore inhibits the legislation's effectiveness.

106. In September 1975, the Legislative Assembly passed a Litter Ordinance which is yet to be gazetted. The Ordinance provides for penalties for littering from moving vehicles and trailers as well as imposing penalties on pedestrian litterers. Rigorous enforcement, which is an important aspect of deterrent, could result in an offsetting of the disproportionate costs which litter contributes to total waste management by reducing the amount to be collected. The present staff ceilings and cost restraints, however, could create difficulties in effective enforcement of the legislation.

107. The Ordinance makes provision for heavy fines (\$250), but the Committee considers it will not operate effectively unless the public is aware of a genuine possibility of prosecution. To this extent, as well as full-time Litter Inspectors and the police, public officials such as Parking Inspectors, Dog Inspectors and Park Rangers should be appointed under Section 8 of the Ordinance as enforcement officers. More efforts should be directed at tracing the owners of abandoned vehicles with a view to charging them with the cost of removal.

Consideration might also be given to imposing a surcharge on vehicle registration and transfer fees to cover the cost of recovering abandoned vehicles.

108. The Committee recommends that -

- public officials be appointed under Section 8 of the Litter Ordinance to act as litter enforcement officers; and
- a method of defraying costs for the removal of abandoned vehicles be devised.

109. Littering can also be reduced by discouraging excessive packaging (see paragraphs 96-98) and encouraging the use of returnable containers. The witness from J. Gadsden Pty. Ltd. informed the Committee that the Company had supported studies in Victoria and South Australia, and had sponsored the Litter Action Research Model in South Australia. Under this project, the Authorities examined four separate areas in South Australia and maintained two as sample areas. Litter decreased by about 89 percent in areas which were subjected to the program. The study concluded that if there was a satisfactory level of public awareness, substantial reductions could be made in the incidence of littering by providing and maintaining sufficient litter bins and dumping facilities.

110. These results emphasise the need for community education programs. The Department of the Capital Territory has undertaken some television advertising but has not had funds to undertake a survey to measure the success of the campaign. The South Australian study concluded that much could be achieved by school-based programs. Public attitude tests showed a marked awareness of litter problems among school children exposed to such programs. D.C.T. has approached the Interim A.C.T. Schools Authority, suggesting the establishment of a formal program as

as part of regular school curriculums rather than occasional campaigns. Issues such as littering would be included as part of general studies on environmental matters. The Committee commends those initiatives.

111. The Committee recommends that funds be made available for an anti-litter campaign to increase public awareness of this problem and its cost to the community and that particular emphasis be placed on this issue in schools.

112. The Committee's attention was drawn to a paper⁷ which studied the effects of compulsory deposits on beverage containers in the State of Oregon, U.S.A. The Oregon legislation was inspired by the desire to combat roadside litter, in which beverage cans had featured prominently. The legislation seems to have been very successful. An immediate and sizeable reduction in the incidence of containers in roadside litter, in both urban and rural areas, was observed. Beverage containers now account for less than 10 percent of litter collected from roadsides. This reduction has been sustained despite growth in average traffic flows of about 5 percent.

113. The study found a number of important reasons for the return rate achieved in Oregon in relation, for example, to bottles:

- . The legal requirement that retailers must accept returned bottles, if they stock that type of bottle, irrespective of the original place of purchase, made it easier for containers to be returned. This was facilitated by the requirement of the legislation for the use of standardised bottles.

7. Peaker, A. 'Resource savings from the re-introduction of a returnable system of beverage containers: a case study of experience in Oregon.' Resources Policy V1 (5) September 1975.

- . Retailers in Oregon accepted the deposit scheme because they also had to pay a deposit to the wholesaler. This two-tier system of deposits (consumer to retailer; retailer to wholesaler) appeared to play an important role in ensuring the working of the system.
- . A sample survey indicated that 87 percent of consumers sampled, found no inconvenience at all in returning bottles.
- . The small deposit required (2 cents on a standard bottle) was sufficient to induce return of bottles. No demonstrable difference in return rates were observed in one area of the State where deposits at a rate of 10 cents per bottle were maintained.

114. One of the effects of the legislation, according to this study, was to make the use of cans uneconomical in comparison with refillable bottles. The Oregon legislation also bans the use of detachable pull-tabs which, by reducing the convenience aspect also reduced the marketability of many cans. In Oregon the brewers and softdrinks manufacturers have almost completely stopped supplying canned beverages. Another affect of the legislation has been resource savings and environmental gains. The use of aluminium, steel, tin and glass has been substantially reduced.

115. The House of Representatives Standing Committee on Environment and Conservation reported on the question of Deposits on Beverage Containers in 1974. It recommended that all beverage containers which did not carry a refundable deposit of 5 cents should incur a tax of 3 cents (payable once only at the point of manufacture or import of the container). No Australian State or Territory has adopted the recommendation of the Committee, although the South Australian Parliament has legislated to provide for compulsory deposits on beverage containers. The South Australian legislation, based on that in force in Oregon, has yet to come into force.

116. The operation of this legislation in South Australia will enable other governments to assess the viability of enacting similar legislation. The Committee recommends that the Commonwealth Government monitor these developments carefully and if they prove successful it should seek the co-operation of State Governments in introducing uniform measures requiring minimum deposits on beverage containers.

Sewage

117. The Canberra sewerage system has been planned and constructed by N.C.D.C. and the Department of Construction. The Department of Construction operates the system on behalf of the Department of the Capital Territory. It also supervises the Canberra stormwater system to ensure that no pollution enters Lake Burley Griffin. The existing A.C.T. sewerage system has four basins: the Molonglo basin (consisting of North and South Canberra, Woden and Weston Creek), the Belconnen, Tuggeranong and Fyshwick basins.

118. The Weston Creek sewage treatment works (serving the Molonglo basin) is capable of treating wastes for a population of 135,000 to 140,000 persons. The current population being served by this facility is 135,000. Effluent from the plant is disposed of into Weston Creek upstream of the Molonglo River. The standard of treatment of the effluent ensures that it can be disposed of without undue environmental effects.⁸

8. Evidence, p.119 - Department of Construction:

"The Weston Creek plant is designed to produce effluent containing not more than 20 milligrams per litre (mg/l) Biochemical Oxygen Demand (B.O.D.) and 30 milligrams per litre (mg/l) suspended solids (SS) and effluent quality close to these figures has been achieved. This quality is the so-called 20/30 standard given by the U.K. Royal Commission on Standards for Sewage Effluent in 1912. This 20/30 standard was developed to protect streams receiving sewage effluent and has been widely accepted as an effluent standard until quite recent times. No phosphate or nitrogen removal facilities are available and the site will not allow further expansion of the plant."

119. The Belconnen area is sewered by gravity to the Belconnen Water Pollution Control Centre located adjacent to Ginninderra Creek, near the A.C.T. - N.S.W. border. This plant is designed to serve a population of 50,000. This is close to the population currently being served by the facility. Treated effluent is discharged into the Ginninderra Creek.

120. Tuggeranong is currently served by a temporary oxidation ditch treatment plant and lagoons. On completion of the Lower Molonglo Water Quality Control Centre this area will be drained via the Tuggeranong Tunnel and Molonglo Valley Interceptor Sewer (as will all existing sewer 'catchments') for treatment at the new plant.

121. Fyshwick, Narrabundah and the Majura Valley are served by the Fyshwick Sewage Treatment Plant, the sewage being pumped to the plant. This plant has capacity for a population of 20,000 persons. Lagoon effluent is pumped into the South Canberra trunk sewers to bypass the lake. It is then further treated at Weston Creek.

122. In the past, the standard of treatment was appropriate given a smaller population. However, the growth of the City has led to some deterioration in water quality downstream of effluent discharge points. This problem has been foreseen and led to the decision to construct the Lower Molonglo Water Quality Control Centre.

123. The Lower Molonglo plant has been designed to produce a high standard of treated effluent to enable continued recreational use of the river immediately downstream of the plant. The design also provides for the reduction of the nutrients, nitrogen and phosphorus, to low levels so as to minimise algal growths in the river and in the Burrinjuck Reservoir. This matter is also important for residents in N.S.W. downstream from the A.C.T. The inland location of Canberra makes

it imperative that the highest standards be applied in disposing of treated effluent in waterways. It is therefore recommended that all waterways within the A.C.T. downstream from sewage treatment works be monitored by the responsible authorities in the A.C.T. and N.S.W. using internationally recognised water quality measurement techniques to ensure that the water quality does not fall below the highest accepted standards.

124. Stage 1 of the Lower Molonglo Water Quality Control Centre is now under construction and is to be completed in mid-1977. This plant has been designed in four stages. The first stage will have sufficient capacity for a population of 400,000 and the four stages are designed for a population of 1,000,000.

125. The plant has been designed to cope with a significant increase in loading as new sources of waste are disposed of. The Department of Construction informed the Committee that the major factor contributing to these increases is likely to arise from the use of domestic garbage grinders. These electrically operated grinders are fitted beneath the kitchen sink and pulverise domestic scraps to a size compatible with ingestion by the sewerage system. There would, if grinders were commonly used, be an increase in use of the Lower Molonglo Water Quality Control Centre which could reduce the capacity of Stage 1 of the plant from 400,000 persons to 270,000 persons and therefore considerable expenditure would be required much earlier than otherwise anticipated in the provision of the later stages. Although the plant could accept the additional load imposed by the extensive use of domestic garbage grinders, it is clear that such use would involve very significant costs and should be encouraged only if considerable advantages in other areas of the waste disposal problem would result.

126. The use of garbage grinders in circumstances where putrescible wastes are generated has advantages from the public health point of view. At present, domestic garbage grinders are used in Canberra subject to adequate capacity in the particular household drainage system. However, the Committee was informed that Regulation 62 of the Canberra Sewerage and Water Supply Regulations prohibits the use of sewerage services for any item other than sewage.

127. The use of domestic grinders which discharge compostible pulverised waste independent of the sewerage system should be encouraged. It would also seem to the Committee that the use of grinders in high-rise residential buildings and commercial premises can be justified on the grounds of public health, even where they feed into the sewerage system. If properly regulated, such limited use should not impose undue burdens on the system. Widespread domestic use should however be discouraged. The Committee recommends that garbage grinders which feed directly into the sewerage system, except in high-rise residential buildings and commercial premises, should be prohibited.

128. The Committee was informed that processes were available which make possible the recovery of useful products from sewage, particularly sewage sludge. These products include industrial water (reclaimed from sewage effluent), sludge gas (e.g. methane) as an energy source, and soil conditioners (based on suitably treated sewage sludges). The Committee recommends that processes for the economic re-use of sewage should be investigated by the National Capital Development Commission with a view to their possible eventual adoption in the Australian Capital Territory.

129. The Committee was informed that discharge of chemicals and industrial waste into the system does not pose a problem at present, as it is sufficiently diluted by the domestic load. Discharge of chemicals into the sewerage system is banned but

difficulties exist in enforcing this prohibition. Because this is only a minor source, there is little inspection of such disposal. Despite the problem being presently a minor one, with the potential for future industrial growth in the A.C.T., the Committee believes action should now be taken to prevent any problems arising.

130. The Committee is concerned at the lack of enforcement in this area and the inherent dangers of pollution involved, and therefore recommends that environmentally desirable methods of chemical and industrial waste disposal should become a requirement in the planning of all commercial and industrial development in the Australian Capital Territory to ensure that such waste is not disposed of through the sewerage system without adequate safeguards.

Waste Oil

131. Approximately 1.3 million litres of waste oil is produced in the A.C.T. each year. Almost all of this is lubricating oil drained from the sumps of engines during routine oil changes. The oil may be contaminated with water, cotton waste, food scraps and also contains chemicals, including the products of combustion and petrol additives, lead, sulphur, barium, vanadium and phosphorus.

132. At present a local firm collects 842,000 litres of waste oil from storage tanks at service stations and workshops upon request by the owners. This is done at no cost to the Department of the Capital Territory. The oil is stored in tanks and subsequently hauled by road transport to Melbourne where it is processed for re-use. The Committee was informed that this service is not widely known and consequently much waste oil is being disposed of in drains. However, D.C.T. is continuing to encourage the remaining waste oil outlets to use the collection service and anticipates that most waste oil in Canberra will soon

be collected and transported to Melbourne. Experiments in the use of waste oil are being undertaken by the Department of Construction in its hotmix plant at Mugga Quarry. Waste oil might also be acceptable in other industrial plants, such as the Commonwealth Brickworks or the Central Health Services Complex at Mitchell. One industrial undertaking in Queanbeyan is already using waste oil as a fuel.

133. The D.C.T. has requested that N.C.D.C. plan for the installation of a 91,000 litre waste oil storage tank in any new bulk fuel storage installation which may be built in Canberra. Any new storage facilities might perhaps be expanded to provide an oil clarification plant. This would enable waste oil, after processing in the plant, to be used as fuel in central heating plants operated in the A.C.T. As a result of these developments, no waste oil is now being dumped in waste disposal areas such as Pialligo, and a satisfactory system for the disposal of waste oil seems to be developing. The Committee considers it important that these initiatives be encouraged by D.C.T. and in particular that steps be taken to ensure that full use is made of the collection system by all sources of waste oil in Canberra. Steps should be taken to publicise this service.

134. The Committee recommends that -

- the planning of all future buildings in the Australian Capital Territory in which waste oil will be generated incorporate storage facilities to hold that waste;
- feasibility studies be undertaken with a view to establishing whether it would be viable to establish in either the Australian Capital Territory or the South East Region of New South Wales a processing plant for oil generated in the area.

Tyres

135. Until recently tyres were dumped in trenches at the Pialligo tip. These trenches were located in an area where there were no fire fighting facilities. No earth was provided nearby to cover the tyres in the event of fire. The tyres were known to be the breeding ground for mosquitoes at tips and any burning produced air pollution even though it was localised and temporary. The smoke from the burning of these tyres occasionally affected flight operations at the airport.

136. There are in existence a number of processes available for handling of waste tyres. One suggested solution to the problem involves shredding and storage. The shredding could best be done at a centrally located site adjacent to a storage pit. To prevent the possibility of fire, the pit could be flooded. The tyres would be stored so as to take up as little space as possible and be readily accessible for transportation should a suitable outlet be found.

137. The N.C.D.C. while agreeing that shredding reduced the bulk and made tyres suitable for disposal in landfill sites, did not regard the product as reusable, as the cost of processing (up to \$50 per tonne) is considered too high. However, D.C.T. is considering the possibility of engaging a contractor for shredding tyres. The shredded product could possibly be used for drainage membranes under sports centres, under playground equipment, or as an additive to bitumanic hotmix.

138. A new process is currently being tested experimentally in Melbourne and Sydney. The tyres are first frozen in liquid nitrogen and then crushed under a drop hammer. After milling and separating, rubber crumb is produced as a final product. A point in favour of this process is that it does not rely on large quantities of energy resources. D.C.T. considered that

this process would not be suitable for Canberra because of the cost of transport to Sydney. The waste product would have to be sufficiently attractive for any company concerned to pay these costs.

139. Tyre splitting, which involves slicing of old tyres to form products such as gaskets, insulators and doormats is another means of disposal. At present, there is not sufficient demand for products from this source to make very much impact on the volume of used tyres. Tyres can also be disposed of through incineration in specially designed plants which burn the tyres at very high temperatures. The process can be adapted so that the heat/energy generated can be harnessed. Unless the plant is suitably constrained however, it will generate smoke in volumes that could cause air pollution.

