MANAGING PRESCRIBED INDUSTRIAL WASTE

Industrial Waste Management Policy
(Prescribed Industrial Waste)
and Policy Impact Assessment

Environment Protection Authority
State Government of Victoria
January 2001
MANAGING PRESCRIBED INDUSTRIAL WASTE

*Industrial Waste Management Policy (Prescribed Industrial Waste)*
and Policy Impact Assessment

Environment Protection Authority
Herald and Weekly Times Tower
40 City Road
Southbank Victoria 3006
Australia

Printed on recycled paper

Publication 734

© Environment Protection Authority, January 2001

ISBN 0 7306 7594 7
FOREWORD

Arthur C. Clarke once said that wastes are merely raw materials we are too stupid to use. Waste is now being seen by the community and by industry as a sign of inefficient resource use. More particularly, wastes are viewed as products of a mind-set that influence the design and manufacturing of consumer goods. We need to change the way we think about industrial production to reap the benefits of cleaner production to remove those actions and processes that do not add value. Indeed, EPA cleaner production programs have demonstrated time and again that waste avoidance, reuse, recycling and energy recovery do pay dividends. Consumers need to be provided with goods and services that suit the purpose for which they are designed and are also produced with maximum efficiency of resource use.

While the goal of zero waste is a legitimate one, the production of everyday goods and services continues to generate industrial waste. Recent debate over a proposal to establish a landfill facility for solid prescribed industrial waste near Werribee has highlighted community concern about the generation and management of these wastes.

Advances have been made in diverting wastes from landfill to various forms of reuse, recycling and energy recovery, but further opportunities for innovation exist and investment in new resource recovery facilities needs to be encouraged. This will provide industry with a wider range of alternatives to landfill disposal and will provide confidence to the community that the need for industrial waste landfilling will continue to reduce.

The policy seeks to respond to these challenges by providing a framework for reducing and safely managing prescribed industrial waste. It encourages investment in economically viable, world class facilities to handle the progressively diminishing waste stream that industry is expected to generate. Additionally the policy seeks to influence generational change necessary for long term gains. This change will occur through the use of economic drivers to influence behaviour and through the provision of information, requiring our schools and universities to lead the way.

BRIAN ROBINSON
CHAIRMAN
INTRODUCTION TO THE INDUSTRIAL WASTE MANAGEMENT POLICY (PRESCRIBED INDUSTRIAL WASTE)

Why has the policy been developed?

The community has made clear its concerns about hazardous wastes. It is worried about pollution and it is reluctant to accept any new hazardous waste landfills. It wants the generation of hazardous wastes minimised and the remaining waste stream to be managed safely. It expects Victoria to have a clear plan for dealing with industrial waste which addresses these concerns.

Trends in the generation and management of hazardous wastes indicate that Victoria is making progress in reducing their quantity and in managing remaining wastes more effectively. However, the pace of the change needs to increase.

To instigate change, a series of measures have been introduced to assist industry and the community to further reduce the amount of hazardous waste being generated and sent to landfill. Building on Victoria’s Industrial Waste Strategy, Zeroing in on Waste, and current regulatory controls, the policy sets the long term aim of eliminating landfill as a disposal route for prescribed industrial waste, and a commitment to ensure no hazardous prescribed industrial waste is disposed to landfill.

These measures include:

- establishment of a Hazardous Waste Consultative Committee to review management practices for hazardous waste and landfill siting options;
- development of a statutory industrial waste management policy to facilitate resource recovery by setting clear requirements for the treatment and management of hazardous waste (which EPA defines as prescribed industrial waste) as well as clear criteria for safe storage and containment. The development of this statutory policy has been informed by the work of the Hazardous Waste Consultative Committee; and
- introduction of a $10 per tonne levy on hazardous wastes currently going to landfill in order to encourage industry to find innovative and more environmentally friendly ways of dealing with these wastes.

Industrial waste management policies are made under the Environment Protection Act 1970. They set a legally enforceable framework for making management decisions about industrial wastes and they provide guidance for environmental protection programs in Victoria, including EPA activities such as licensing, enforcement and community education.

The Industrial Waste Management Policy (Prescribed Industrial Waste) provides a framework for the management of prescribed industrial waste which seeks to protect people and the environment from hazards that may be posed by prescribed industrial wastes. It aims to establish a statutory climate which encourages industry to recognise and take up the benefits of waste avoidance and resource recovery – a climate which stimulates innovative approaches to waste management and thus provides Victorian industry with greater choice and certainty in managing their wastes. Building on existing controls, the policy requires waste generators to apply the waste management hierarchy in all management decisions.
regarding prescribed industrial wastes. This hierarchy specifies a preference order for waste management as follows:

1. avoidance
2. reuse
3. recycling
4. recovery of energy
5. repository storage
6. treatment
7. containment.

The policy also provides for an appropriately high level of environment protection at all facilities receiving prescribed industrial waste, particularly where long term containment is the only practicable management option for a prescribed industrial waste. The policy also makes clear that no hazardous prescribed industrial waste is permitted to be disposed in landfill.

**Prescribed industrial wastes in Victoria**

**What are prescribed industrial wastes?**

Prescribed industrial wastes are wastes of commercial or industrial origin that the community expects to be carefully managed and closely regulated because of their potential impact on human health or the environment. Such wastes are prescribed by law and are subject to greater regulatory control than other wastes. Prescribed industrial wastes include:

- wastes from a variety of industrial processes, including the manufacture of commonly used products such as paints, batteries and plastics;
- wastes from commercial operations such as dry cleaning services, fast food stores and car repair workshops;
- infectious material from hospitals and laboratories; and
- contaminated soils arising from past practices that are no longer acceptable, such as using wastes for levelling land, leaking storage tanks and spills that were not cleaned up.

**How are prescribed industrial wastes regulated?**

Victoria has a well-developed regulatory system for the management of prescribed industrial wastes.

Waste management has been regulated since the introduction of the *Environment Protection Act* 1970. The Act establishes EPA and gives it the power to regulate industrial waste and carry out long range planning in waste management.

Victoria’s first Industrial Waste Strategy, released 15 years ago, focused attention on waste minimisation and the waste hierarchy. The hierarchy was reinforced in statutory policy through the *Industrial Waste Management Policy (Waste Minimisation)* 1990. This policy established a generic framework for waste management and has driven the adoption of cleaner production and waste avoidance principles in Victoria.
Public consultation during the review of the original 1986 Industrial Waste Strategy identified strong support for continued EPA regulation over the management of prescribed industrial wastes. A key part of this regulatory system are the Environment Protection (Prescribed Waste) Regulations 1998 (which replaced similar regulations made in 1987). These regulations classify certain wastes as prescribed industrial wastes and work with the Environment Protection Act 1970 to specify a system of controls over various aspects of the management of those wastes. In line with the principle of ‘cradle to grave’ waste management, the regulations establish a transport certificate system making generators of prescribed industrial wastes responsible for ensuring that their waste is transported in permitted vehicles and is received by an appropriate facility. Generators must also submit annual returns specifying the quantities and types of prescribed industrial waste they have produced. All facilities that accept prescribed industrial wastes are subject to EPA works approval and licensing to ensure they are properly located, designed and operated. Operators must provide EPA with a financial assurance to cover the cost of any unforeseen environmental clean-up.

In April 1998, after extensive consultation, EPA released a new Industrial Waste Strategy for Victoria, Zeroing in on Waste. The strategy provides a ‘road map’ towards the ultimate elimination of prescribed industrial waste and is framed around three basic objectives:

1. to achieve the widespread avoidance of waste by facilitating the adoption of cleaner production policies and practices;
2. to maximise the economic value of resources during their life cycle through reuse, recycling and energy recovery in preference to disposal; and
3. to foster a culture of continuous improvement in the waste management industry to achieve and maintain best practice in the management of residual waste streams in Victoria.

The aim of the Industrial Waste Management Policy (Prescribed Industrial Waste) is to help realise these objectives for hazardous wastes.

**Trends in prescribed industrial waste generation**

In 1998 more than 600,000 tonnes of prescribed industrial wastes were produced in Victoria – enough to half fill the MCG. In addition, 250,000 tonnes of low level contaminated soil were disposed to landfill.

About 60% was solid material of which almost three quarters was disposed to landfill and about a tenth was reused, recycled or recovered for energy. Comparison with previous years suggests the amount of prescribed wastes generated is still increasing, though less is being sent to landfill and more is being reused, recycled or treated.

The remaining 40% was liquid material which was transported for treatment at specialist facilities (liquid industrial wastes have been banned from landfill since 1987). The amount of liquid prescribed industrial waste generated in Victoria appears to be stabilising or decreasing.

The above figures do not include prescribed industrial wastes that are sent via sewer to a treatment works under a Trade Waste Agreement with a sewerage authority.

The quantity and make up of the prescribed industrial waste generated each year varies with changes to commercial and industrial activity. The construction industry, in particular, produces variable amounts of contaminated waste soils depending on the projects in progress.
A number of major planned redevelopments in Melbourne, such as the Docklands project, have the potential, through their excavation activities, to generate large quantities of contaminated soils over the next several years that will require treatment, reuse, containment or disposal.

**Trends in prescribed industrial waste management**

Over the past decade, Victoria’s prescribed waste management industry has developed from a predominantly landfill-based industry to a diverse system of specialist treatment, recovery, recycling, storage and disposal facilities. Currently, 97 premises are licensed by EPA to receive prescribed industrial waste, some of which operate multiple processes or facilities. The increasing sophistication of Victorian waste management has allowed the diversion of significant quantities of industrial wastes for reuse and recycling for energy recovery, such as:

- using spent refinery catalyst in road foundations;
- using fly ash for concrete manufacture;
- recovering zinc and copper from spent catalyst and baghouse dust;
- using waste oil, organic sludges and liquids as alternative fuel sources; and
- using food residues in composting and soil conditioning.

The industrial and regulatory environment in which the waste management industry operates continues to evolve. Prescribed industrial waste generation is decreasing in some sectors, posing challenges to the viability of some waste treaters. For example, a rationalisation of liquid wastes treatment facilities is expected due to a reduction of waste streams as manufacturers develop waste minimisation programs and their own treatment facilities. Competition has seen prices for treating liquid waste drop substantially.

While there may be an oversupply of liquid waste facilities, for solid prescribed industrial waste the situation is reversed. Victoria is facing a diminishing supply of licensed landfill space and increasing disposal costs.

**How can industry avoid generating wastes?**

Many companies have reduced their waste generation by adopting cleaner production principles. Cleaner production is an approach to manufacturing which involves changes to management practices, processes and product design to prevent or reduce waste production. Its emphasis is preventing waste generation rather than the traditional ‘end of pipe’ fixes to treat wastes before discharge to the environment. The benefits of cleaner production usually include rapid payback of initial investment due to reduced raw material and waste treatment costs.

EPA promotes and assists cleaner production through its Cleaner Production Partnerships Program, which will be expanded using additional funds from the recently established landfill levy on prescribed industrial waste.

A collection of cleaner production case studies is available from the EPA Information Centre and on the EPA website.
The policy

The policy gives legal expression to the community’s desire for improved management of prescribed industrial wastes. Based on widely accepted environmental principles, it seeks to enable and motivate industry to reduce these wastes and the hazards they pose. EPA commits to strategic actions to support and encourage industry’s efforts. The policy provides industry with certainty on the standard of performance it needs to achieve, and includes tools to help them do so. It obliges waste management facility operators to provide public reports on their performance, and obliges EPA to monitor and report on progress in meeting the policy objectives.

How the policy was developed

As required by the Environment Protection Act 1970, EPA prepared a draft Industrial Waste Management Policy (Prescribed Industrial Waste) and draft Policy Impact Assessment which were released for public comment on 2 June 1999. In preparing the draft policy EPA consulted with the Hazardous Waste Consultative Committee and representatives of other stakeholders. A Technical Advisory Panel was established to assist EPA in developing the draft policy.

EPA held information sessions on the draft policy in Melbourne, Geelong, Morwell, Wangaratta and Bendigo. In addition, specific meetings and workshops were held with various industry and community/environment groups. Following the deadline for receipt of public comments, EPA reviewed the comments received, and considered the findings of the Hazardous Waste Consultative Committee. This information assisted in the preparation of the final policy and Policy Impact Assessment. In addition, a summary document of comment and EPA’s response was prepared and is available from the EPA Information Centre at 40 City Road Southbank (tel: 9695 2722).

Policy foundation

The objectives of the policy are to protect human health, amenity and the environment from hazards that may be posed by prescribed industrial waste, to minimise the generation of waste and to eliminate as soon as practicable the disposal of prescribed industrial waste to landfill. Implementation of waste reduction targets will be used to evaluate if the objectives of the policy are being achieved.

The policy calls upon and conforms with a number of important principles that have achieved widespread international acceptance. These are: the waste management hierarchy referred to previously, the adoption of eco-efficiency, the broadened responsibilities embodied in the concept of product stewardship, the precautionary principle to guide decision making where there is uncertainty, the concept of intergenerational equity, the principle of cost effectiveness in responses to environmental issues, and the idea that improved valuation pricing and incentive mechanisms are critical for improving environmental performance.

Resources should be used efficiently and prescribed wastes should be managed to retain their economic value. Industry is therefore encouraged to minimise the generation of prescribed industrial wastes through better product and process design, selection of appropriate raw materials and improved process management.