140. By the process known as pyrolysis, tyres are heated so as to produce recoverable energy. The feasibility of introducing this form of disposal in Canberra is discussed in 214-225.

141. The N.C.D.C. submitted that to recycle old tyres was not an economically viable proposition for Canberra at the present time. The cost involved for the plant necessary to establish the various processes referred to above could not be justified because -

- . the processes themselves were still in a state of development so that plant built now might soon be superseded by new technologies;
- . Canberra's small size and the limited number of outlets for recycled material in Canberra provided an inadequate base for the operations.

N.C.D.C. considered that the only satisfactory method of disposal at present was landfill.

142. It has now been decided to stop the dumping of tyres at Pialligo. Since January 1976, tyres have been dumped in tyre trenches at the West Belconnen tip and covered with soil to prevent burning. The tyres are being buried in a manner which would permit retrieval for re-use.

143. In view of this evidence, the Committee concluded that current methods of disposal were satisfactory for the A.C.T. at the present time. However, it was felt that recycling of tyres was highly desirable and the responsible authorities in the A.C.T. and the region should keep the matter under review with the aim of introducing processes and plants to recycle used tyres as soon as the conditions for their introduction are favourable.

Builders' Refuse

144. Builders' refuse is presently accepted at landfill sites but not at the Ainslie Hoppers. Other builders' refuse sites of a temporary nature are established in new development areas as part of a plan to convert those sites eventually into sports fields or amenities. Selection of new sites for this purpose in new areas will be determined by the convenience of the site for development operations in the area, the extent to which areas downgraded by quarrying and erosion can be restored for land use, and the creation of 'a landform' suitable for such uses as railway yards, playing fields and golf courses (Kingston, Stirling and Kambah) that may have been provided for in the plan for the area.

145. The Committee does not foresee any difficulties arising from the above strategy. Comments contained in Chapter IV concerning the management of landfill sites apply also to builders' refuse tips.

Trade Waste

Present Disposal Methods

146. The Department of the Capital Territory has direct responsibility for commercial waste collection. Over 1100 industrial containers and seven rear-loading compaction vehicles are used. The service provided by the Department is intended to operate on a cost recovery basis. Commercial premises can either make use of D.C.T.'s service or make their own arrangements for the removal of waste. D.C.T. has 600 customers and receives about two new applications each week. The service is available for schools, government flats and commercial clients, and is functioning satisfactorily. All premises are serviced twice weekly. The waste is delivered to Pialligo tip. Cardboard and saleable paper from commercial sources are being collected by a paper contractor. Commercial enterprises have found it is in their interest to make full use of the recycling facilities offered by A.P.M. and A.C.I. in order to minimise the cost to them of D.C.T.'s service.

147. Automotive and construction wastes are the responsibility of the industries concerned and can be disposed of at any of the tips in the Territory.

148. In attempting to operate the commercial waste service on a cost recovery basis, the Department is in competition with other private contractors offering the same service. Unlike its competitors however, D.C.T. as a Government Department must observe regulations administered by the Public Service Board and the Treasury. For example, charges for the service are prescribed in the regulations and cannot be altered without amendments to relevant legislation. This is a slow process and places the service at a disadvantage to its commercial competitors. If the enterprise were operated as a public-owned statutory authority, then these regulations would not apply and the service would be

able to compete on equal terms with its commercial rivals (see Chapter VII).

149. Public health principles applicable to household garbage apply also to commercial and public waste, large scale eating establishments and food processing or handling establishments. Currently, the principal method of waste disposal is D.C.T.'s trade waste service. The Capital Territory Health Commission considers this system deficient in some respects and submitted that -

- . lack of definition of responsibility for maintenance and cleaning caused by the sharing of containers by several shops or a group of buildings;
- . containers are subject to damage and vandalism;
- . there is a lack of such facilities as rear-yard drainage sumps of sufficient size for cleaning containers and a need in some cases for the areas around containers to be cleaned and checked for overflows;
- . problems of access arise in public places such as service laneways.

150. These disadvantages are compounded by conflict and deficiencies in some Public Health regulations which apply to the storage and disposal of waste from eating houses. Where containers are shared by several shops it is impossible to enforce certain regulations. For instance, proprietors of eating houses are responsible under the regulations for providing receptacles, cleaning them and removing refuse, but because containers are provided by D.C.T. free of charge, the proprietors regard it as D.C.T.'s responsibility to service them.

151. The C.T.H.C. finds it difficult to enforce public health regulations and said it was unable to prosecute successfully for breaches where waste facilities are shared. C.T.H.C. informed the Committee that as a result of the difficulty of determining legal responsibility for breaches of health regulations, it generally has only a persuasive role in this respect.

152. In view of the above difficulties and the possibility of industrial action at times preventing the collection of garbage, the Committee recommends that the Public Health regulations should be amended to make the occupier of each individual commercial premises responsible for the regular removal of garbage to a suitable place of disposal. Containers should be so identified that responsibility for each is clearly defined.

153. Approximately 15 percent of eating houses in the A.C.T. have garbage grinders installed. As already indicated this method of disposal is regarded as appropriate for commercial premises.

Other Matters

154. Some businesses have opted to dispose of waste themselves rather than using D.C.T.'s service. For example, the Lend Lease Corporation, a prominent Canberra landlord, has undertaken its own waste disposal operations for a number of years. It found this necessary because of inadequate storage areas for waste containers, misuse of facilities by tenants placing large cartons in the containers and leaving little room for other refuse, cleanliness, safety, and cost (Lend Lease found that operating the service itself was cheaper and more reliable).

155. Lend Lease arranged some years ago for the Canberra City Lions Club to bale and remove all waste cardboard from its

shopping centres. This reduced the quantity of waste to be dumped and created a source of income for a charity.

156. With the probable increase in industrial development in Canberra, problems of waste management will increase and long-term planning is essential. This can only be achieved through a thorough review of existing legislation and practices. The Committee therefore recommends that authorities involved in both general planning and waste management continue to review existing legislation which affects waste management practices, to ensure there are no health hazards or dangers arising from trade wastes which will adversely affect the quality of the environment in the Australian Capital Territory.

Radioactive Waste

Current Situation

Hospitals

157. Radioactive waste is produced in the course of diagnostic and therapeutic procedures at Canberra's hospitals. It presents virtually no problem because if radioactive substances are to be safely administered to a patient, the material chosen must have minimally hazardous emissions. Unused vials of materials, used syringes and other contaminated disposal apparatus proceed through strict storage conditions for some weeks. They are then taken to Pialligo tip and buried, under the supervision of hospital authorities, at the base of 8 metre "deepwaste" trenches.

158. More than 95 percent of all radioactive material used at the hospitals loses half its activity within six hours. The Committee was informed that the activity is less than one millionth of its initial value after five days and that it presents no danger to the public.

Australian National University

159. Radioactive material is used in fifteen different departments and schools at the University. As many as five research staff in each location handle the material. The Radiation Safety Committee of the A.N.U. submitted that the procedures it applies in handling radioactive material reduce to an absolute minimum the hazards which radiation might present to its employees or the public. The quality of waste and its degree of activity is well below the published international standards and standards recommended in the Radioactive Substances Act 1957 of N.S.W.

160. The Radiation Safety Committee (A.N.U.) submitted that radioactive waste should be disposed of at a site specially set aside for the purpose rather than at a municipal garbage tip. A central storage area where isotopes of medium and high toxicity can be stored should also be established. Radioactive waste material is also handled and disposed of in small quantities by C.S.I.R.O. and the Bureau of Mineral Resources.

161. The Committee is satisfied that the disposal of radioactive waste in the A.C.T. does not present any danger to the public, but it deplors the fact that the A.C.T. has no official regulations controlling the safe handling of radioactive substances.

162. The Committee was informed by the Minister for Health, the Hon. Ralph J. Hunt, M.P., that a draft Ordinance is being prepared by C.T.H.C. providing for the control and disposal of radioactive waste material. The Committee considers that there is no justification for further delay in finalising this legislation. Well tried, internationally established regulations have been in force for many years in the States of the Commonwealth and in other countries. The Committee views the proposed

Ordinance as requiring the utmost priority and recommends that its enactment be proceeded with immediately.

163. Enforcement of the legislation should be made the responsibility of an agency of the highest competence and authority to assess relative risks and discuss them on a basis of equal 'status' with all users. The enforcing agency must be given power to withdraw any individual licence to use radioactive materials or machines if necessary.⁹

164. The Committee was told that radioactive material could be carried safely on ordinary commercial flights. Small quantities were transported to Canberra daily on scheduled flights and about one flight a week would carry the material in more substantial quantities. The only danger that might arise would be in quite exceptional circumstances such as an aircraft accident. Fire could melt the protective lead casing of containers in which the materials are carried. In such an event, there would be danger to those involved in the accident and to rescue and emergency parties. It would be prudent for C.T.H.C. to establish a register of personnel who are especially qualified to assist in such an emergency by reason of training and experience in handling such materials. If necessary, a special squad could be formed. A stock of decontamination equipment and special clothes should be provided. Emergency services should be briefed on the appropriate measures to be taken should such an emergency occur. The Committee recommends accordingly.

9. During the Inquiry, the Committee became aware of a practice whereby x-ray apparatus in the A.C.T. was occasionally re-sold to private individuals not necessarily qualified to operate or maintain the equipment. The Committee was informed that the practice could result in serious damage where the apparatus was operated by an incompetent person or if it was not properly maintained. Faults, not discernable to the un-trained eye, occasionally arose. The matter is outside the scope of the reference for the Inquiry but the Committee has brought the question to the attention of the Minister for Health so that it might be adequately covered by legislation.

PART C - WASTE DISPOSAL

CHAPTER IV: LANDFILL DISPOSAL

Present System and Contemplated Strategy

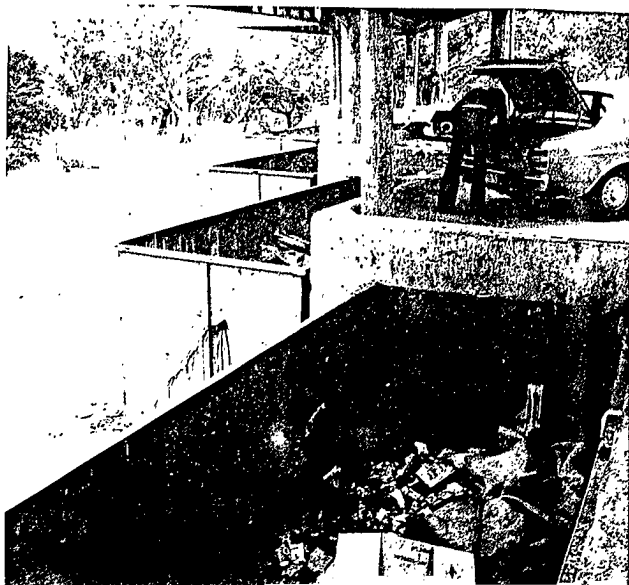
165. The landfill method of disposal is the process of dumping raw refuse into designated land excavations. The present system of landfill disposal in Canberra includes major landfill sites at Pialligo and West Belconnen for refuse from domestic and trade waste collections and privately delivered wastes; minor landfill sites at Long Gully and Kambah, which are used for privately delivered domestic refuse, City Parks Administration waste, builders' refuse, public litter and street sweepings; and a transfer station at Ainslie equipped with refuse hoppers which take waste similar to that of minor landfills sites - this waste is taken to the West Belconnen landfill site for disposal.

166. Some minor landfill sites have been closed recently. N.C.D.C. has estimated that the Pialligo tip will last for another 10 years (but see paragraphs 168-169) and West Belconnen tip 25 years. Recently acquired compacting equipment which compresses loose garbage will assist in extending the life of these tips. Besides the existing tips, N.C.D.C. will be undertaking site identification works for a major landfill site in the Tuggeranong area. A study is also currently being undertaken on land-use and its impact in the Eastlake, Pialligo and Fyshwick area. N.C.D.C.'s current strategy permits refuse from Gungahlin, when constructed, to be disposed of at West Belconnen. A specific site in this area would not be necessary until about 1990.



Figure 11 Ainslie Transfer Station.

Figure 12 Refuse hoppers at Ainslie Transfer Station.



167. The N.C.D.C. further suggested that the landfill method of disposing of untreated raw refuse should be continued in Canberra. The Committee notes that by limiting the number of minor landfill sites and creating fewer widely dispersed major sites, a situation is created favourable to a total collection system because householders have to travel long distances to dispose of gardening and minor building wastes.

168. During its Inquiry, the Committee received information that the development of Pialligo tip, which had been part of N.C.D.C.'s strategy, would have to be curtailed. It had been originally proposed to extend the tip to a site on the north-east of Pialligo Avenue. When the Department of Transport was approached about this planned extension, it expressed serious reservations about the proposal. The Department of Transport was concerned that a serious 'bird hazard' could be encountered by aircraft using Canberra Airport. The degree of hazard would increase if the disposal operations were transferred to the proposed new site. Birds had not presented a problem at Pialligo in the past but the recent closure of the nearby Kingston and Deakin tips which had acted as a feeding ground for the birds had resulted in a marked increase in the bird population at Pialligo.

169. The Department of Transport advised the Committee that the tip should not, under any circumstances, be extended so that tipping operations come closer to the airport. The tip operation should be closed as soon as practicable. It has formally notified N.C.D.C. and D.C.T. of these objections and proposes to take action under Regulation 92A of The Air Navigation Regulations to declare the area a prohibited place for depositing waste. The Committee has been informed by D.C.T. that birds at Pialligo represent no immediate hazard to air traffic. D.C.T. has taken steps to make the area less attractive to birds by burying waste every day and destroying birds. The Department of Transport

advised the Committee that it does not regard the site as a serious bird hazard area at present and is satisfied with the measures being taken to control the bird population. However, it is opposed to further development of the site for landfill and does not generally regard the area as appropriate for this purpose.

170. The Committee is concerned that the Department of Transport did not notify N.C.D.C. and D.C.T. of the potential bird hazard until the question of extension to Pialligo actually arose. The site has been in use for waste disposal since 1964. There appears to have been a failure in communications between transport and urban planners in a matter of considerable importance to the public. The Committee therefore recommends that the National Capital Development Commission contact all Commonwealth Departments and interest groups with a request to lodge objections to the proposed siting of future landfill areas and to take any objections into consideration before the development of such sites proceeds.

IS LANDFILL THE ANSWER?

Environmental Considerations

171. The environmental implications of the landfill method of disposal include the effect caused by 'leaching', which in the long-term can lead to pollution of watercourses; a danger of explosion from gases; and litter being blown by the wind on and near tipsites or along access routes to tips. Tipsites are ugly, provide breeding places for vermin and can cause air pollution. The process also involves a loss of many resources which could be recycled.

Leaching

172. Liquid waste produced from the decomposition of landfill refuse is known as 'leachate'. Leachate contains high concentrations of dissolved organic or inorganic materials which may drain into the ground water and then into small water courses. Leachate can contaminate the ground water or water courses downstream from tip sites thus creating dangers to people and to the ecology of the surrounding area.

173. The West Belconnen site drains into two creeks which in turn flow into the Murrumbidgee River. The ponds provided to contain leachate will not eliminate the problem entirely but should reduce it significantly. Leachate can also be pumped to the Lower Molonglo Water Quality Control Centre which is located nearby. Leachate could be diverted into the sewerage system if necessary but there is no proposal to do this at present as measures being taken are considered adequate. Leachate monitoring of the area is being undertaken. As the landfill operation increases in scale, more sophisticated methods of leachate disposal may be required.

174. The Pialligo site, because of its proximity to the Molonglo River and its location upstream of Lake Burley Griffin, is a potential hazard if not properly controlled. Site investigations have not disclosed any pollution. N.C.D.C. said that the presence of an impermeable clay layer in the soil under the landfill site restricts the movement of leachate into the river. The chances of leachate escaping into the Molonglo River were remote because most of it drained into a dam and there was an overflow dam to take additional leachate in the event of heavy rainfall. The Committee considers that strict leachate protection and monitoring measures should be undertaken to ensure that this does not occur.

175. As long as the landfill method of disposal continues to be used sites should not, in the view of the Committee, be located near watercourses. All sites, including closed sites, should be monitored to check against ground water pollution. This will involve sinking observation boreholes to take periodic samples of the water, chemical and biological analysis of samples and interpretation of results.

Gas Control

176. The main problems resulting from the creation of gases by decomposition are -

- five to ten percent methane gas mixed with air in a confined space is explosive;
- ammonia can give rise to compounds in drinking water which can be harmful to humans;
- concentrations of free carbon dioxide greater than about 20 parts per million create corrosive conditions;
- hydrogen sulphide is extremely toxic.

177. The most common method of confining these gases is to place an impermeable barrier over the floor and walls of the landfill area to restrict the movement of gas. Sometimes such a barrier exists naturally if there is an adequate thickness of clay or other impermeable soils. Vents filled with a suitable material such as gravel are required at selected locations to allow gases to escape into the atmosphere where there will be a minimal danger to humans. N.C.D.C. stated that about one or two years after completion of the landfill the danger from this source is considerably reduced.

Litter

178. The problem posed by litter at landfill sites is caused by material dispersed in windy conditions and the loss of waste en route to tips. N.C.D.C. considered that as the West Belconnen tip is 1.6 km. from the nearest residential development, the impact of noise, dust, blown litter, gas production, flies and rodents is unlikely to be significant to residents. The Committee is aware, however, that there had been considerable problems for residents particularly from litter falling from vehicles travelling to the tip. The Committee notes that this matter is dealt with in the Litter Ordinance (see paragraph 106). However, special attention should be given to access routes to landfill sites in order to avoid problems such as those currently being experienced by residents living on the access route to the West Belconnen tip. Such measures, together with litter proof fencing, a rigorous site cleaning program (which should include the approaches) and strict supervision of cartage should result in an improvement in the situation. Traffic movement along Phillip Avenue to the Ainslie transfer station creates noise and litter. However, these are at present apparently not of major concern to residents in the area. The Committee considers that any major tip should be sited well away from population centres so as to avoid traffic hazards, air pollution, litter and general nuisance.

Visual Impact

179. The West Belconnen site is in an area already affected by the Belconnen Water Pollution Control Centre and a number of overhead powerlines. At present, the area receives few visitors. By the time the Molonglo and Murrumbidgee Rivers have been developed as areas for recreation, it is envisaged that existing screen planting around the perimeter of the site will reduce its visual impact. 'Landform' and trees at Pialligo could reduce the impact of extensions there. The Committee recommends that efforts should be maintained to reduce the unsightliness of existing and closed tips.

Health Considerations

180. The Committee received evidence from the Capital Territory Health Commission that landfill sites are not considered satisfactory because food scraps and other putrescible matter, deposited at the tips, provide a feeding and breeding environment for pests particularly rats and flies. Pests are attracted to these areas because deposited material is often not properly buried. Tips, particularly minor tips, are in some cases too close to housing resulting in complaints of flies and odours by nearby residents. Uncovered waste may be set alight causing smoke pollution in the area. These problems are not as prevalent in Canberra now as they have been in the past because many of the minor household tips in closely populated areas have been closed. D.C.T. has recently acquired compaction units which reduce spaces where vermin can shelter and breed at tips.

181. Smoke from tips is also a health hazard particularly for those who have a bronchial or asthmatic condition. The problem of fires at tips in Canberra has been reduced by the closure of minor household tips, use of compaction equipment and better fire control measures at the two major tips. The Committee is of the opinion that if landfill disposal is to

continue, it should be on the condition that all stringent and necessary precautions are undertaken to prevent the unnecessary occurrence of fires at tips.

Economic Considerations

Transfer Stations and Landfill Sites

182. The question of costs is a major concern in selecting a method of waste disposal. Operations at Pialligo and West Belconnen were estimated to cost \$80,000 and \$75,000 respectively in 1975-76. The estimated annual costs for operating the sites were as follows:

1975-76	Pialligo	West Belconnen
Tonnage for Disposal	42,000 tonnes	24,000 tonnes
	\$	\$
Operating costs	75,000	62,000
Fixed Annual costs	13,000	13,000
Total Annual costs	88,000	75,000
Cost per tonne	2.10	3.10
Average cost per tonne:	\$2.50	

Source: Evidence, p.30.

It was estimated that on the basis of handling 6,000 tonnes per annum the annual cost of the operations of the Ainslie Transfer Station would be \$50,000.

The development costs for Pialligo and West Belconnen were -

	Pialligo	West Belconnen
	\$	\$
Fencing	10,000	12,000
Weighbridge	40,000	40,000
Access and services	40,000	43,000
Amenities		15,000
Leachate control		20,000
Total Development Cost	90,000	130,000
Life of Site (from 1975)	10 years	25 years

Source: Evidence, p.30.

Cost of compaction equipment recently acquired was \$138,000. The cleaning-up and restoration of closed tips will cost about \$40,000.

183. As Tuggeranong expands to the south, haulage costs to Pialligo will increase. With increasing population and the possible need to close Pialligo in the near future (see paragraph 169) it will be necessary to commence a site in the district. The capital cost of a new landfill site at Tuggeranong is estimated at \$150,000 with other associated costs comparable to those applying to the Pialligo and West Belconnen sites.

184. A current problem with the Ainslie Transfer Station is that the refuse dumped there is in an uncompacted form which increases the haulage costs to the landfill site. However, D.C.T. informed the Committee that with the right type of compaction equipment the cost of the Ainslie hopper would be reduced dramatically and a much cleaner operation would result.

185. In the course of the Inquiry, conflicting views were expressed as to whether landfill was the most economic means of disposal. N.C.D.C. suggested that landfill was the best method of disposal as the land could later be developed as parks and sportsgrounds and for other purposes. Some witnesses considered that to bury garbage was a waste of land. In this view, the value of the land at current residential land values should be taken into account in determining the economics of the landfill method. Landfill also led to the waste of resources that might have been recovered if other methods of disposal were used. Witnesses from M & T Chemicals informed the Committee that a city such as Canberra would discard between 9,000 and 12,000 tonnes of ferrous scrap per year which, if processed, might yield as much as 50,000 kg. of tin per annum. Other types of waste such as glass, paper and cloth which can be recycled are also buried. N.C.D.C. agreed that improved recycling could reduce Canberra's annual landfill requirements and lengthen the life of existing landfill sites by approximately 15 percent. The economics of landfill as a method of waste disposal in comparison with other methods is difficult to quantify and will depend on many factors.

186. One of the large components of costs in waste disposal is haulage. Recently there has been a steady increase in the cost for cartage of garbage to landfill sites. The estimated haulage costs within Canberra are listed in Table 4.

187. With the introduction of a system of total collection N.C.D.C. said the totals in Table 4 would be increased by an estimated 27 percent. At the same time, however, this increased cost to the community would be offset by the fact that private householders would no longer need to make trips to landfill sites to dump additional rubbish. Annual haulage costs for other types of refuse are estimated to be as follows: Trade Waste \$70,000, City Parks Administration refuse \$56,000 and street sweeping and public litter \$67,000.

TABLE - 4
ESTIMATED HAULAGE COSTS - 1975 FIGURES

	Population	Average Haul	Quantity	Tonne-km	Cost
		km	tonnes		\$
Belconnen	50 000	21	7 900	165 900	56 000
North Canberra	53 000	13	8 364	108 784	37 000
South Canberra	27 000	14	4 260	59 682	20 500
Woden	37 000	16	5 842	93 472	31 500
Weston Creek	20 000	21	3 160	66 360	22 500
Tuggeranong	3 000	23	474	10 902	2,500
	190 000		30 000	505 100	170,000

Source: Evidence, p.26.

Waste handling costs for other Australian cities are listed in Table 5.

TABLE - 5
WASTE HANDLING COSTS
(including annual capital costs of plants and facilities)
Annual Total 1972

	\$	\$/Person	\$/Cubic Metre	\$/Tonne
Sydney	19 100 000	6.53	4.46	20.08
Melbourne	10 250 000	3.97	3.06	13.75
Brisbane	3 170 000	4.53	3.72	16.80
Perth	3 217 000	4.58	3.14	14.12
Adelaide	2 000 000	3.47	2.81	12.63
Canberra	1 035 000	6.77	4.47	20.10
Hobart	595 000	3.89	4.60	20.70
	39 367 000			

Source: Evidence, p.199.

188. One witness suggested that collection costs could be reduced with the development of a site in Tuggeranong as collection vehicles operating in Tuggeranong would not need to travel to Pialligo and back to deposit Tuggeranong's waste. A witness from the Packaging Industry Environment Council (P.I.E.C.) said that transport costs could be reduced by the provision of more transfer stations. Smaller vehicles collecting from households could transfer their loads into larger vehicles and waste could be compacted at the transfer station before disposal at the major tip sites.

189. Witnesses from the Urban Environment Study Group (U.E.S.G.) suggested that the design of Canberra, as a series of separate 'towns' within an urban region meant that it might be more efficient and economical to transport wastes in two stages. The first stage would involve local collection and transport to a transfer station within each of the towns of Belconnen, Woden Valley, Canberra, Weston Creek and Tuggeranong. At the transfer stations the wastes could be transferred to vehicles of larger capacity and taken to a landfill site or other facilities serving the whole region. Facilities for mechanical separation of the garbage could be located either at the transfer stations or at the central collection point. Separated material could be specially dealt with for disposal at the landfill site or prepared for recycling. Such a system removes the need for a larger number of relatively small capacity vehicles to make many long journeys to the disposal site or other facility.

Bulk Reduction

190. Most methods of bulk reduction lead ultimately to a product which must be disposed of by landfilling. Bulk reduction reduces the volume of waste so as to increase the life of a landfill site. Other benefits are that the environmental impact of a landfill area can be reduced and the suitability of the site for subsequent re-use and development can be improved.

Typical savings in landfill requirement achieved by bulk reduction methods are: incineration 80 percent, pulverisation 25 percent, high density baling 35 percent and composting 35 percent (each of these processes is discussed in paragraphs 191-203 and 228-229).

191. Incineration reduces all oxidisable organic matter to ash, leaving no material for microbial decomposition thus reducing the leachate problem. This method also limits the breeding environment for pests such as rodents and flies. The residue presents no fire hazard. The disadvantages of incineration are its possible effect on air quality through gases emitted and the cost of installing emission control equipment. Also with incinerated residues, hard spots caused by fused particles may cause problems with respect to footings or surface excavation, unless they are broken up on site. Some chemical residues from incineration may, for example, attack concrete if present in high enough concentrations. This problem can be solved by letting the fill-age at least 2 years before building on it, by which time 80 - 90 percent of the soluble material would normally be removed by leaching.

192. The capital cost of an incinerator to handle Canberra's daily domestic waste (250 tonnes) is estimated at \$3.2 million. Operating costs exceed \$0.5 million per year. The cost of reduction of a tonne of solid waste would be \$6.50 to \$6.90 per tonne once the cost of disposing of the 20 percent residue is taken into account.

193. Pulverisation (or shredding) reduces the individual components of the municipal waste stream to evenly sized, easily handled waste. Ferrous metal, aluminium, waste paper, glass and plastics can be extracted from shredded material if the necessary plant is available. The remainder of the refuse is then suitable for incineration, pyrolysis or landfill.

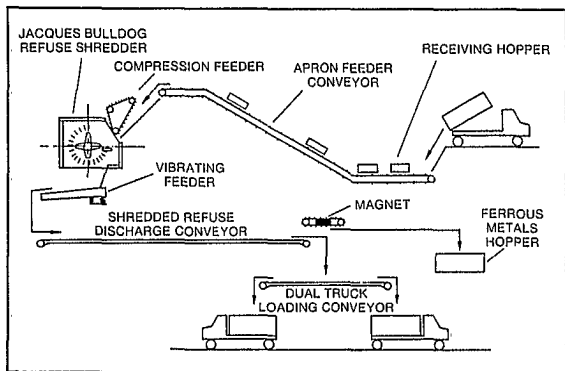


FIGURE 13 FLOW DIAGRAM OF CANTERBURY MUNICIPAL COUNCIL SHREDDING PLANT.

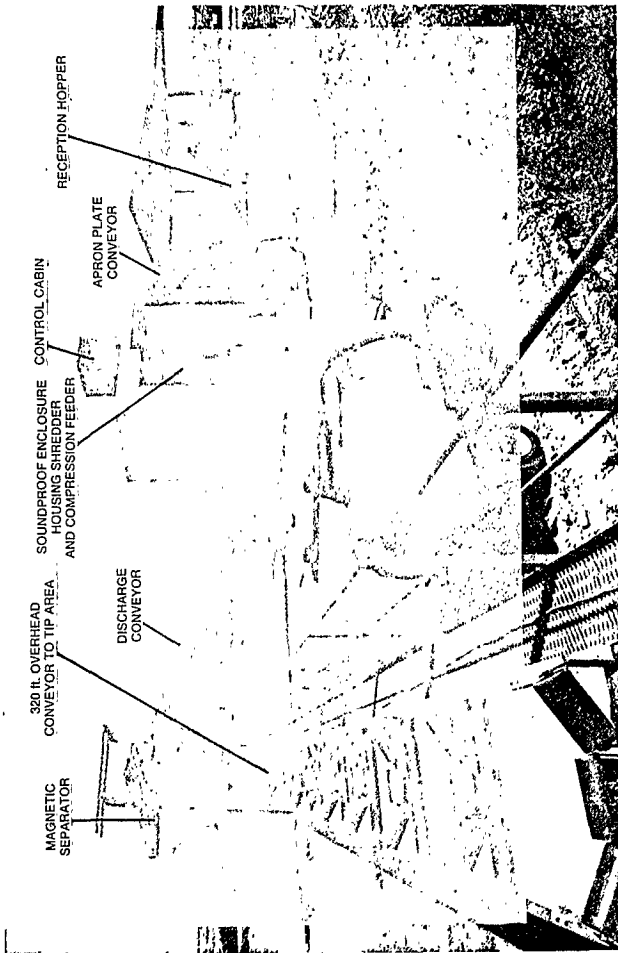


FIGURE 14
Canterbury Municipal Council Refuse Shredding
Plant

194. The Municipality of Canterbury, N.S.W. has recently installed a garbage shredder at its landfill site. This is the first plant of its kind in Australia and provides an example of a modern disposal technique. The Steel Can Group provides the technical specifications, expertise and finance for the installation of magnetic separation equipment to recover for recycling all ferrous scrap (including steel cans) from the shredded solid waste.

195. The S.C.G. also undertook to defray the costs associated with the operation of the magnetic separator for an initial two year period and guarantees a market for the recovered steel scrap.