The concept of ‘practicability’ is a key concept in the policy. Assessing whether a prescribed industrial waste management option is ‘practicable’ involves consideration of environmental,
technical, logistical and financial issues. These might include the significance of the environmental hazard posed, the quantity of waste generated, the availability of legitimate resource recovery options, access to appropriate waste treatment facilities and the cost of waste treatment.

**Policy programs**

Under the policy, EPA is to employ a wide range of measures to meet the policy objectives.

It will work with the finance, accounting and business sectors, recognising that the most environmentally sound and efficient approaches to management of prescribed industrial wastes generally result in net financial benefits for industry. These benefits are often not recognised in normal accounting and business practices.

Partnerships which build the capacity for change will be encouraged, to facilitate waste avoidance and improved waste management. EPA will work with industry, community and other interested parties to establish targets for waste avoidance, reuse and recycling on a sector basis.

EPA will seek to help consumers to better understand that their day-to-day consumption patterns influence the production of prescribed industrial waste.

Waste generators will be encouraged to develop environment improvement plans. This is a well-established environmental management tool involving an audit of waste streams within a facility, identification of reduction programs, and documented commitments and schedules for carrying out these programs. The process can also involve interaction with the local community and agreement on targets and timelines for environmental improvements.

In addition, EPA will also use its statutory tools, such as licences, works approvals and notices, to implement the policy.

**Policy tools**

Decision support tools are provided to enable EPA and industry to determine the preferred management option for a prescribed industrial waste based on the waste management hierarchy.

Specifically, a tool is provided to enable EPA or a prescribed industrial waste generator\(^1\) to classify a waste according to the degree of hazard posed and the availability of alternatives to containment.

Application of a prescribed industrial waste decision framework then guides the user towards the appropriate management option in line with the waste management hierarchy.

EPA will classify waste containment facilities based on their standard of siting, design, construction, operation, maintenance and provisions for post-care. Where the decision framework shows that no practicable option is available for a prescribed industrial waste other

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\(^1\) The term *prescribed industrial waste generator* is used throughout this policy when referring to obligations on those that generate or produce prescribed industrial waste. This differs from the term *prescribed industrial waste producer* which is used in the Environment Protection (Prescribed Waste) Regulations 1998 and includes only those premises from which prescribed industrial waste is transported off-site, other than by sewer (ie. generally transported off-site on a highway).
than containment, the choice of containment facility must be made in accordance with the following classification of wastes and facilities.

<table>
<thead>
<tr>
<th>Hazard classification of the prescribed industrial waste</th>
<th>Class of solid waste facility able to receive the waste</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category A – prescribed industrial waste requiring a very high level of control and ongoing management</td>
<td>Not suitable for containment. Must be treated to reduce hazard classification allowing containment or safely stored pending development of other suitable management options.</td>
</tr>
<tr>
<td>Category B – prescribed industrial waste requiring a high level of control and ongoing management</td>
<td>Class 1 (‘Prescribed industrial waste containment facility’)</td>
</tr>
<tr>
<td>Category C – prescribed industrial waste posing a low hazard C (a) – wastes with potential amenity effects, non-persistent organic C (b) – other low environmental risk wastes</td>
<td>Class 2 (‘Municipal landfill’) or Class 1</td>
</tr>
</tbody>
</table>

**Keeping track**

EPA will monitor progress in achieving the Government’s target for reducing prescribed industrial waste going to landfill. If the monitoring indicates that significant reductions in the amount of waste to landfill is not being achieved, the policy will be reviewed.

Monitoring trends in the generation and management of prescribed industrial waste will help with waste management planning and with the assessment of waste management practices, and will also provide an information resource for the public. Detailed reports will be produced and information will be made available through EPA’s website and annual report.

The policy requires premises licensed to receive prescribed industrial waste to prepare an annual environmental performance report detailing the quantities and types of waste received and other environmental information. These reports are also to be made publicly available.

EPA will continue to develop programs designed to monitor and audit the performance of facilities receiving prescribed industrial waste.

**Expected impacts of the policy**

The policy places increased emphasis on avoidance as the preferred management strategy for prescribed industrial waste generators. A flexible framework is provided allowing waste generators to respond in a variety of ways. Where a business invests in waste avoidance through cleaner production, experience shows that costs are generally rapidly recouped. Any increases in waste management costs are limited to those that are ‘practicable’. The policy itself is not expected to have a significant impact on landfill costs.

The policy will encourage further development of a robust and innovative waste management industry able to provide choice and reliability for prescribed industrial waste generators. At
present, some sectors of Victorian industry may be over-reliant on the diminishing prescribed industrial waste landfill capacity. Such generators may therefore be exposed to significant increases in costs due to the introduction of containment facilities and uncertainty as to long term availability of containment options.

Particular impacts of the policy include requirements to develop environment improvement plans, waste classifications and annual reports. These would cost at most a few thousand dollars to prepare. Additional costs to EPA are also fairly small.

EPA’s analysis indicates that the minor costs of implementing the policy are more than offset by the benefits to society, the environment and future generations.
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### GLOSSARY OF TERMS