196. Canterbury Council was faced with rapidly diminishing tipping facilities. If sanitary landfill was to continue as its waste disposal method, it would require haulage of the wastes to other areas at considerably increased costs. The Council therefore chose pulverising for a number of reasons:

- . shredded refuse contracts to four times the density of raw refuse after only one year on the tip;
- . shredded refuse is relatively odour free and spreads easily so that the milled garbage can be effectively handled by light plant;
- . it does not attract birds or vermin to the same extent as raw refuse, and fly infestation is reportedly rare;
- . heavily loaded vehicles can travel on freshly shredded garbage without bogging, even in extremely wet conditions;
- . the amount of earth moving equipment required is reduced;
- . daily soil cover is not required over freshly shredded refuse as is the case with normal landfill tipping. Overseas findings reported to the Committee disclosed that milled refuse can be left uncovered on landfill for several

years without giving rise to problems of vermin, odour or litter being blown by wind. In some instances shredded garbage approximately one year old is used for covering raw refuse;

- reduced moisture penetration because of the compaction of shredded refuse reduces the leaching effect;
- tests have indicated that shredded refuse is not a fire danger to the same extent as raw unmilled refuse;
- shredded refuse will support plant growth within approximately one year, which enables early redevelopment of reclaimed areas such as sporting fields, parks, and general open space areas;
- because shredding produces a uniformly sized product, tears open plastic bags, and generally separates individual items in waste, it becomes relatively easier to extract recyclable items such as steel cans.

197. The process of pulverisation does, however, have some disadvantages. For example, the noise from the hammers is intense. The Steel Can Group submitted that methods such as enclosure within buildings and the use of heavy rubberised doors, can provide sufficient acoustic protection.

198. Witnesses from the Society for Social Responsibility in Science (S.S.R.S.) submitted that volume reduction by pulverisation seemed modest in comparison with the compaction that can occur in normal landfill by using the latest compaction equipment. Pulverisation is capital intensive, and the potential problem of toxic material leaching from landfill may actually be accentuated. By itself it achieves no recovery. There is also a problem with wind-blown paper waste. However, this difficulty can be overcome with correct site selection and management. The problem of wind-blown waste would disappear with improvements to design such as total enclosure of conveyor belts. There may also be problems

with tyre shredding if large quantities were to be processed as it may affect the ultimate use of the reclaimed land.

199. The Steel Can Group submitted that the cost of installing and operating a shredder/seperator system over a period of say 20 years should be compared with savings that might result if -

- . three additional landfill sites did not have to be acquired, excavated and prepared for use;
- . waste did not have to be delivered to the additional sites which in all probability would be located at greater distances from the city centre than present sites; and
- . income from sale of materials recovered from the shredder/seperator system, e.g. steel scrap, tin, aluminium, glass, refuse-derived fuels, etc.

200. Local councils in N.S.W. specify the following criteria when tenders are invited:

- . The plant must be written off at a flat rate of 10 percent over ten years.
- . That it will cost no more than 4 cents per kilowatt per hour for electricity.
- . That it can be staffed by no more than 3 men on a 40 hour per week basis in addition to general maintenance costs and up-keep of the plant.

201. Under these conditions it costs approximately \$3 per tonne to run a plant with the capacity of 30 to 40 tonnes per hour. It costs between \$90 to \$120 per hour. To adapt a shredder for separation of fibre and aluminium the cost would be greater, but these operations are still being developed and it is difficult to project a cost for them. The Committee was informed that the Canterbury Council project seems promising from a financial point

point of view. The shredder now handles 50 tons/hour and is capable of handling two to three times this amount.

202. High density baling is a process whereby refuse is pressed into bales and bound with wire or sealed with bitumen. Densities of fills obtained using baled refuse is on average about 30-40 percent greater than the density possible with well compacted raw landfill. High density baling does not change chemical composition of refuse but reduces the availability of oxygen during the decomposition process, leading to higher proportions of methane and hydrogen sulphide. This process produces the smallest volume of leachate.

203. High density bales normally undergo only minor settlements and form a stable landfill. When the bales are placed directly in the landfill areas, they form construction blocks which can support foundations. Construction of services, piers or piles through the bales is difficult because of their inherent strength resulting from their high density. Total cost for this system is estimated at \$4.50/tonne.

204. The N.C.D.C. stated that the existing system of refuse disposal, upgraded by the use of more efficient compaction equipment at the tip is the most suitable system for waste disposal for Canberra. The average cost per tonne for compacted landfill is estimated at \$2.00/tonne. Compaction of raw refuse on site is undertaken by using tractors or bulldozers. D.C.T. recently purchased steel-wheeled "landfill compactors" which achieve the best compaction reducing raw waste in volume by about 30 percent.

205. The N.C.D.C. submitted that of bulk reduction methods, compaction of raw landfill involved the least cost. Potential environmental and resource conservation benefits of other options were not considered sufficient by N.C.D.C. to justify the higher

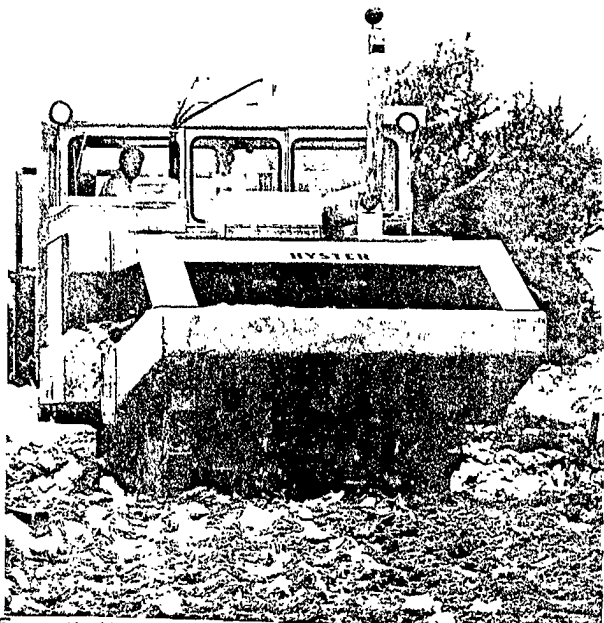
cost involved (see Table 6, showing summary of costs of alternative bulk reduction). N.C.D.C. stated that any investment designed to improve the quality of the landfill beyond that obtainable by compaction would be wasted. Benefits from the savings in land would not offset the added cost of bulk reduction. The Committee regards N.C.D.C.'s method of costing as deficient in that only capital and operation costs of alternative methods are considered. Potential savings through resource recovery, the use of energy created by some of these methods and less tangible but socially important environmental advantages are not sufficiently considered.

TABLE - 6
SUMMARY OF COSTS OF ALTERNATIVE BULK REDUCTION METHODS

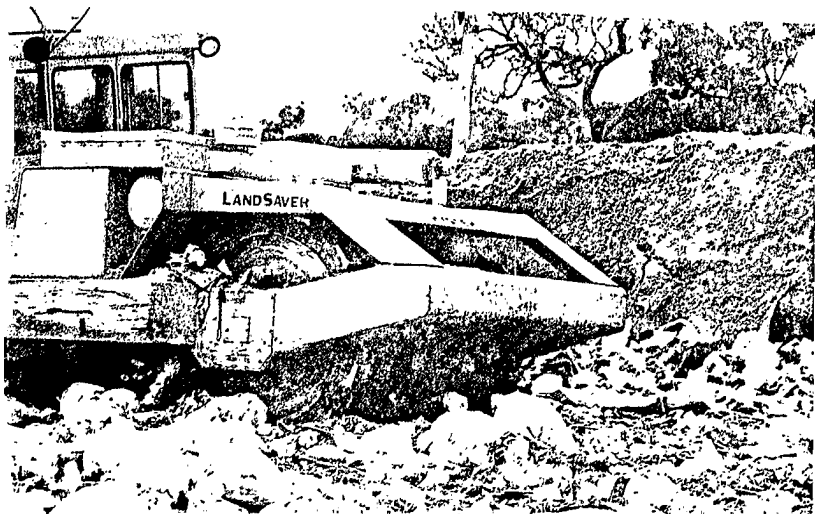
Treatment	Initial capital expenditure (A)	Cost of treatment (per tonne)	Ultimate cost of disposal (per tonne)	Current annual costs (B)
	\$	\$	\$	\$
Raw Landfill	220,000	..	2.00	160,000
Incineration	3,200,000	6.50	6.90	552,000
Pulverisation	700,000	2.50	4.50	360,000
High Density Baling	900,000	2.50	4.50	360,000
Composting	2,100,000	4.70	6.10	488,000
Pyrolysis-Resource	3,000,000			
Recovery	4,000,000	15.00	say 12.00	about 1,000,000

- A. There would probably be some additional expenditure for landfill sites in conjunction with the bulk reduction alternatives.
- B. No account has been taken of extra haulage costs associated with a single pre-treatment facility compared with a better strategic coverage with landfill sites. However this would not represent a significant cost increase.

Source: Evidence, p.13.



FIGURES 15 & 16. Compactor used at Canberra's landfill sites



Reclaimed Land Use

206. The N.C.D.C. stated that landfill areas could be used productively by industry and for agriculture, as construction areas and also as open space or for recreational purposes. Land was regarded as being on loan for waste disposal purposes until such time as it was reclaimed for these productive uses.

207. Completed landfill areas used for agricultural and recreational purposes require a thick cover of soil over the completed sanitary landfill. Areas require careful maintenance to ensure that soil cover is not eroded by wind or water to avoid leachate. Irrigation should not be allowed in landfill used for agricultural purposes because of the leachate problem. Gas vents are needed to ensure the free exit of decomposing gases. Gas and leachate monitoring stations are needed to detect any breakdown in the impermeable layers or the venting systems. Completed sanitary landfills at construction sites present considerable problems because of possible soil subsidence. Gas leakage and containment within confined spaces in or around buildings had led to explosions. Leachate waters may come into contact with buildings' foundations or supporting piles causing corrosion.

208. In its submission to the Committee, D.C.T. submitted that the city had derived benefits from the use of sites for waste disposal reclamation. Examples of previous landfill sites include Golden Grove (Red Hill), railway yards, many sporting fields and recreation reserves. N.C.D.C. informed the Committee that the major landfill sites at Pialligo and West Belconnen would later be used for storage yards with portable buildings.

Conclusion

209. The Committee considers that landfill is in many ways an unsatisfactory method of waste disposal because it is wasteful of land, gives rise to health and environmental problems and

does not ensure the full recovery of much recyclable material. It is basically a short term and limited approach. Technical advances in resource recovery are proceeding at a rapid pace. It is possible to foresee a total resource recovery operation in Canberra within twenty years. Developments in the field will need to be closely monitored with a view to their ultimate use in Canberra. Such methods could progressively limit the need for landfill.

210. The Committee supports the concept of transfer stations like the Ainslie operation. The sites selected should be convenient to residential areas and compaction equipment should be provided. The provision of such transfer stations might stabilise haulage costs and could make a total collection system unnecessary. If accessible to householders, such stations could be used as a base for transfer of waste to major landfill sites and for resource recovery operations.

211. The Committee recommends that the National Capital Development Commission closely monitor technical advances in resources recovery with a view to the eventual establishment of a resources recovery system and the restriction of the landfill method of disposal in planning the future of Canberra's waste disposal operations. It also recommends that transfer stations with suitable compaction equipment be established and located to provide optimum access for Canberra householders.

CHAPTER V: RESOURCE RECOVERY -
ALTERNATIVE DISPOSAL METHODS

Introduction

212. Resource recovery is the conversion of waste materials to energy or by-products that can be put to commercial use. American estimates suggest that one billion gallons of home heating oil or five million tons of coal could be saved annually in the United States by 1980 through the use of solid waste as fuel.

Pulverisation

213. This method is used primarily as a method of bulk reduction but it can be adapted to assist with the recovery of materials such as metal, glass and paper. For example, the shredder operated by Canterbury Council has a magnetic separator which separates most of the ferrous scrap from the waste stream after it has been pulverised. Details of this process were discussed in the previous Chapter.

Pyrolysis

214. Pyrolysis is still being developed. It is a process where rapid technological advances are taking place. It involves the heating of the organic portion of municipal or industrial wastes to a suitably high temperature (200^o - 900^oc.) in the complete or partial absence of oxygen to produce compounds which may be used as fuels, base chemicals and feed stocks for the petrochemical industry. The products are in three component streams, i.e. a gas component, an oil, and a char consisting of carbon plus any inert material (glass, metal, rock etc.) not removed at the primary separation stage. The proportion of these three compounds can be controlled to a considerable extent by varying the pyrolysis conditions. Both the gas and oil produced

are sulphur-free and have calorific values comparable to other gases and fuel oil.

215. The Capital Territory Health Commission submitted that from a public health point of view, pyrolysis would be a desirable system of waste disposal. The advantages of the process were -

- . that most of the materials in municipal solid waste could be converted to an economically viable product;
- . the volume of waste can be reduced by 90 percent or more;
- . the entire process is contained, thus preventing air, water or land pollution;
- . it has none of the visual and other drawbacks of landfill (e.g. odour, pests, etc.);
- . a pyrolysis plant requires no more land than an incinerator and far less than a landfill or composting operation;
- . since the process is non-polluting and requires little land, a pyrolysis plant can be located in a city, resulting in savings in transportation costs;
- . the energy credits generated (e.g. a tonne of solid waste equals approximately $\frac{1}{2}$ tonne of coal in B.T.U.) substantially offset the operating cost. Gas created can fuel the plant and leave ample heat for other uses.

216. Whilst the gas produced by pyrolysis is not recommended for cooking, it is ideal as space heating for schools, offices and public buildings, and as a fuel gas for industry. Oil from the pyrolysis process can also be used for heating oil. The residue can be screened to remove metals. Briquettes can be made and used as a fuel, or as a filter medium for removing from the liquid fraction organic substances, which can then be burned. Another possible advantage of pyrolysis is that the

solid waste management scheme could be integrated with a sewage scheme such as the Lower Molonglo Water Quality Control Centre to facilitate disposal of solid waste recovered from sewage.

217. A suggestion put to the Committee to ensure a market for the gas was that a pyrolysis plant might be usefully constructed in a proposed industrial area (e.g. Jerrabomberra) or near a proposed large office complex (e.g. Tuggeranong Town Centre, Cameron Offices) to attract industry by the prospect of a cheap energy supply.

218. A process described by witnesses from M & T Chemicals involved the shredding of municipal waste followed by extraction of a fuel fraction by an air clarification method. A steel and iron fraction could be recovered by magnetic methods. The recovery of aluminium by electro mechanical means and glass and ceramic fraction by a dry screening process could then follow. The remaining residue can then be used as landfill or further treated by pyrolysis. The process is "open ended" in that it allows for the application of new technologies for the recovery of other reusable resources as these technologies become commercially available. At present, up to 80 percent of municipal waste can be recycled by this process. It is a refinement of the Canterbury shredder operations.

219. M & T has installed a pyrolysis plant in Milwaukee, U.S.A. which it expects to operate profitably by processing the garbage generated by that city (population of 700,000 people). The capital cost of the plant is about \$14 million, i.e. \$20 per head of population.

220. An application of pyrolysis techniques still being developed, is the Union Carbide system called purox. The key advantages of this system are -

- . it produces a clean burning fuel gas and a sterile, compact solid residue;
- . it eliminates emissions which pollute the atmosphere;
- . it has the flexibility to handle all forms and types of refuse;
- . it involves economically attractive installation and operating costs;
- . the production of oxygen required for the operation of the plant is undertaken by the plant itself, i.e. the plant is a self-contained operation.

221. The purox system produces 4 times as much energy as it consumes which means that 80 percent of the energy it produces is available for other uses. The process could provide a centralised disposal facility serving several neighbouring developments such as Canberra's five towns. It is claimed that its clean operation avoids the major objections commonly associated with landfill or incinerators. Combustion of its fuel gas produces emissions below the maximum, generally specified internationally for air quality standards. Markets and uses for the fuel, gas and solid residues recovered are more likely to be found in heavily populated areas. For example, dense granular residue produced by the system is considered suitable as a construction fill material. Union Carbide Pty Ltd. submitted that it was also possible to adapt the process to recover glass and other recyclable materials before processing in the purox system.

222. The N.C.D.C. told the Committee that at the moment, to establish a pyrolysis plant in Canberra would involve a capital outlay of approximately \$20 million, and estimated that the cost of disposal by this method was \$12 per tonne of refuse. Other witnesses submitted that N.C.D.C.'s figure of \$12 per tonne was high and could be affected by the choice of process and a

failure to take into account energy recovery credits. The capital cost of setting up a pyrolysis plant is considerable, but it might be argued that pyrolysis would cost no more in the long-term than landfill if all factors are considered such as the cost of land purchasing, cost of transport and the potential value of the resources recovered.

223. With a resource recovery process like the purox system, the unit cost of disposal tends to decrease as population density increases. With the landfill method of waste disposal, the reverse is true; unit cost increases in proportion to population density. Union Carbide Pty. Ltd. submitted that a plant of 350 tonnes daily capacity, sufficient to cope with Canberra's refuse, would cost between \$11 million and \$16 million.

224. The Society for Social Responsibility in Science submitted that some purox units so far developed are small enough in size to be suitable for consideration for use in Canberra. The Committee was impressed with the potential of this technology and considers that N.C.D.C. and D.C.T. should begin to appraise the system to assess its relevance for use in the A.C.T. Such a process could not only make use of refuse from Canberra but also from Queanbeyan and perhaps Yass, Goulburn and Cooma. N.C.D.C. informed the Committee that the thermal station proposed for Tuggeranong has been planned with the capacity for using such a plant.

225. The Committee therefore recommends that the waste disposal authorities in the Australian Capital Territory study the pyrolysis process of waste disposal with a view to assessing the feasibility of establishing such a plant in the Australian Capital Territory.

Incineration

226. This form of waste disposal is in some respects similar to, but less sophisticated than, the pyrolysis method. Incineration has the following disadvantages:

- . air pollution standards cannot be met without extremely costly stack gas cleaning systems. Canberra already has an air pollution problem which is inevitable, given frequent inversions and very light and variable winds;
- . while volume reductions of 80 percent to 90 percent are possible, the residue is not inert and land filling is still required;
- . resource recovery is minimal.¹⁰

227. However, modern incinerators (at Hamilton, Ontario, Chicago, Frankfurt and London) have been constructed which comply with modern environmental standards and lend themselves to the pre-sorting of wastes and the recovery of energy in the form of heat or power. In the Netherlands there has been some development of vats in which plastics can be burnt, along with micro-organisms, to produce fertilizer.

Composting

228. Refuse is prepared for commercial composting by reducing it in size using one of a number of different types of mills. At the preparation stage the refuse is sorted in sophisticated plants by mechanised systems, magnetically separated, and sewage sludge may be added. Composting is then accomplished in windrows, pits, trenches, wells, tanks or towers. The success of the

10. The Waverly Woollahra incinerator in Sydney has experienced difficulties in meeting air pollution control requirements and was closed to permit modification to the emission control system.

process is dependent on the existence of a market for compost and any recyclable material recovered. The compost resulting from this process is a soil conditioner and has no value as a fertiliser unless mixed with sludge from sewage treatment plants.

229. The composting process has not proved economically viable because the production costs have not been offset by the revenue received from sale of compost. The estimated cost of a plant for the A.C.T. is \$2.1 million with annual operating cost of about \$0.5 million. Since it is most unlikely that a composting plant in Canberra could become self-supporting, this process of volume reduction is not favoured by the Committee.

Conclusion

230. If resource recovery methods are correctly initiated and managed, they will be able to continue operating long after landfill sites become unavailable or increasingly costly to develop and will permit the recycling of many resources.

231. The Committee considers that the method suggested below for recycling can be undertaken in conjunction with a resource recovery unit. Such a system is better than one in which materials which may originate as separate items are mixed together, compacted and transported to a high capital-cost plant for separation using energy intensive machinery. The Committee believes that energy and resource recovery should be a primary criterion in the choice of a future waste disposal system for Canberra.

PART D - RECYCLING

232. The topic of recycling has taken on added importance in recent years for many reasons. These include the diminishing reserves of certain raw materials and the need to conserve others, together with questions of energy conservation.

233. There is a great deal of value in various waste materials if they can be separated economically. For example, Table 8 supplied by the P.I.E.C. shows an estimate of the value of materials which could have been recovered from Australia's municipal wastes in the year 1972. In Australia today, there is not enough effort made to recover such resources.

234. If householders, traders, institutions and governments were to separate their waste paper, glass, metals and textiles for re-use or recycling, then this would relieve the waste disposal system of a substantial burden. The waste would also serve as a source of revenue to offset the cost of collection of other forms of waste.

235. The witness representing the Packaging Industry Environment Council said that in valuing recyclable materials, a number of considerations were taken into account, such as -

- . the price that the recycler would be prepared to pay;
- . the going price for the equivalent quantity of raw material;
- . the cost of transportation often in small loads from source to recovery centre;
- . any adverse effects on the environment. For example, the use of other scarce resources such as fuel;

- . the additional energy used for separation and processing of recovered materials.

236. Other considerations which determine the recycler's ability to accept reclaimed resources are their quality and quantity. In the manufacture of most products, the tolerances of impurity allowed are specified, e.g. the acceptable percentage of tin, aluminium or lead in steel scrap is strictly limited. With the recycling of glass particular attention must be paid to colour and the addition of even small quantities of aluminium (from tops or foil caps) causes unwanted effects in the final product. It was, therefore, essential for the material offered to meet these standards.

237. The Packaging Industry Environment Council also submitted that there were difficulties if the manufacturer relied on recycling for the provision of raw materials. For instance -

- . the segregation of recyclables into various components relies heavily upon the public's co-operation;
- . household collections are labour intensive and require special vehicles. They are seldom profitable due to high transport costs and comparatively low market value of the materials recovered.

The location of the market in relation to the source of the secondary materials must be considered, particularly transportation costs.

238. One of the main problems associated with recycling in Canberra is that of freight costs to markets. N.C.D.C. submitted that because of Canberra's distance from major industrial centres, opportunities to recycle materials economically, particularly those requiring access to a major recovery process, are limited. Such materials include metal, glass and paper. Industry

representatives disagreed with this (see paragraphs 56, 69 and 82). The cost of transporting material once recovered may more realistically be assessed as marginal 'backloading costs', rather than average haul costs which is the present basis of charging. These savings in disposal costs should then be taken into account. Table 7 lists the freight backloading costs supplied to the Committee by the Department of the Capital Territory earlier this year.

TABLE 7

Normal Rate	\$25.00 per tonne
Overnight Rate	\$ 0.17 per kg.
Backloading Rate	Negotiable
Backloading (overnight)	\$ 0.16 per kg.

239. Besides the feasibility of efficient collection, resource recycling needs to be attractive economically if it is to be readily accepted because in many cases extraction from raw material is cheaper than recycling. The Committee believes that paper, glass and metal can be recycled on an economic basis from Canberra provided that the amount of material recovered is sufficiently large and its collection is reliable and regular. Current prices for recyclables delivered to manufacturers are as follows.

Mixed quality paper	\$40.00 per tonne
Cullet (white or green)	\$35.00 per tonne
Cullet (Brown)	\$30.00 per tonne
Recyclable bottles (Beer)	33 cents per dozen
Aluminium	\$300-\$400 per tonne
Steel	\$35.00 per tonne

Source: S.S.R.S., November 1976.

TABLE 8
 ESTIMATED PRODUCTION AND VALUE OF
 MUNICIPAL WASTE IN AUSTRALIA
 IN 1972
 (by weight)

Material	Percent of solid waste	Tonnes of waste produced	Salvage value \$ per tonne	Total value \$m
Paper	37.00	1,741,500	10.00	17.4
Glass	10.00	471,000	12.00	5.6
Ferrous metals	6.30	296,500	10.00	3.0
Aluminium	1.30	61,200	200.00	12.2
Tin	.02	1,000	2,000.00	2.0
Copper	.31	14,600	600.00	8.7
Lead	.02	1,000	80.00	0.1
Other metal	.05	2,400	100.00	0.2
Putrescibles	32.00	1,506,200	5.00*	7.5
Plastics	4.00	188,200	10.50*	2.0
Other putrescible items	5.00	235,200	5.00*	1.2
Dirt and ashes	4.00	188,200	nil	nil
		4,707,000		59.9

* Based on composting or calorific values.

Source: Evidence, pp.177-8.

240. The N.C.D.C.'s approach to disposal of household waste is -

- a "total" domestic collection system using large mobile bins;
- compacted landfill with appropriate land re-use; and
- to encourage resource recovery to its economic limit.

N.C.D.C.'s strategy suggests that any recycling centres would not only need to be well publicised but readily accessible and regularly cleared. Transfer stations, such as Ainslie, could be established and manned by an attendant directing people to place various forms of waste in the appropriate hoppers. The N.C.D.C. agreed that if a total collection system was implemented, its existence could run counter to attempts currently being made to encourage recycling of paper and glass. Smaller conventional garbage bins would encourage the segregation and recycling of paper, cardboard and glass. N.C.D.C. stated that the use of a "total" collection system would make further municipal tips in built-up areas unnecessary. In the absence of a total collection service and with the present reduction in the number of easily accessible municipal tips, people may dump rubbish indiscriminately.

241. The N.C.D.C. in answer to the assertion that the "total" collection system would not be compatible with resource recycling said that this would be valid only if no alternatives were provided. The N.C.D.C.'s strategy would place the responsibility on householders to separate recyclables from their rubbish for collection by house to house collectors or disposal in specially devised containers located at special depots or shopping centres. N.C.D.C. saw no inconvenience to the public in disposing of their bottles and cans on their regular trips to the local shopping centre.

Household Separation of Recyclable Material

242. A major advantage of separation "at-source" is that, even with a low capital outlay, it can greatly reduce the volume of waste to be disposed of. At the same time it facilitates a high degree of resource conservation. Moreover, it provides an ideal opportunity for routine measurements of the

quantity and composition of material handled. A further advantage is that it makes the community aware of the implications of its life style for city management.

243. The Society for Social Responsibility in Science submitted that, even without financial inducement, there is evidence to suggest considerable willingness by the general public in Canberra to be involved in the segregation of material for collection. The Society claimed that experimental recycling bins at several shopping centres in Canberra were so successful that the amount of material deposited posed such a problem for collectors that the scheme had to be discontinued. (There was however at the time industrial trouble in the domestic collection service which led to people depositing uncollected waste in these facilities.) The survey conducted by S.S.R.S. on attitudes towards the waste paper recovery service in Weston Creek, found that three-quarters of the people surveyed were prepared to make some use of the service, provided some aspects of the system were changed (see Appendix F). Two studies carried out by INSPECT students found that 80 percent of the householders studied would be willing to separate wastes into two or three components to facilitate resource recovery. N.C.D.C. stated that it had not conducted a survey but correspondence received in response to the public announcement of its "strategy" indicated public concern that more productive use should be made of waste products.

244. The Committee believes that there is evidence of considerable acceptance by the community of the concept of household segregation of recyclable materials. This goodwill would need to be enlisted and fostered if recovery and recycling of materials was to be successful. To this end, the Committee details below its own suggestion for an effective system of household segregation and collection of recyclable materials.

Containers for Storage

245. One of the basic requirements if a household collection system is to be effective is the provision of proper storage containers for each item intended for recycling in every household. Witnesses from the former Department of Environment and Conservation submitted that a plastic rack or box to contain bottles, one plastic-lined sack to hold and protect paper waste, and another to hold cans and metal wastes should be provided. The S.S.R.S. Weston Creek survey concluded that a sturdy box should be made available with the appropriate recycling identification on it. A possible design is for a standing container for recyclable waste that is sufficiently mobile to be put out for regular collections. This would avoid danger from broken glass on nature strips and litter on roads. Instructions on use of the bins could be written on the side and could indicate the day of the month on which the bin is to be collected. Containers based on the same principles could be placed at medium density housing sites.

Collection

246. The Committee considers that the current twice weekly collection of household refuse could be reduced to a once weekly collection if a proportion of the waste now going into the bins were to be placed in containers and collected. Collection of the recyclable materials could for example be undertaken by franchising individuals or partnerships. An important aspect of such collections is that they be undertaken on a regular basis. The Weston Creek survey suggested that the key to success was for householders to be assured of regular service. The recommendations of the S.S.R.S. survey, with minor amendment to accommodate the Committee's strategy, commend themselves to the Committee.

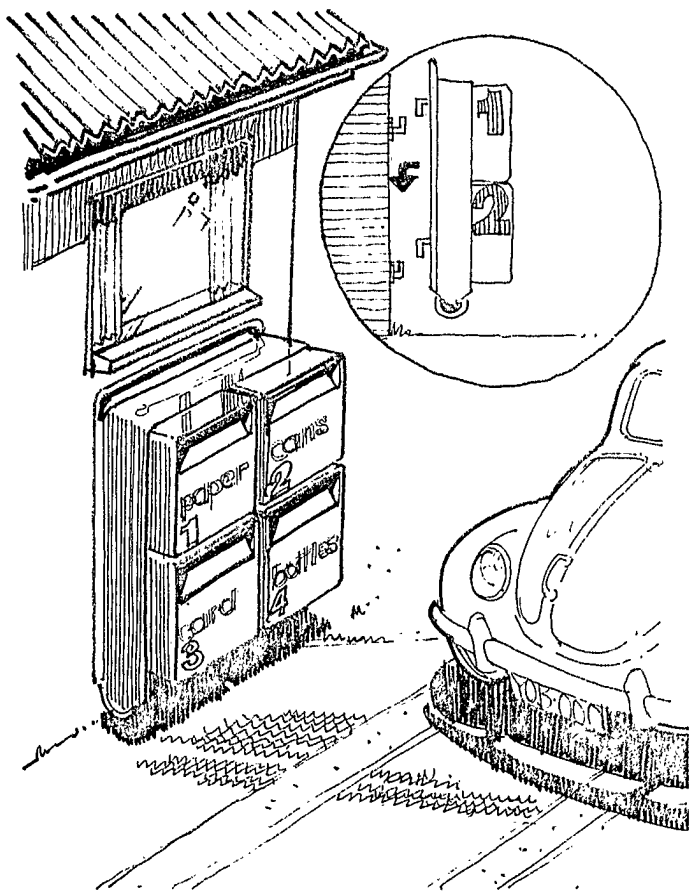


Figure 17 Household Recycling bins.