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<th>Definition</th>
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<tbody>
<tr>
<td>Authority</td>
<td>The Environment Protection Authority constituted under the <em>Environment Protection Act</em> 1970.</td>
</tr>
<tr>
<td>Best available technology</td>
<td>Techniques, methods or processes which generate the minimum waste per unit output, equivalent to that which is achievable by proven, viable and commercially available techniques, methods, processes or practices.</td>
</tr>
<tr>
<td>Chemical fixation</td>
<td>A process whereby waste is bonded chemically to a stable inert matrix.</td>
</tr>
<tr>
<td>Cleaner production</td>
<td>Reduction of waste through the life cycle of a manufactured article. It is based on practices and technologies that minimise waste generation and energy consumption. It involves the introduction of product design, cleaner technologies, processes and practices that minimise waste.</td>
</tr>
<tr>
<td>Commonly available technology</td>
<td>Modern techniques, methods or processes as commonly used in any particular industry.</td>
</tr>
<tr>
<td>Containment facility</td>
<td>A facility for the containment of those wastes for which there is no opportunity for reuse, recycling or energy recovery existing now or in the foreseeable future.</td>
</tr>
<tr>
<td>Corrosive</td>
<td>Ability to damage or destroy organic tissues or other materials by chemical action.</td>
</tr>
<tr>
<td>‘Cradle to grave’</td>
<td>An overall approach to managing wastes from their generation (with the emphasis on minimising their generation) to their ultimate fate (where the emphasis is on the environmental acceptability of the means of treatment or containment).</td>
</tr>
<tr>
<td>Eco-efficiency</td>
<td>Producing more and higher value goods and services per unit input with less environmental impact.</td>
</tr>
<tr>
<td>Elutriation standard</td>
<td>A standard to determine the potential of a waste material for leachate formation in a landfill.</td>
</tr>
<tr>
<td>Elutriable fraction</td>
<td>The concentration of a contaminant determined using a method designed to simulate leaching of the contaminant from the waste under landfill or other conditions as appropriate.</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>A technique whereby a waste is placed in a sealed container to prevent contact with its surroundings.</td>
</tr>
<tr>
<td>EPA</td>
<td>The Environment Protection Authority.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>-----------------------------</td>
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</tr>
<tr>
<td>EPA licence</td>
<td>Licences are required before operating and include discharge limits, operating conditions and monitoring and reporting requirements to ensure environmentally sound operations.</td>
</tr>
<tr>
<td>Fill material</td>
<td>Soil (sand, clay and silt), gravel or rock with contaminant concentrations less than those specified in table 2 of EPA Publication 448, <em>Classification of Wastes</em>, published by the Authority in 1995 as amended from time to time or republished by the Authority.</td>
</tr>
<tr>
<td>Financial assurance</td>
<td>Provides a guarantee that the cost of site clean-up would not fall as a charge on the community through failure of the occupier of the premises to make or pay for necessary measures.</td>
</tr>
<tr>
<td>Immobilisation</td>
<td>Waste treatment techniques that restrict the migration of wastes to their surroundings. Waste can be immobilised by chemical fixation, encapsulation or solidification or a combination of these methods.</td>
</tr>
<tr>
<td>Incineration</td>
<td>The process of controlled burning of waste material in an environmentally acceptable manner so that only ashes remain.</td>
</tr>
<tr>
<td>Leachate</td>
<td>Liquid which has percolated through or drained from waste material and which contains soluble components of the waste.</td>
</tr>
<tr>
<td>Licence to operate</td>
<td>Community confidence in a company’s environmental management that enables them to continue to operate effectively. For example, this confidence may be reflected in decreased cost and time associated with approvals for future works or activities.</td>
</tr>
<tr>
<td>Municipal waste</td>
<td>Putrescible wastes and solid inert wastes from manufacturing, commercial processing and service industries and waste generated within residential dwellings, but does not include liquid wastes, night-soil, prescribed waste or prescribed industrial waste.</td>
</tr>
<tr>
<td>Off-site</td>
<td>Away from the site of production of waste.</td>
</tr>
<tr>
<td>On-site</td>
<td>On or adjacent to the site of the production of waste.</td>
</tr>
<tr>
<td>Post-closure</td>
<td>The ongoing management of a landfill or long term containment facility following its closure, to ensure protection of human health and the environment, until such time as the landfill does not pose a hazard to human health or the environment.</td>
</tr>
<tr>
<td>Prescribed industrial waste</td>
<td>A waste or mixture prescribed for the purposes of the <em>Environment Protection Act 1970</em>.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Prescribed industrial waste generator</td>
<td>An occupier of premises at which prescribed industrial waste is generated. The term <em>prescribed industrial waste generator</em> is used throughout this policy when referring to obligations on those that generate or produce prescribed industrial waste. This differs from the term <em>prescribed industrial waste producer</em> which is used in the <em>Environment Protection (Prescribed Waste) Regulations</em> 1998 and includes only those premises from which prescribed industrial waste is transported off-site, other than by sewer (ie. generally transported off-site on a highway).</td>
</tr>
<tr>
<td>Pre-treatment</td>
<td>Initial treatment of waste materials to make them safe to handle or precondition them for subsequent processing or containment.</td>
</tr>
<tr>
<td>Putrescible waste</td>
<td>Waste able to be decomposed by bacterial action.</td>
</tr>
<tr>
<td>Recovery of energy</td>
<td>Use of a prescribed industrial waste to generate heat energy.</td>
</tr>
<tr>
<td>Recycling</td>
<td>Use of prescribed industrial waste as input into the manufacture of a product following any form of prior treatment or reprocessing.</td>
</tr>
<tr>
<td>Repository</td>
<td>Short to medium term storage facility from which materials may in future need to be retrieved when viable recovery methods or improved forms of treatment become available.</td>
</tr>
<tr>
<td>Residual waste</td>
<td>Waste remaining when all practicable measures for avoidance, minimisation, reuse, recycling and recovery of energy have been adopted. Such waste must be treated or contained in such a way that human health and the environment are protected.</td>
</tr>
<tr>
<td>Reuse</td>
<td>Use of a prescribed industrial waste as a direct input to the manufacture of a product without prior treatment or reprocessing.</td>
</tr>
<tr>
<td>Sludge</td>
<td>A viscous mixture of solids and liquids which may or may not be capable of flow or transfer by pumping.</td>
</tr>
<tr>
<td>Solid inert waste</td>
<td>Hard waste and dry vegetative material which have negligible activity or effect on the environment.</td>
</tr>
<tr>
<td>Solidification</td>
<td>A waste treatment technique which converts liquids or sludges to stable solids.</td>
</tr>
<tr>
<td>Sustainable development</td>
<td>Development which meets the needs of the present without compromising the ability of future generations to meet their own needs.</td>
</tr>
<tr>
<td>Trade waste</td>
<td>Liquid waste that is discharged by industry into a sewer and accepted by the water industry for treatment.</td>
</tr>
</tbody>
</table>
Works approval

Certain premises with a potential for environmental impact are scheduled under the *Environment Protection Act* 1970. Before works can commence on such premises, a works approval is required from EPA. Once complete, all works must be operated in accordance with a licence issued by EPA.
POLICY IMPACT ASSESSMENT

INDUSTRIAL WASTE MANAGEMENT POLICY
(PRESCRIBED INDUSTRIAL WASTE)
1. PURPOSE OF THIS POLICY IMPACT ASSESSMENT

The Policy Impact Assessment provides a discussion of the rationale for and likely environmental, social and financial impacts of the policy and identifies key alternatives considered during its development. It incorporates a description of the policy development process and the procedure for making comment on the policy.

Policy Impact Assessments (PIA) are required for all new or revised State environment protection policies and industrial waste management policies. This PIA seeks to summarise all the information, including scientific analysis and stakeholder input, used to develop the policy in a clear and transparent manner for the community and decision makers to consider.

Through this PIA the reader should gain an understanding of:

- Victoria’s environment protection system and the policy development process for this policy;
- the background to this policy, including a description of prescribed industrial wastes and how they are currently managed through the use of statutory, economic and educational mechanisms;
- the policy including its objectives, intent and principles, proposed changes to the management of prescribed industrial wastes, and the likely implications of key actions which will need to take place in order to achieve the policy’s objectives; and
- a summary of the policy impacts.
2. WHAT DO WE KNOW ABOUT PRESCRIBED INDUSTRIAL WASTES?

This section provides background information on the nature and extent of prescribed industrial wastes, the industry that has developed to manage these wastes and the role of Government in establishing a framework to protect human health and the environment.