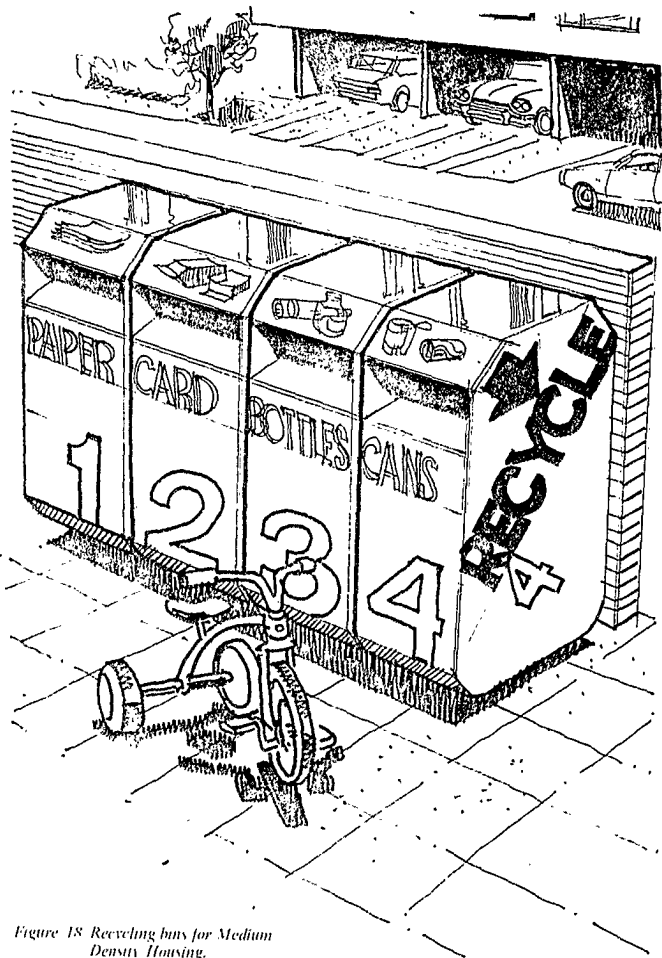


Figure 18 Recycling bins for Medium Density Housing.

Funding

247. The Committee considers that the system has economic advantages if, as envisaged by the Committee, the number of weekly collections of rubbish is reduced from two to one. These savings might offset the cost of providing containers for the service and perhaps subsidise collectors for their capital outlay.

248. The Committee notes that the Steel Can Group has assisted the Canterbury Council in its operations by supplying it with a magnetic separator. It also notes that Australian Paper Manufacturers has paid for the costs of household newspaper containers in Brisbane and that Australian Consolidated Industries has established a bottle recycling depot at Fyshwick. Similar assistance might be provided by interested parties if such a scheme as that suggested by the Committee were to be established in Canberra. Implementation of such a scheme would also mean extension of the life of the landfill sites which would save costs. N.C.D.C. suggested that improved recycling could in fact reduce Canberra's annual landfill requirements or lengthen the life of landfill sites by 15 percent.

Implementation of the Scheme

249. It is envisaged that the scheme could be implemented on a trial basis once the current waste disposal contracts expire. The Committee considers that given suitable containers and a reliable, regular service it would not be difficult to arrange for people to exclude papers, bottles or cans from the domestic waste collections. The Committee considers, however, that its suggested segregated waste collection scheme should initially be conducted in a few suburbs to test the scheme's feasibility and its acceptance by the community. The suggested scheme could well be integrated with the general waste collection service.

250. Such a system would need to be preceded by a well considered explanatory program (by television, radio and press) to inform the community. Such matters as savings in costs and the ultimate use of the material recycled should be explained to householders. The community should be informed of the results of the proposed pilot project.

251. The N.C.D.C., in providing the Committee in August 1975¹¹ with its estimates of costs of a segregated collection scheme, suggested that segregation of refuse would result in an extra cost to the municipal account of the order of \$250,000. These estimates were calculated on the basis that only 75 percent of the recyclable material would be obtained (approximately 15,000 tonnes per annum), that there would be a once weekly refuse collection and a three weekly cycle for paper, metals and glass collected in sequence (i.e. one recycling collection a week).

252. Dr Gifford of S.S.R.S. questioned N.C.D.C.'s estimates on segregated collection schemes. He argued that to collect about 15,000 tonnes of recoverables, about 10 not 20 trucks would be needed at a cost of about \$470,000 per annum rather than the \$930,000 estimated by N.C.D.C. Dr Gifford estimated that the value of 15,000 tonnes per annum would be \$575,800 rather than \$408,000 as estimated by N.C.D.C. S.S.R.S. submitted that the valuation of recoverable material used by N.C.D.C. was too low and the Society's estimates were based on higher valuations for the material. The effect of these reassessments, excluding the opportunity costs of land after complete filling, would, in Dr Gifford's opinion, bring the nett cost of the scheme down to \$1,530,000.

11. Evidence, pp.134-5.

253. The Committee considers that such a scheme if implemented could result in savings for the community. If collection was undertaken as envisaged by self-employed contractors and if householders were supplied with recycling bins made of solid material to reduce replacement costs, then, in the Committee's view, the principal costs would be in establishing the scheme. Benefits would accrue to the community in the form of cheaper household waste collection services, reduced pressure on landfill sites and scarce raw material resources would be conserved.

254. The Committee therefore recommends that a pilot household segregation and collection scheme for paper, glass and metal be implemented on the following basis -

- suitably marked containers for recyclable material be supplied to householders by the Department of the Capital Territory;
- collections be done on a self-employed franchise basis with each collector being encouraged to collect all the materials at the one collection and that collections be conducted monthly;
- that the Department of the Capital Territory conduct a campaign using radio, television and the press to inform the public and secure its co-operation with the service;
- that the Department of the Capital Territory commission a pilot study to assess the success of the scheme and that a report be presented to the Minister for the Capital Territory and the A.C.T. Legislative Assembly.

Other Methods of Recycling

255. Experiments with special bins for paper and bottles were conducted at Manuka and Waramanga shopping centres in 1972. The experiment at Waramanga was widened in March 1974 to include the Weston Creek area. It has been discontinued because the

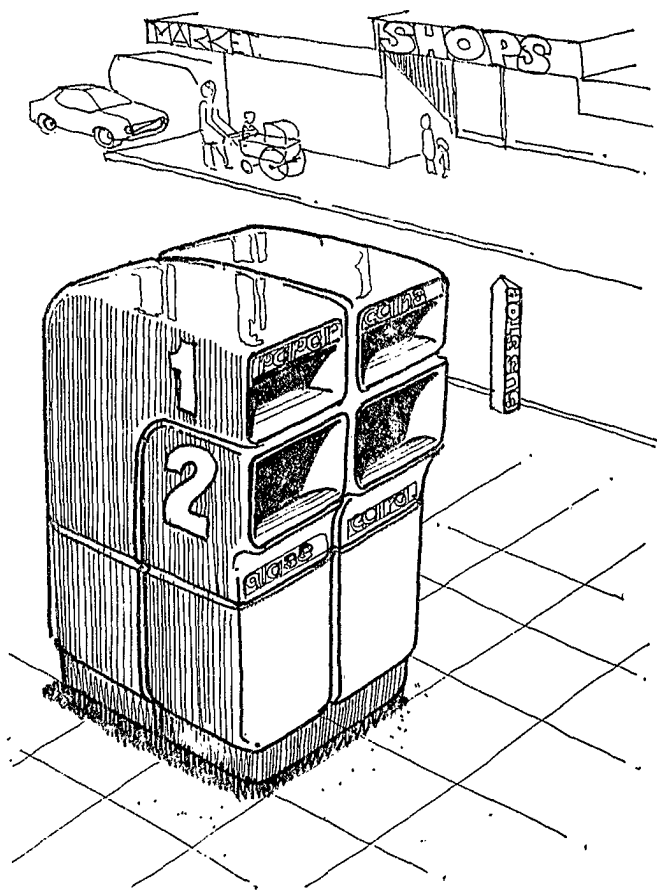


Figure 19 Recycling bins for use at
Suburban Shopping centres.

quantities received were in excess of the capacity of local salvage agents and because of some misuse of containers. The S.S.R.S. suggested that although some abuse of these facilities had occurred, citizen co-operation, participation and support were surprisingly good. The scheme failed only because the authorities could not maintain clearances.

256. Whilst the Committee recognises that problems were encountered by those conducting previous experiments, it considers that bins of the type illustrated (see Figure 19) should be installed at each suburban shopping centre to complement the household collection scheme. Such bins could be emptied by the franchised collector for that particular area. Bins for food scraps and wrappings should also be provided nearby to encourage use of the recycling bins for their proper purpose.

257. Some witnesses urged that garbage should be separated at some central point rather than by householders. Technical methods of sorting recyclable materials at tip sites in large quantities have yet to be perfected. The capital cost of the necessary equipment is also high. Contamination of materials in a resource recovery process also makes such a process less effective than separating at source by the householder. Operating costs involved will remain high as it would mean retaining the present twice weekly waste collection.

258. The Committee considers that the issue of recycling is one in which the Commonwealth Government should take a more direct interest. The impact of incentives such as locational assistance and transport concessions are matters beyond the control of local authorities and industries, and requires action on a national level. In the United States of America, for example, authorities are looking at taxation incentives to encourage use of recycled materials. Nevertheless, without

maximum encouragement from local authorities significant recycling may not be viable.

Collections by Charities

259. Much recycling to date has been motivated by charitable appeals. Charities in the A.C.T. do have collections for welfare purposes but these are mainly for clothing and furniture. The Smith Family is currently collecting between 65 and 70 tonnes of clothing per annum. This meets local requirement for charitable distribution and creates a cash surplus of approximately \$10,000 for the A.C.T. branch of the Smith Family. In evidence the Smith Family informed the Committee that any "total" collection system, such as that proposed by N.C.D.C., could adversely affect the agency's ability to obtain supplies of paper, clothing and other materials which help to finance its activities. Other welfare agencies, such as St Vincent de Paul and the Salvation Army, would be similarly affected in their ability to perform their charitable functions.

260. Koomari, the Handicapped Citizens Association, now collects only clothing and used goods on a door-to-door basis. It provides collection bins at its Fyshwick premises for the depositing of paper. It also collects, on request, second-hand clothing or rags. The Association expressed concern that a variation of the disposal methods within the A.C.T. might affect the Association's activities.

261. The Committee considers that the method of waste disposal it proposes will not in any way remove the sources of waste currently used by charities for fund raising and, in fact, it supports the need for an alternative to a total collection scheme so that all types of material can be recycled for the benefit of both the community and local charities. The possibility exists that these charities could obtain the franchise for the collection service.

PART E - WASTE MANAGEMENT

CHAPTER VII: WASTE MANAGEMENT

Present Waste Management

262. At present the responsibility for waste management in the A.C.T. is fragmented between a number of departments and instrumentalities. Appendix G lists the departments responsible for administering wastes and pollutants in the A.C.T. This dispersal of control is a cause of confusion and limits effective operations. The Committee considers that there is a need for co-ordination between the authorities in departments, bureaux and instrumentalities to ensure that the total waste management system does not deteriorate.

263. The Committee also received evidence that existing A.C.T. waste laws were essentially concerned with littering; that the A.C.T. lacks some important environmental protection legislation in this respect and that overall there was a need to bring Regulations and Ordinances up to date in relation to disposal of waste.

264. The Committee considers there is a need to have a general review of the role of each authority dealing with aspects of waste collection and disposal together with greater co-ordination and rationalisation of responsibilities between these authorities. Waste management in the A.C.T. is also made more difficult because legislative responsibility is now located in a variety of different departments and instrumentalities.

Future Waste Management in the A.C.T.

265. Waste management planning needs to have the capacity to adapt to change, to develop appropriate technology and to influence urban planning so as to protect urban amenities against undesirable risks. These risks might develop quite quickly in

the A.C.T. and surrounding areas of N.S.W. For example, problems could be much more serious if industrialisation continues to develop in Queanbeyan where a flow of solid, liquid and air-borne wastes could affect Canberra without Canberra having the ability to exercise effective control.

266. The Urban Environmental Study Group witnesses submitted that waste management planning in Canberra is likely to be influenced by the following factors -

- . an inland city with limited water supplies;
- . population growth expectations;
- . an affluent community;
- . high amenity standards; and
- . low density settlement.

More particularly the following problems which will need attention are -

- . extensive use of surrounding land and water resources for recreation purposes;
- . limited areas suitable for landfill waste disposal;
- . restricted stream flows;
- . poor air ventilation;
- . temperature inversion problems;
- . no legislation defining environmental quality standards;
- . no general legislative provision of standards and techniques of waste management and pollution control;
- . no single authority responsible for oversight of all waste management problems;

- . divided responsibility for management and control as between a variety of authorities with predominantly national commitments;
- . no legislative provision of environmental standards in workplaces;
- . constitutional inability to control prospective developments of activity or of waste management procedures in towns on A.C.T. borders;
- . significant urban settlements downstream from Canberra;
- . rudimentary garbage disposal methods and arrangements;
- . high quality sewage treatment provisions with disposal of effluent to rivers after tertiary treatment;
- . commitment, through the Commonwealth Government, for the establishment of national environmental standard.

267. Witnesses from U.E.S.G. were also of the opinion that Canberra was peculiarly exposed to risk from industrial development in Queanbeyan within a decade. Flows of all wastes from outside Canberra, not open to control by Canberra, could quickly have a drastic effect on Canberra's environment in terms of solid, liquid and air-borne wastes. At the very least, it would appear essential that some type of co-operative plan for waste management by Canberra and Queanbeyan should be developed. In the slightly longer-run, attention should be given to the regional location of manufacturing in and around the A.C.T. The effects of air-borne and other wastes need to be known for planning settlement in the A.C.T. and the expansion of Queanbeyan, particularly given the restricted river flows. The presence of Lake Burley Griffin exposes Canberra to considerable potential risk. The occurrence of Queanbeyan sewage flowing into Lake Burley Griffin is an illustration of what could possibly develop in other respects.

268. The type of industry to be allowed, and its scale, will have very important implications for waste management in the A.C.T. Waste management plans must take this industrial planning, including the nature and scale of activity, very much into account. Increasing industrial activity in Canberra will also add to the problems. With an increasing population, air pollution and water pollution must be a matter for concern.

269. The need for some overall co-ordinating body responsible for waste management was suggested by some witnesses. Some of the reasons for such a suggestion were -

- . that an effective dialogue between waste disposal authorities and the packaging industry was needed;
- . control of generation, disposal, recycling and re-use should be co-ordinated;
- . a co-ordinating authority should have responsibility over the practical instrumentalities concerned with solid, liquid and air-borne wastes;
- . a waste management authority could encourage greater participation to get householders to segregate waste for recycling rather than relying on voluntary associations and people's goodwill to participate.

270. The concept of a waste authority is not new in Australia. The N.S.W. Government established a Metropolitan Waste Disposal Authority (M.W.D.A.) for Sydney. The M.W.D.A. is a statutory body of the N.S.W. Government comprising 7 members. Its duties and responsibilities extend to the control of waste, domestic, commercial and industrial, within the Sydney metropolis. The authority is not concerned with waste collection. It is responsible solely for disposal.