Issues addressed include:
- what are prescribed industrial wastes?
- how much prescribed industrial waste does Victoria generate?
- who generates prescribed industrial waste?
- how are prescribed industrial wastes managed?
- what are the trends in generation and managing prescribed wastes?
- what is the nature of the waste management industry?

These issues are important in assessing the purpose and impact of this policy and how it will achieve the nominated objectives.

2.1 What are prescribed industrial wastes?

Prescribed industrial wastes are those wastes of commercial or industrial origin which the community expects to be carefully managed and closely regulated because of their potential to cause environmental hazard. Non-hazardous, solid inert wastes generated by businesses and households, such as cardboard, glass, wood and plastic are not prescribed industrial wastes.


Prescribed industrial wastes can be liquid or solid in form, or something in between (sludges and slurries). They are considered to pose a potential risk to human health or the environment because of their physical or chemical properties or infectious or odorous nature. The actual risk they pose depends on how they are handled, treated, transported and ultimately contained of as well as their volume and inherent hazard.

There are many different types of prescribed industrial wastes. The majority is waste from industrial, commercial and trade activities such as car repair workshops, dry cleaning services, fast food chain stores, food processing plants, chemical, paint and plastics manufacturers, dental surgeries and hospitals.

‘Trade waste’ is liquid waste that is discharged by industry into Victoria’s sewers and accepted by sewage treaters for treatment. The trade waste stream is made up of a variety of waste inputs from industrial and commercial sources mixed with water and domestic sewage. These wastes include waste types otherwise defined as prescribed industrial waste. Trade wastes can include biodegradable waters, suspended solids and compounds of nitrogen, sulfur and other organic and inorganic compounds (including heavy metals such as chromium, copper, cadmium and nickel).

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2 Under the Environment Protection Act 1970 environmental hazard includes danger to human beings or the environment whether imminent or otherwise.
Contaminated soils are also prescribed industrial wastes, and are commonly found when old industrial sites or old service stations are being redeveloped. They represent a legacy of practices that are no longer acceptable such as spills that are not cleaned up or leaking storage tanks. Contaminated soils can pose a risk, for example, where young children or animals have access to them or where they leach off-site with the potential to contaminate waterways. When found, they must, under the Environment Protection Act 1970, be managed to ensure no off-site impact and to make the site safe for its intended use by either removal or management on-site.

2.2 How much prescribed industrial waste does Victoria generate?

Based on data available from EPA’s waste transport database, Victorian industry generated and transported off-site about 611,000 tonnes of prescribed industrial waste in 1998 (356,000 tonnes of solid prescribed industrial waste and 255,000 tonnes of liquid prescribed industrial waste). These wastes were transported off-site for reuse, recycling, energy recovery, treatment or disposal.

A breakdown of liquid and solid prescribed industrial waste transported off-site (other than by sewer), by waste type, is presented in figures 2.1 and 2.2.

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3 Contains information from certificates for the transport of prescribed waste in Victoria which are required under the Environment Protection (Prescribed Waste) Regulations 1998.

4 For information on the types of prescribed liquid and solid industrial wastes transported off site for treatment and disposal, refer to appendix 1.

5 This figure excludes discharge to sewer. The estimates of the generation of prescribed industrial waste in Victoria in 1998 differ from those published in the Hazardous Waste Consultative Committee’s Hazardous Waste Management in Victoria, Discussion Paper #1, April 1999. The differences reflect further refinement of the data analysis to ensure wastes that move from one premises to another under the TRANCERT system were not double counted.
2.3 Who generates prescribed industrial waste?

A wide range of industry and other commercial activities are responsible for the generation of prescribed industrial wastes from food processing to major chemical and petrochemical industries, land development and construction and fast-food outlets. The generation of prescribed industrial waste is characterised by a large number of small generators and a relatively small number of major generators. For example, more than 80% of the 20,000 generators transporting prescribed industrial waste off-site report less than 10 loads per year through the TRANCERT system. These small producers include fast food and related premises producing grease trap wastes, and photographic laboratories.

In general, the manufacturing sector is a significant contributor to the total generation of prescribed industrial waste. Some of the major manufacturing and related industries generating prescribed industrial waste include:

- metals refining, processing and recycling;
- food processing and related activities;
- ink manufacturing;
- leather and textiles processing;
- chemical industries;
- petroleum industries; and
- car and component manufacturing.

These industries manufacture everyday goods and services used

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Low level contaminated soil – what is the story?

Low level contaminated soil is defined in Classification of Wastes (EPA Publication 448). Contaminant concentrations in low level contaminated soil are typical of those that may be suitable for commercial, industrial and other less sensitive uses or, in some cases, residential use.

About 250,000 tonnes of low level contaminated soil was sent to landfill in 1998.

As part of the revision of the Environment Protection (Prescribed Waste) Regulations 1998, low level contaminated soil was included in the list of prescribed industrial wastes. Previously, the disposal of low level contaminated soil was controlled through EPA giving specific approval for disposal from each project.

As a result of the inclusion of low level contaminated soil as a prescribed industrial waste, the total quantity of prescribed industrial waste transported off-site will increase. In practice, this is a result of changes in the classification of a waste rather than any change in the total quantity of contaminated soil (including low level contaminated soil) disposed to landfill. The quantities of prescribed industrial waste referred to in this Policy Impact Assessment do not include low level contaminated soil, unless specifically indicated.

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6 See appendix 1 for more detailed information.
by Victorians. Much of the liquid and semi-liquid (sludge), and some of the solid prescribed industrial waste generated by the industries listed on page five, are consigned to waste treaters. In treating these wastes, an aqueous waste stream is frequently discharged to sewer as trade waste, and a solid residue remains requiring disposal. Waste treaters contributed approximately 26% of all the prescribed industrial waste received by specifically engineered landfills in 1998.

In 1998, 34% of prescribed industrial waste received by specifically engineered landfills was contaminated soil from development projects.

2.4 How are prescribed industrial wastes managed?

Victoria has a well-developed industry for the management of prescribed industrial wastes, with a wide range of facilities for reuse, recycling, recovery of energy, treatment and disposal.

What is the difference between a specifically engineered landfill and other landfills?

Landfills designed and engineered to receive a broad range of prescribed industrial wastes are referred to as ‘specifically engineered landfills’. Victoria currently has two major specifically engineered landfills.

Some other well-designed landfills primarily receiving municipal waste are licensed to receive a limited range of low hazard prescribed industrial wastes.
Disposal for treatment and landfilling are the major management avenues for prescribed industrial wastes. Figures 2.3 and 2.4 present a breakdown of prescribed industrial waste transported off-site (other than by sewer) in 1998, by treatment/disposal type.

Reuse, recycling and recovery of energy
Approximately 10% of solid prescribed industrial waste and 40%\(^7\) of liquid prescribed industrial waste are currently recycled, reused or subject to energy recovery, including:

- processing of solvents, waste oily sludges and similar organic materials to produce fuels;
- reuse of food processing wastes as stockfeed or composting as a soil conditioner;

\(^7\) Includes estimate of prescribed industrial waste stored pending reuse, recycling or energy recovery. Some of this prescribed industrial waste will be transported under the TRANCERT system when consigned for reuse, recycling or energy recovery and hence will be double counted (when estimating the total quantity of prescribed industrial waste generated). In 1998 34,000 tonnes of the 114,000 tonnes recorded against reuse, recycling and recovery of energy were material stored pending reuse.

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Example 1: Reuse, treatment and energy recovery at Alcoa

**Spent Pot Lining treatment and recovery**

Spent Pot Lining (SPL) is a carbon-based waste produced by aluminium smelters. The waste is hazardous as it contains around 10% fluoride and 1% cyanide. Most of the world’s SPL is landfilled without treatment. However this entails some risk of leaching of the contaminants. Portland Aluminium has been required through its EPA licence to store its SPL in sheds and develop treatment and recycling methods for this material.

Portland Aluminium is using an oxygen-enriched lance injection furnace, which is technology developed by Ausmelt. In the furnace, which operates at about 1250°C, the carbon is burnt, the cyanide destroyed and the fluoride recovered (as either NaF or as AlF\(_3\)). Both of the fluorides can be reused in the smelting process. A glassy slag is also produced, and investigations into reuse alternatives for this material are continuing.

**Energy recovery from anode dust**

Aluminium smelters use carbon anodes in making aluminium. Cleaning the bars that hold the anode generates a carbon dust. This dust can be partially recycled in the anodes, but more dust is produced than can be recycled. The dust consists of 80% carbon with a range of inorganic species such as silica, alumina, fluoride and iron oxide. This material has been stockpiled at Portland Aluminium since the opening of the smelter.

In 1995, Blue Circle Southern Cement began a research program that culminated in an application for an EPA works approval in 1997 to investigate burning the dust from Portland in its cement kiln. This enabled Blue Circle to replace about 10% of its energy requirement with the carbon dust. The research program also showed that using the dust results in a 10–15% decrease in nitrogen oxide (an air pollutant) emissions from the kiln, and no detectable increase in the emission of any other pollutants. It is anticipated that this successful application will result in the use of similar dust from the Alcoa aluminium smelter at Pt Henry for further energy recovery.
- reuse of grease trap sludge as compost or feedstock;
- reuse of fly ash as a soil conditioner or in concrete manufacturing;
- reuse of spent sulfuric acid as a neutralising agent;
- recycling of waste oil and solvents;
- recycling used drums;
- reclamation of metals; and
- waste solvents, inks, oils, paints and other liquid wastes with calorific value reprocessed for use as a waste fuel.

For example, Teris[^8] processed a range of organic wastes producing approximately 15,000 tonnes of fuel in 1998 for use in cement kilns.

The potential for reuse, treatment and disposal of contaminated soil depends on the nature and level of its contamination. Low level contaminated soils, for example, can sometimes be safely reused in road construction, building foundations and landscaping.

**Treatment of prescribed industrial waste**

In 1998, waste treaters received 125,000 tonnes of prescribed industrial waste for treatment, and, in turn, generated 65,000 tonnes of prescribed industrial waste for further treatment, storage or disposal (not including trade waste discharged to sewer). Waste treaters accept a wide range of waste types for treatment, with no single dominant waste type. Treatment often involves the generation of solid waste from liquid or sludge. Comments from industry have indicated that as more companies develop waste minimisation programs and their own waste treatment facilities, the quantity of waste going to separate treatment companies, in many categories, will continue to reduce. The remaining wastes are likely to be more difficult to treat or have higher concentrations of hazardous materials, producing more solid prescribed industrial waste per quantity of liquid waste treated.

Analysis of 1998 data shows that waste dealt with in Victoria included:
- 5,500 tonnes of contaminated soil for fixation prior to landfill disposal[^9];
- 25,000 tonnes of oily waste, much of which was solidified prior to landfill disposal;
- 20,000 tonnes of industrial washwaters; and
- 14,000 tonnes of grease trap, wool scouring and other wastes amenable to biological treatment, or in some cases grease recovery.

Approximately 30,000 tonnes of clinical and pharmaceutical wastes was generated in 1998, with the majority of this disposed of by incineration at a facility operated by Brambles or through the grinding and disinfection plant operated by the Daniels Corporation.

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[^8]: Formerly known as Scori.
[^9]: This is in addition to the 72,000 tonnes of contaminated soil directly disposed to landfill in 1998.
Managing Prescribed Industrial Waste – Policy Impact Assessment

Landfill disposal
Approximately 255,000 tonnes of prescribed industrial waste were disposed to landfill in 1998, including 208,000 tonnes to specifically engineered landfill. Data on the nature of the wastes received by specifically engineered landfills\(^\text{10}\) shows:

- contaminated soils represent the largest single waste category;
- chemically fixed wastes and other wastes generated by the waste treatment sector represent the next largest category\(^\text{11}\);
- relatively small quantities of oily sludges, resins or other materials with potential for energy recovery were deposited; and
- relatively small quantities of putrescible waste were received\(^\text{12}\).

Prescribed industrial waste disposed to landfills other than specifically engineered landfills comprised mainly of food processing and other putrescible waste, low level contaminated soil and small quantities of asbestos, particularly in regional areas. Figure 2.5 presents a breakdown of prescribed industrial waste received by specifically engineered landfill, by waste type.

Discharge to sewer
In 1995, the total trade waste volume accepted by Victoria’s water industry was approximately 65,000–75,000 ML. The metropolitan water industry accepted approximately 70% of this total for treatment. The major waste component is biodegradable waste. Other wastes include heavy metals wastes containing chromium, copper and cadmium.

2.5 What are the trends in prescribed industrial waste generation and management?

Trends in generation of prescribed industrial waste
The TRANCERT database provides information on the off-site movement of prescribed industrial wastes and can be used to obtain some indication of trends in the generation and

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\(^{10}\) Refer to appendix 1 for further details of prescribed industrial wastes received by specifically engineered landfill.

\(^{11}\) Of the prescribed industrial waste generated by major waste treaters, 80% was consigned to a specifically engineered landfill. Major waste treaters have been selected on the basis of the five waste treaters producing the largest quantity of prescribed industrial waste. The major waste treaters are typically responsible for generation of 60–80% of all the prescribed industrial waste generated by the waste treatment sector.

\(^{12}\) In the order of 25,000 tonnes of putrescible waste was received by other landfills. Refer to appendix 1 for further details.
management of prescribed industrial wastes.\textsuperscript{13} The limitations of these data must be recognised; for example, the TRANCERT database only records where prescribed industrial waste are transported off-site other than to sewer.