271. The powers of the M.W.D.A. are to -

- . direct where waste shall be received;
- . direct what routes shall be used by the people transporting waste to a disposal depot;
- . control charges which may be imposed by an authority operating a depot, being a public authority;
- . impose conditions upon the operators of waste disposal depots and facilities;
- . impose conditions upon people involved in the transport of trade waste; and
- . impose conditions upon people who generate waste, by licencing or registration by which mandatory impositions can be made to protect the environment and ensure that community health is properly safeguarded.¹²

272. In respect of waste liquids, the M.W.D.A. believes the crucial factor in determining the appropriate form of disposal is to establish a "catalogue" of the content of the waste. Control of the disposal of liquid waste into the sewerage system is the responsibility of the Water Board and it is only when material does not meet the Board's specifications that the M.W.D.A. directs disposal of that liquid waste. Another important matter with which the M.W.D.A. is not directly involved is disposal of radioactive waste. However, it maintains liaison with the Australian Atomic Energy Commission.

273. Before the establishment of the Authority, N.S.W.'s position was similar to that now existing in the A.C.T. Functions which it now exercises were fragmented between the State health authorities and local government councils. The

12. Evidence, p.317.

Authority is funded in part through the imposition of a levy per tonne of waste delivered to waste disposal depots. Licensing and fines also provide revenue.

274. Fines of up to \$5,000 per day for breaches of the Act by individuals, companies or public bodies can be imposed. Officers of the Authority are not trained "environmentalists" but are nevertheless concerned with the environmental ramifications of their activities. Environmental studies undertaken by the Authority in connection with projects are undertaken by research engineers in a research and development section. The Authority produces environmental impact statements for its own operations and requires statements from private operators seeking to establish a depot. The Authority is working on waste management plants well beyond 1978. At the same time it is monitoring, on a day-to-day basis, the performance of operations such as the Canterbury shredder. The Authority is also monitoring the performance of alternatives to landfill such as pyrolysis which it considers could be more attractive than conventional incineration because of control of air pollution and the utility of the gas produced in the process.

275. Consequently, the Authority is deferring consideration of incineration until it has been able to examine more closely developments in pyrolysis. It is also concerned with recycling. The Committee considers local waste management could become the responsibility of a waste authority not exclusively restricted to disposal.

276. There were a number of roles suggested by some witnesses for such a body. The S.S.R.S. suggested that there should be community involvement in the administrative and decision-making processes of waste management. Another suggestion was that

consideration should be given to the management of the waste not only for Canberra but for the immediate region. The size of the area to be included would be determined by transport costs. For example, it could include the nearby population centres of Queanbeyan and Yass, and perhaps even Goulburn and Cooma as part of an overall waste disposal area.

277. Such an authority could also be charged with planning such matters as waste disposal, recycling and resource conservation, and ways of packaging which produce less waste content. The day-to-day operations could be under the control of an authority or part of the City Manager's Office. Canberra may be in a unique position in that the possibility exists for suitable waste management controls to be established at a time when serious problems have not already emerged and when experimental work or surveys can be done. It is possible that Canberra could set the example for waste management in other inland cities and areas in Australia.

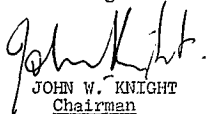
278. The structure suggested by U.E.S.G. was for a waste management authority concerned with the planning and oversight of all these aspects of waste management and in respect of all types of waste. The suggestion was to associate the authority with (and possibly integrate it with) the N.C.D.C. Such an authority should have powers to direct, in any way, the activities of specific operating authorities carrying out waste transfer and treatment tasks in respect of air-borne, liquid and solid wastes. Most importantly, the authority should be responsible for budget proposals and funding allocations. U.E.S.G. commented that the authority should not merely be an administrative body, but be equipped to carry out research and investigations so as to deal with problems and to provide solutions.

279. The Committee considers that, upon the evidence presented to it, there is a need for a comprehensive waste management body in the A.C.T. which can co-ordinate the various aspects of waste management discussed in the Report. Such a body could have ultimate responsibility for rationalising and co-ordinating collection and disposal of waste by regulations. The Committee envisages that such a body would need to have representation from those departments at present mainly responsible for waste collection and disposal together with outside representation providing independent technical expertise in such fields as industrial design, chemistry and engineering. The C.S.I.R.O., A.N.U. and the Canberra College of Advanced Education are organisations which could be called upon in this regard. The Committee believes that the superintending body should have budgetary control over waste management and should eventually come under the executive control of the Legislative Assembly, with the devolution of territorial governmental powers.

280. The Committee therefore recommends that a Waste Authority should be established within the Australian Capital Territory based on the content of paragraph 279 of this Report.

281. Problems of waste management throughout Australia are, in many cases developing beyond the capacity of municipal authorities to cope. There may be a need to consider establishing an organisation similar to the National Centre for Resource Recovery in the U.S.A., an authority supported by industry, unions, educational institutions and the media. The U.S. Centre is a private organisation which is looking at technology and making technology available to various group. Any comparable authority in Australia could be an amalgamation of government, consumer and industry representatives.

Parliament House
December 1976


JOHN W. KNIGHT
Chairman

APPENDIX A

RESOLUTION OF APPOINTMENT

The resolution of appointment of the Committee is as follows:

- (1) That a Joint Committee be appointed to -
 - (a) examine and report on all proposals for modification or variations of the plan of lay-out of the City of Canberra and its environs published in the Commonwealth of Australia Gazette on the nineteenth day of November 1925, as previously modified or varied, which are referred to the committee by the Minister for the Capital Territory, and
 - (b) examine and report on such other matters relating to the Australian Capital Territory as may be referred to the committee -
 - (i) by the Minister for the Capital Territory, or
 - (ii) by resolution of either House of the Parliament.
- (2) That the committee consist of ten members, four to be nominated by the Prime Minister, two to be nominated by the Leader of the Opposition, two Senators nominated by the Leader of the Government in the Senate and two Senators nominated by the Leader of the Opposition in the Senate.
- (3) That every nomination of a member of the committee be forthwith notified in writing to the President of the Senate and the Speaker of the House of Representatives.
- (4) That the members of the committee hold office as a joint committee until the House of Representatives expires by dissolution or effluxion of time.

- (5) That the committee elect as Chairman of the committee one of the members nominated by the Prime Minister or by the Leader of the Government in the Senate.
- (6) That the committee elect a Deputy Chairman who shall perform the duties of the Chairman of the committee at any time when the Chairman is not present at a meeting of the committee, and at any time when the Chairman and Deputy Chairman are not present at a meeting of the committee, the members present shall elect another member to perform the duties of the Chairman at that meeting.
- (7) That the committee have power to appoint sub-committees consisting of three or more of its members, and to appoint the Chairman of each sub-committee who shall have a casting vote only, and refer to any such sub-committee any matter which the committee is empowered to examine.
- (8) That a majority of the members of a sub-committee constitute a quorum of that sub-committee.
- (9) That members of the committee who are not members of a sub-committee may take part in the public proceedings of that sub-committee but shall not vote or move any motion or constitute a quorum.
- (10) That the committee or any sub-committee have power to send for persons, papers and records.
- (11) That the committee have power to move from place to place and to sit during any recess.
- (12) That any sub-committee have power to move from place to place, adjourn from time to time and to sit during any recess or adjournment.
- (13) That the committee or any sub-committee have power to authorise publication or any evidence given before it and any document presented to it.
- (14) That the committee be provided with necessary staff, facilities and resources.
- (15) That the committee in selecting particular matters for investigation take account of the investigations of other Parliamentary committees and avoid duplication.

- (16) That the committee have leave to report from time to time and that any member of the committee have power to add a protest or dissent to any report.
- (17) That the committee or any sub-committee have power to consider and make use of the evidence and records of the Joint Committee on the Australian Capital Territory appointed during previous Parliaments.
- (18) That the foregoing provisions of this resolution, so far as they are inconsistent with the standing orders, have effect notwithstanding anything contained in the standing orders.
- (19) That a message be sent to the Senate acquainting it of this resolution and requesting that it concur and take action accordingly.

APPENDIX B

LIST OF WITNESSES

BLUNN, Mr A.S.	City Manager, Department of the Capital Territory
BUCHANAN, Dr M.E.	Member, Urban Environment Study Group, Australian National University
BUCKLEY, Dr I.K.	Resource Conservation Group, Society for Social Responsibility in Science, A.C.T.
BURCH, Dr W.M.	Physicist, and Radiation Protection Officer, Canberra Hospital
BURNETT, Mr D.W.	Director, Lend Lease Investments Pty Limited, A.C.T.
BUTLIN, Professor N.G.	Head, Urban Environment Study Group, Australian National University
CAMERON, Mr L.C.	Manager, Jaques (N.S.W.), Division of Jaques Limited, Victoria
CARPENTER, Mr D.D.	Branch Secretary, Transport Workers' Union of Australia, Canberra Branch
CARSTAIRS, Dr J.L.	Private Citizen

CHRISTIANSEN, Mr B.F.	Senior Chemist, Public Health Laboratories, Capital Territory Health Commission
CONOLLY, Mr R.	Director/Chairman, Metropolitan Waste Disposal Authority, Chatswood, N.S.W.
CORY, Mr D.J.	Manager, Canberra Oil Disposals
CRABB, Mr J.	Director and General Manager, New South Wales, Simsmetal Pty Ltd.
DARROCK, Ms D.B.	Resource Conservation Group, Society for Social Responsibility in Science, A.C.T.
DEAN, Mr G.W.	Planning Controller, Australian Paper Manufacturers Limited, Sydney
DENTRY, Mr H. St. O	Public Affairs Manager, Australian Consolidated Industries, Head Office, Melbourne
DEWEY, Mr J.E.	Acting Chief Health Inspector, Capital Territory Health Commission
DOW, Mr A.B.	New South Wales Recycling Manager, Australian Paper Manufacturers Limited

DUGGAN, Mr W.T.	Manager, Corporate Affairs, J. Gadsden Australia Ltd., Melbourne
FAULKENER, Mr D.	Trading Manager, New South Wales, Simsmetal Pty Ltd.
FISCHHOF, Dr T.J.	Development Manager, Australian Consolidated Industries Limited, Technical Centre, Melbourne
GILFORD, Dr R.M.	Chairman, Resource Conservation Group, Society for Social Responsibility in Science, A.C.T.
GURNEY, Mr J.C.	Technical Manager, Pure-Pak Australia Ltd Melbourne
HAERTSCH, Mr A.	Product Manager, Department of Engineering Processes, Union Carbide Australia Ltd., Sydney
HENKEL, Mr G.G.	Hydraulics Section, Environment and Water Resources Branch, National Capital Development Commission
HENTY, Mr J.G.	Executive Assistant, City Services Branch, Department of the Capital Territory
HIGGINS, Mr W.	Director, Environment and Water Resources Branch, National Capital Development Commission

HOLLIS, Mr S.	Associate, L.T. Frazer and Associates Pty Ltd, Consulting Engineers, Canberra
HONEYSETT, Brig. J.D. (O.B.E.)	Executive Director, Packaging Industry Environment Council, Melbourne
HORSLEY, Mr P.	Chief Engineer, Metropolitan Waste Disposal Authority, Chatswood, N.S.W.
HOWLETT, Mr R.L.	City Health and Building Surveyor, Queanbeyan City Council
JOY, Dr C.S.	Member, Urban Environment Study Group, Australian National University
KALRA, Dr T.	Project Officer, Pollution Branch, Department of Environment, Canberra
LANDER, Mr D.S.	Assistant Secretary, City Services Branch, Department of the Capital Territory
LAWRENCE, Mr W.E.	Assistant Secretary, Urban Affairs Branch, Department of the Capital Territory
LINDGREN, Mr P.R.	Contracts Engineer, Henry Simon (Aust.) Pty Ltd, Glebe, N.S.W.

McINTYRE, Mr A.R.	Director, Housing and Construction, A.C.T. Region, Department of Housing and Construction, A.C.T.
MILLER, Dr B.J.F.	Staff Member, Australian Government Analyst, Department of Science, A.C.T.
MILLER, Mr C.J.	Environmental Manager, The Steel Can Group, Melbourne
MORRIS, Mr T.J.	Executive Member, Hall and District Progress Association, A.C.T.
MULLER, Mr F.G.	A.C.T. Councillor, Australian Conservation Foundation
NEWELL, Mr B.S.	Assistant Secretary, Pollution Branch, Department of Environment, A.C.T.
O'FLAHERTY, Dr C.	First Assistant Commissioner, Engineering, National Capital Development Commission
PAUSACKER, Mr I.	Private Citizen
PAYNE, Mr A.R.	New South Wales Manager, M & T Chemicals (Aust) Pty Ltd Unanderra, N.S.W.
PETERS, Dr F.E.	Australian Government Analyst, Department of Science, A.C.T.
PICKERING, Mr B.E.	Divisional Manager, Henry Simon Australia, Division of Simon Engineering (Aust.) Pty Ltd. Glebe, N.S.W.

POWER, Mr C.E.	Proprietor, Canberra Paper and Cardboard Recycling Company
ROBERTSON, Mr I.F.	Executive Secretary, The Smith Family, Canberra Branch
ROCHFORD, Mr J.A.	Executive Member, Hall and District Progress Association, A.C.T.
ROSENBERG, Dr H.	Senior Fellow, Australian National University
ROSICH, Dr R.S.	Private Citizen
RYDER, Mr W.G.	Member, Urban Environment Study Group, Australian National University
SAW, Mr J.A.	Principal Environmental Officer, Environment Systems Branch, Environmental Policy Division, Department of Environment, Housing and Community Development, A.C.T.
SKINNER, Mr J.J.	Chief Property Officer, Department of Services and Property, A.C.T.
SMYTHE, Mr F.S.	Executive Officer, Land and Property Management, Department of Services and Property, A.C.T.
SPELLMAN, Mr W.B.	Organiser, Australian Workers' Union, A.C.T.
STRANGWAYS-DIXON, Dr B.H.	Medical Officer of Health, Capital Territory Health Commission
THOMPSON, Mr C.	Mechanical Engineer, City Services Branch, Department of the Capital Territory
TINGEY, Mr R.J.	Secretary, Hall and District Progress Association, A.C.T.

TODD, Mr W.J.	Executive Chairman, Steel Can Group, Melbourne
TURNER, Mc J.G.	Resource Conservation Group, Society for Social Responsibility in Science, A.C.T.
USBACK, Mr R.G.	Director, Environment Policy Branch, Department of Environment, Housing and Community Development, A.C.T.
WARDROBE, Mr R.S.	Assistant Director, Technical Services, Department of Housing and Construction, A.C.T.
WHITE, Mr M.F.	Managing Director, M & T Chemicals (Aust.) Pty Ltd., Five Islands Road, Unanderra, N.S.W.
WHITTON, Mr G.W.	Town Clerk, Yass Municipal Council
WILLEY, Mr G.D.	Health Surveyor, Yass Municipal Council
WILSON, Mr E.G.	Engineering Geologist, Bureau of Mineral Resources, Canberra
WOODWELL, Mr E.C.	Manager, Koomarri Collections Enterprises (Handicapped Persons Association), A.C.T.
WRIGHT, Mr A.I.	Member, Executive Committee, Steel Can Group, Melbourne

The Public Service designation of witnesses and the name of the Department or Authority they were representing was that at the time they gave evidence before the Committee.

APPENDIX C

CONDUCT OF THE INQUIRY

Introduction

The Committee was initially appointed by resolutions of both Houses of Parliament on 8 November 1956 and has been reappointed in succeeding Parliaments. The Committee was appointed for the duration of the 29th Parliament by resolutions of the Senate and the House of Representatives in July 1974. It was subsequently reappointed for the course of the 30th Parliament by resolutions of the Senate and the House of Representatives in March 1976.