Trends for individual prescribed industrial waste categories are also highly dependent on specific events. For example, major site redevelopments that generate contaminated soils, emergency events – such as the disposal of firewater from the Coode Island fires in the early 1990s – and the disposal of inert sludges, resulting from the City Link tunnelling activities.

**Liquid prescribed industrial waste**

The quantity of liquid prescribed industrial waste transported off-site, other than by sewer, while variable, has decreased from 283,000 tonnes in 1995 to 255,000 tonnes in 1998.\textsuperscript{14} The quantity of putrescible organic wastes transported off-site has increased significantly since 1995, while paints, resins, inks, dyes and adhesives, acids, alkalis and washwaters have decreased substantially, probably due to waste minimisation and on-site treatment by generators. Liquid prescribed industrial wastes with calorific value are increasingly being used as fuel rather than being incinerated, and there is further scope for diversion in this area. More putrescible organic wastes are being reused or otherwise reprocessed, often as stockfeed, soil conditioner or compost.

The trends in management of liquid prescribed industrial waste are consistent with the intent and direction of this policy. However, further guidance and clarity of direction is necessary to maximise the opportunities for waste avoidance, reuse, recycling and recovery of energy.

**Solid prescribed industrial waste**

A review of data for solid prescribed industrial waste since 1995 indicates that solid prescribed industrial waste transported off-site for treatment, storage or disposal, while variable, has increased overall by approximately 15\% (42,000 tonnes) from 1995 to 1998. Contaminated soils are responsible for much of the variability in quantity. Contaminated soil disposed to specifically engineered landfill increased from 54,000 tonnes in 1995 to 95,000 tonnes in 1997, before dropping to 72,000 tonnes in 1998.

Increases in the off-site transport of solid prescribed industrial waste from 1995 to 1998 were attributable primarily to the following categories:

- solid/sludge waste requiring special handling (67,000 tonnes or 36\% increase over the period 1995 to 1998), including:
  - asbestos
  - contaminated soil
  - chemically fixed and solidified wastes;

- putrescible organic wastes, largely from food processing and related activities (10,000 tonnes or 157\% increase);

\textsuperscript{13} EPA established the transport certificate system in 1989 as a means of tracking the movement of prescribed industrial wastes. A transport certificate must accompany every consignment of prescribed industrial waste. Each certificate includes details of the producer, transporter, receiver, waste type, quantity and treatment. This information is collected and maintained in the TRANCERT database by EPA. Limitations in use of the TRANCERT database to assess trends in waste generation and management are discussed in appendix 1.

\textsuperscript{14} Refer to appendix 1 for further details.
• inorganic chemicals, including chromium containing tannery waste and waste from primary and secondary smelting (6,000 tonnes or 20% increase); and

• clinical wastes/pharmaceutical wastes (6,000 tonnes or 25% increase).

It should be noted that the increases in the above categories are in part offset by decreases in others.

Figure 2.6 illustrates the trends in off-site transport and disposal of solid prescribed industrial waste between 1995 and 1998. Key points are:

• generation of solid prescribed industrial waste from the manufacturing sector, including solid wastes derived from the treatment of liquid waste from the manufacturing sector increased by about 10% from 1995 to 1998;

• generation of contaminated soil for off-site management increased by about 15%;

• reuse, recycling, and energy recovery from solid prescribed industrial waste is relatively minor (10%) but appears to be increasing, as is treatment of solid prescribed industrial waste;

• disposal of prescribed industrial waste to specifically engineered landfill was variable over the period, ranging from a high of 250,000 tonnes in 1997 to a low of 177,000 tonnes in 1996, and 208,000 tonnes in 1998;

• disposal of prescribed industrial waste to specifically engineered landfill, excluding contaminated soils, shows a decrease from 176,000 tonnes in 1995 to 136,000 tonnes (23%) in 1998; and

• disposal of prescribed industrial waste to other landfills increased slightly over the period (16% of all solid prescribed industrial waste transported off-site in 1998 was consigned to a landfill other than a specifically engineered landfill). Disposal of prescribed industrial waste to other landfills is expected to rise substantially in 1999 as a result of the Environment Protection (Prescribed Waste) Regulations 1998 which included low level contaminated soil as a prescribed industrial waste.

When contaminated soil is excluded, the trends in management of prescribed industrial waste are broadly consistent with the intent of this policy in that disposal of prescribed industrial waste to landfill is reducing and uptake of other options is increasing. However, there was an 11% increase in the quantity of non-soil solid prescribed industrial waste transported off-site from 1995 to 1998. As discussed in appendix 2, a range of alternatives to landfill are being increasingly used for managing contaminated soil, but this trend is masked by the increased quantities generated.

While these trends are in the right direction, further reductions in the generation of prescribed industrial waste and further movement of management practices toward options preferred under the waste hierarchy are required to achieve a substantial reduction in prescribed industrial waste to landfill.
2.6 What is the nature of the waste management industry?

An understanding of the role, make-up and trends in the waste management industry is critical to understand the need for and development of this policy. Achieving the policy objectives will require changes in the waste management industry to improve the utilisation of waste.

The waste management industry is already experiencing some market driven change. This must be appreciated to:

- properly separate the impact of the proposed policy from changes which are occurring as the market responds to the current business environment; and
- understand the role of this policy in providing a clear framework and direction for managing prescribed industrial waste and creating certainty for investment to achieve the policy objectives.

An overview of the waste management industry and the associated issues is presented below.\textsuperscript{15}

A robust, sustainable and cost-effective waste management industry performing in a manner consistent with community expectations is fundamental to:

- a strong and developing industry base in Victoria, with its associated employment and wealth generation;
- protection of the environment through the proper management of wastes with the potential to adversely affect human health and the environment; and
- supporting the standard of living experienced by the general public including the availability of consumer goods at reasonable prices.

Stakeholders in the waste management industry include a large number of local and international organisations working in the following areas:

- waste generation;
- waste collection and transportation;
- landfill ownership and operation;
- waste treatment
  - for disposal
  - for reuse, recycling or recovery of energy;
- consulting industry on waste minimisation and other waste management issues;
- recycling or reuse of wastes; and
- recovery of energy from wastes.

Substantial structural change is expected as waste managers respond to market conditions and over-capacity in some sectors, and seek to take up opportunities for new products and services in other areas. These changes reflect current market conditions and may accelerate due to the policy’s emphasis on avoidance, reuse, recycling and recovery of energy from prescribed industrial wastes. Already, some waste management companies are realigning their business away from the provision of a specific treatment or disposal service towards an integrated

\textsuperscript{15} Refer to appendix 2, ‘Contaminated Land Development’, for further information.
Managing Prescribed Industrial Waste – Policy Impact Assessment

waste management service encompassing advice on waste avoidance, assessment of options for reuse, recycling and recovery of energy and provision of treatment and disposal services.