The duties of the Committee are to:

- (a) examine and report on all proposals for modification or variations of the plan of lay-out of the City of Canberra and its environs published in the Commonwealth of Australia Gazette on the nineteenth day of November 1925, as previously modified or varied, which are referred to the committee by the Minister for the Capital Territory, and
- (b) examine and report on such other matters relating to the Australian Capital Territory as may be referred to the committee -
 - (i) by the Minister for the Capital Territory, or
 - (ii) by resolution of either House of the Parliament.

The Inquiry

On 11 March 1975 the then Minister for the Capital Territory, (the Hon. G.M. Bryant, E.D., M.P.) wrote to the then Chairman of the Joint Committee on the Australian Capital Territory appointed for the 29th Parliament, Senator B.R. Milliner, requesting that the Committee undertake an inquiry with the following terms of reference:

It is assumed there will be progressive difficulty in facilitating the collection and disposal of the City's wastes. There is a need for both new techniques and for a long term strategy for collection and disposal. In this context the Committee is asked to examine and report on the most desirable long term approach to waste collection and disposal having regard to:

- (a) the predicted city growth, its geographical spread and estimated future volumes of waste;
- (b) technical considerations, including existing practices and new Australian and overseas techniques, for disposal or for re-use and recycling of used material;
- (c) economic implications of currently used techniques and any feasible new procedures;
- (d) environmental qualifications;
- (e) social aspects including individual responsibility for waste collection and disposal (in particular litter in places generally open to the public); community group responsibility for waste collection and disposal and nuisance caused by waste and waste disposal; the effectiveness of local laws; and
- (f) the extent to which both management and labour practices can facilitate efficiency and economy.

The Committee agreed to undertake the Inquiry and the Chairman advised the Minister accordingly. Advertisements were placed in local and major interstate newspapers inviting interested persons to make submissions to the Inquiry. Individuals and organisations considered able to assist the Committee were approached directly and submissions on specific aspects of the terms of reference were sought from them.

When the double dissolution of the Parliament occurred on 11 November 1975, the Committee had held 6 public hearings and one inspection. Further hearings and inspections had been scheduled for Sydney and Canberra in that month. The interruption caused by the election delayed resumption of the Inquiry. But the resolution appointing the Committee in the 30th Parliament by providing:

... that the committee or any sub-committee have power to consider and make use of the evidence and records of the Joint Committee on the Australian Capital Territory appointed during previous Parliaments ...

has ensured continuity and enabled the present committee to make use of the effective work of its predecessor.

On 18 March 1976 the Committee was reappointed. At a meeting on 30 April 1976, it considered a letter from the Minister for the Capital Territory, (the Hon. A.A. Staley, M.P.) to the Chairman, Senator J.W. Knight and agreed to the Minister's request that it continue the Inquiry. In addition to carrying out other work under paragraph (a) of its duties, the Committee has held 3 public hearings and one inspection in relation to this Inquiry.

APPENDIX D

RESULTS OF OVERSEAS SURVEY ON WASTE COLLECTION AND DISPOSAL UNDERTAKEN BY THE COMMITTEE

The Committee wrote to 36 overseas municipal authorities concerning their waste collection and disposal methods and plans, and received replies from 28. Those areas selected were in three continents and reflected a cross section of secondary and tertiary industrial based centres. These authorities offered a twice-weekly collection of garbage from either conventional bins, plastic garbage bags, or a combination of both for domestic waste. In most instances trade waste was collected separately, although the treatment of that waste, with the exception of noxious wastes, was similar to that of the domestic garbage. Responsibility for waste collection was a government one, but collection itself was by both government and private enterprise. Compaction vehicles are used by many of the authorities.

The most popular forms of disposal are incineration and landfill - incineration being more popular in areas of denser settlement. Other methods of disposal currently in use include pulverisation, composting, and baling. Transfer stations are used in some centres where landfill is the primary method of disposal and sites are far distant from the actual area of generation.

Some cities such as New York, Edmonton and Washington D.C. in North America, and others in Britain are considering plans for long term resource recovery projects, including power generation and pyrolysis, as well as segregation of waste.

A number of replies specifically identified waste paper collection as a viable resource recovery operation which can be undertaken as an "at source" procedure; others undertook either commercially or on a charity basis a broader range of recycling activities including rag, metal and glass recovery.

The 28 replies to the Committee's request for information provided the following details:

Collection

Twice weekly service using conventional bins, bags or a combination of both. Mixture of open trucks/compactors.

Disposal

<u>Present Practices</u> ¹	<u>Percent</u>
Transfer stations	25
Baling	7
Composting	14
Pulverisation	21
Landfill	42
Incineration	53 (including use of heat for central heating/cooling)
Recycling	28
<u>Future Comprehensive Plans</u>	
Resource recovery/pyrolysis or combination fuel for electricity generation	25

The last figure indicates many Authorities are seriously committed to comprehensive future planning. For example, New York City is looking at the year 2010 as a change-over date from its present system which includes landfill and incineration to a total resource recovery operation including front-end segregation and pyrolysis.

¹ In many instances authorities use a combination of disposal methods.

APPENDIX E

RESULT OF SURVEY OF METHOD OF
DISPOSAL OF COMMONWEALTH GOVERNMENT WASTE PAPER

In June 1976 the Committee wrote to Government Departments and Statutory Authorities located in Canberra seeking information about their method of disposal of paper and cardboard waste. The replies received provided the Committee with information on the paper and cardboard recycling practices of over one hundred separate establishments.

The following table presents the findings of the survey:

Question 1: Is paper and cardboard from your Department/
Authority segregated for recycling after use?

YES	16
NO	30

Question 2: Do you have classified as well as unclassified waste paper and what method of disposal is used for each class of waste paper?

A. Classified Waste Generated

YES	35
NO	72

B. Method of Disposal:

(i) Classified

(a) Recycled	7
(b) Not recycled	28

(ii) Unclassified

(a) Recycled	16
(b) Not recycled	56

Question 1 applies to specific Departments and Authorities. Other questions relate to offices within such Departments and Authorities in Canberra. The totals provided in each answer vary because of different arrangements applying within individual Departments or Authorities.

Question 3: Do you have overall control of disposal of waste and cardboard or is this operation undertaken by -

- (i) the Department of Administrative Services, or
- (ii) the landlord(s) of the building(s) you occupy?

Control over Waste Collection

(a)	Self	44
(b)	Department of Administrative Services	27
(c)	Landlord(s)	8
(d)	Contract Cleaners	5

Question 4: If you dispose of your own waste paper and cardboard, how is this done?

A. Classified Waste

(i)	Tip	8
(ii)	Incinerated	18
(iii)	Recycled	6
(iv)	Normal Garbage Service	1
(v)	Pulped/Shredded	13

B. Unclassified Waste

(i)	Tip	31
(ii)	Incinerated	3
(iii)	Recycled	11
(iv)	Garbage	18
(v)	Shredded	2
(vi)	Charity	3

Problems which were drawn to the Committee's attention in response to the survey included the number of newspapers and journals being thrown out on an annual basis; one Department alone reported a total of over 45,000 items. Much paper of a carbonised or polystyrene or polythene treatment is unsuitable for recycling, as is paper mixed with other waste, including food scraps. There is however a great potential for recycling paper waste such as newspapers, journals, telephone books and cartons which is not currently being undertaken. The Committee was particularly concerned to find that schools had recently changed from a segregated waste operation to a total collection as part of the trade waste service. This the Committee believes is a retrograde step.

APPENDIX F

QUESTIONNAIRE STUDY OF PEOPLE'S ATTITUDES TOWARDS THE WASTE PAPER RECOVERY SERVICE IN WESTON CREEK, A.C.T.

By the Resource Conservation Group,
Society for Social Responsibility
in Science (A.C.T.) - July, 1976

Introduction

Mr Colin Power, under contract to Australian Paper Manufacturers Ltd has initiated a house-to-house waste paper pick-up service in Weston Creek. The day of the pick-up has been advised by a slip of paper in the mailbox of each householder two or three days before each of the 10 collections during the past year. The response has been below what is necessary to maintain a viable business. We wished to know whether there is any likelihood of the level of paper recovery improving and what steps should be taken to achieve this.

Method

While recognizing that it was beyond our resources to perform a comprehensive and academically rigorous study which would lead to detailed conclusions on which considerable confidence could be placed, it was nevertheless decided that a modest questionnaire study could be useful in developing tentative policy recommendations.

A small questionnaire (Attachment) was drawn up. The possible answers to questions were such that it was fairly easy to distinguish between households who were keen users of the service, those who were completely disinterested or those who might become good users in the future. The final question (6 or 7) gave the householder an opportunity to express opinions on how the service could be made more useful to them.

A pre-selected sample of houses well distributed along both long and short streets in the suburbs of Weston and Holder within the town of Weston Creek were approached. Where nobody was at home, we went to the next house. Six interviewers compiled a total of 90 responding houses in both day and evening visits. The level of non-responding householders was negligible. The interviewers identified

themselves before asking any questions and explained that they were seeking information which might help improve a paper recovery service operating in Weston Creek.

Results

The responses allowed interviewees to be grouped into five categories as shown in Table 1.

TABLE 1
Grouping of the Total Responses
Into Five Categories

<u>Category</u>	<u>Percent</u>
Already reliable users	16
Occasional users readily amenable to improved contributions	10
Poor users probably amenable to improvement	11
Non-users probably amenable to improvement	35
Non-users unlikely ever to contribute	28
	<hr/>
	100
	<hr/>

Sixteen percent of respondents claimed to be frequent users of the service. This does not mean that they have used the service on every occasion, but it is indicative of considerable interest and support. The figure is consistent with the estimate of Mr Colin Power, the operator of the service, that on each collection he has had only about a 10% response.

There was a further 10% of respondents who, although only occasional users of the service, would, according to their comments, readily become regular users with relatively slight effort on the part of the service operator.

Another 11% had used the service at least once and were sympathetic towards it but would probably need more persistent effort and publicity to convert them into regular users. Householders in this category often stated that they did not have enough waste paper to warrant 5 or 6-weekly collections or claimed they used all the paper for other things. They apparently do not realize the range of paper and boards which can be recycled.

Of the 63% of the respondents who had never used the service, about half had seen the pamphlet advertising collection at least once. Nevertheless, only 28% of the total sample seemed to be clear cases of people who would not be expected to use the service in the foreseeable future. Although this was mostly due to disinterest, the category also includes those recycling their paper through the church or Koomarri. In a few instances the householders were reacting to some bad experiences of non-collection of material put out either for Mr Power or Koomarri.

Of the remaining 35% of the sample, those who had never used the service but who might use it in the future, several indicated that they were keen to use the service but had not done so to date either because they were new to the district or because they had never been notified.

In summary, the indications are that three-quarters of the people would be likely to use the service at least sometimes if some aspects of the system were changed.

Improvements in the System

We found virtually no hostility from respondents. There was willingness to discuss ways of obtaining better patronage.

Two observations were made again and again and stand out as major reasons for the low level of participation so far. First, at no time have householders received indications or assurance that the paper pick-up is an ongoing, regular service which can be relied upon to be repeated. Second, and this is related to the first point, the notice has been too late for most people to gather together an appreciable quantity of paper for the collection. Not knowing there would be another collection in 5 - 6 weeks' time, they had not started collecting again.

The key to success is, we believe, that householders be in no doubt that they have an assured, regular service.

Both the idea of a calendar of future pick-up dates and of a container being provided received considerable support by potential users, but there was no clear preference for one or the other as a reminder mechanism.

Recommendations

On the basis of these results, we conclude that it will be worthwhile persevering with house-to-house paper collection in Weston Creek and we recommend that the following measures be taken to enlarge the clientele. These recommendations are in order of increasing difficulty or expense to the service operator.

1. Maintain letterboxing of leaflets before each collection, giving several days notice. Ensure collection on advised day.
2. Slip a leaflet into the letterbox when collecting from a house, thanking the householder for using the service and stating when the next collection will be. Some information could also be given on the range of paper which will be collected - e.g. newspaper, glossy magazines, old envelopes, flattened cardboard boxes, cereal packets, but not waxed cardboard such as milk cartons.
3. Letterbox non-contributors with a similar leaflet whenever time permits on the round.
4. Advertise in every issue of the Weston Creek Newsletter, including the dates of collection by suburb if possible. Perhaps use a gimmick to arouse interest e.g. calculate the accumulated number of trees equivalent to the total quantity of paper collected from Weston Creek or the dollar value of landfill operation and space saved by diverting the paper.
5. Circulate an annual or semi-annual calendar with planned dates of collection circled. Use the back for a concise statement of the virtues of paper recycling and information on paper types as in (2) above.
6. Have an advertising splash in the Canberra Times, and if funds permit, on radio and T.V., at the time that the calendars are distributed. Regular brief radio and T.V. advertisements may be a possibility when the service is Canberra-wide.

7. Make a sturdy box available for storage and collection purposes to those who need it. Have appropriate recycling identification on it. The calendar could advise householders how to obtain a box. (Storage space itself was not generally considered a problem by respondents).

ATTACHMENT

1. Have you ever received a pamphlet like this in your mailbox? It is supposed to have been delivered every month for the last 10 months to let you know when the next paper pick-up would be.
2. Have you ever used this house-to-house service?
3. Even though you never received a pamphlet, did you know that there is a house-to-house waste paper collection service in Weston Creek?
4. Why don't you use the service (much)?
5. There is in fact a monthly house-to-house collection of waste paper. If you leave your old newspapers and cardboard bundled up on the nature strip it is picked up for recycling. Would you use this service if you knew when he was coming and if it was better publicised?
6. Can you see any way the service could be improved to make it more effective? (e.g. containers provided, calendar of collection dates)
7. How should the service be improved to encourage you to use it (all the time)? (e.g. regularity, frequency, container, publicity).

APPENDIX G

DEPARTMENTS RESPONSIBLE FOR ADMINISTERING WASTES AND POLLUTANTS IN THE AUSTRALIAN CAPITAL TERRITORY

National Capital Development Commission

The functions of the N.C.D.C. are to plan, develop and construct the City of Canberra as the National Capital of the Commonwealth.

It is responsible for urban development works: housing, roads, water, sewerage, drainage, schools.

Agencies do the detailed design, all construction and some supervision: the N.C.D.C. therefore, acts as the co-ordinating and controlling unit.

Department of the Capital Territory

The Department is responsible for most of the administration of the A.C.T. Of relevance to waste management are the following functions:

- . Garbage Collection and Disposal (operated by contractors) - household garbage clearance; trade waste clearances; sanitary services; grease trap services; street cleaning.
- . Transport, bus service; parking; motor vehicle testing and registration.
- . Control of inflammable liquids.
- . Administration and control of A.C.T. land, parks and gardens.
- . Collection of water and sewerage charges and municipal rates.

Department of Administrative Services

The Department is responsible in the first instance for the management of government office space in Canberra.

Department of Construction

- . Operation and maintenance of the Canberra water supply and sewerage systems, including treatment plants, dams, and water storage areas on behalf of the Department of the Capital Territory.
- . Operation of Commonwealth industrial establishments: quarry, timber mill, cement products factory.

Department of Health

Responsible for the health aspects of the control and management of drinking water catchment areas, Lake Burley Griffin and A.C.T. rivers, and Public Health legislation enforcement.

Department of Transport

Management and control of Canberra Airport and aircraft.

Department of Defence

Management and control of RAAF base, Fairbairn and RAAF aircraft.

Source: Evidence, pp.241-2.

APPENDIX H

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