One of the factors contributing to this restructuring is the oversupply of capacity for treatment of some liquid prescribed industrial wastes, particularly aqueous wastes. As waste volumes in this sector have decreased, competition has increased reducing prices leading to rationalisation of facilities.

Organisations often adopt reuse or energy recovery as a means of more cost-effectively undertaking their core business (e.g. some cement kilns burn prescribed industrial waste as a supplementary fuel). The availability of facilities for reuse or energy recovery may therefore depend on unrelated markets.

Similarly, there is an increasing trend towards specialised facilities for reuse, recycling, recovery of energy or treatment of prescribed industrial waste in niche markets. This emerged initially in treatment of wastes such as polychlorinated biphenyls (PCBs) and other chlorinated organics, for some of which there are only one or two facilities established in Australia.

Two specifically engineered landfills able to accept a broad range of prescribed wastes have been established in Victoria: Cleanaway–Tullamarine and Pacific Waste Management–Lyndhurst. These are the primary facilities serving industry in Victoria.17

Thirty-one other landfills are licensed to receive putrescible prescribed industrial waste such as food processing wastes, asbestos (after appropriate packaging to avoid the release of fibres) and low level contaminated soil16. Most are engineered landfills, principally receiving municipal waste. Twenty-seven are located in regional Victoria.

Limited space is available for the disposal of many types of prescribed industrial wastes. With the impending closure of the Tullamarine facility, the Lyndhurst landfill will be the primary facility for disposal of these wastes. Prices for landfill disposal of prescribed industrial wastes at specifically engineered landfills have increased markedly in the past two years and are expected to reach in the order of $100/tonne in the near future. Space for disposal of low level contaminated soil, putrescible prescribed industrial waste and asbestos in other landfills is not limited to the same extent as space in specifically engineered landfills.

Similarly, industry sources advise that the costs for treatment of some liquid wastes are expected to rise in response to market factors such as rationalisation of treatment capacity in some sectors.

Separate consideration is given to contaminated land development in appendix 2. It is essential that an understanding of the management of contaminated soils informs the development of the policy, given the massive volumes of contaminated soil and low level contaminated soil sent to landfill. There is significant scope for minimising the volume of contaminated soil excavated and transported off-site, for reusing soils on-site or off-site, in some cases for recovery of energy from soils and treatment. It should be recognised that remediation of a contaminated site in itself generates an environmental and community benefit, returning land to a higher value productive use.

16 Thirteen of the 31 landfills are licensed to accept low level contaminated soils.

17 A third specifically engineered landfill, the Dutson Downs facility, can accept a small range of prescribed industrial waste compared to Cleanaway–Tullamarine and Pacific Waste Management–Lyndhurst.
In summary:

What are prescribed industrial wastes?

- Prescribed industrial wastes are wastes of a commercial or industrial origin, generated in the production of everyday goods and services that the community expects to be carefully managed and closely regulated. Prescribed industrial wastes vary in hazard and hence the level of management required. A waste may be classified as a prescribed industrial waste for a range of reasons including amenity, toxicity, leachability and flammability.

How much prescribed industrial waste does Victoria generate?

- In 1998, Victorian industry generated and transported off-site about 611,000 tonnes of prescribed industrial waste, of which 356,000 tonnes were solid prescribed industrial waste and 255,000 tonnes were liquid prescribed industrial waste.

Who generates prescribed industrial waste?

- There are a large number of small generators and a small number of major generators, with the manufacturing sector being a major contributor. Redevelopment of contaminated land is a major but variable contributor, and waste treaters are themselves major generators of prescribed waste.

How are prescribed industrial wastes managed?

- Waste treaters accept a wide range of liquid, and some solid, waste from industry. This treatment often results in a solid residue disposed to landfill and an aqueous component disposed to sewer. A significant quantity of liquid prescribed industrial waste is discharged to sewer as trade waste.

- Ten per cent of solid prescribed industrial waste and 40% of liquid prescribed industrial waste is currently reused, recycled or used for energy recovery. Recovery of energy from liquid organic waste accounts for approximately 5% of the liquid prescribed industrial waste stream.

- Fifty-eight per cent of solid prescribed industrial waste is disposed to specifically engineered landfill. Contaminated soils make up 34% of this, with solid wastes from waste treaters (typically chemically fixed waste and filter cake) making up approximately 30%.

- Clinical and pharmaceutical wastes represent a significant (30,000 tonnes/yr) stream that is managed independently of other prescribed industrial wastes.

What are the trends in waste generation and management?

Generation:

- The quantities of solid prescribed industrial waste (excluding contaminated soils) transported off-site for treatment, storage or disposal have stabilised and are now only slowly increasing. Quantities of liquid prescribed industrial waste transported off-site, other than by sewer, have decreased since 1995.

Refer to appendix 2 for further discussion of the management of contaminated soils.
• Generation of prescribed wastes can be substantially affected by major one-off events particularly associated with development or emergency response. The quantities of contaminated soil disposed to specifically engineered landfill are highly variable but have increased from 54,000 tonnes in 1995 to 72,000 tonnes in 1998. Similarly, the quantities of low level contaminated soil disposed to landfill have increased substantially.

• While these trends are headed in the right directions, particularly in the case of liquid prescribed industrial waste, they are not sufficient to resolve the issues of sustainability of waste management in Victoria or achieve the target reduction in disposal of prescribed industrial waste to landfill.

Management:
• Excluding contaminated soils, the disposal of solid prescribed wastes to specifically engineered landfill has decreased slightly.
• Reuse, treatment and diversion of some putrescible and low hazard wastes to other landfills is responsible for the slight decrease in the quantity of prescribed industrial waste disposed to specifically engineered landfill despite increases in the total quantity of solid prescribed industrial waste generated.
• Reprocessing of liquid organic wastes for energy recovery and reuse for other purposes is increasing.

Waste management industry
• Sustainable waste management, including a sustainable waste management industry, is a key element in ensuring the continued social and economic development of Victoria.
• The waste management industry includes a large number of operators and other stakeholders, although within any one niche sector there may only be one or two key providers.
• The availability of facilities for the reuse, recycling and energy recovery from prescribed industrial waste is often dependent on industries other than waste management.
• Two specifically engineered landfills serve Victoria, although following the impending closure of the Cleanaway facility at Tullamarine, the Pacific Waste Management landfill at Lyndhurst will be the primary provider for disposal of a broad range of prescribed industrial waste in Victoria. In addition, 31 other landfills are licensed to receive a restricted range of low hazard prescribed industrial waste, such as food processing wastes and low level contaminated soil. Many of these are located in regional Victoria.
• Costs for disposal of prescribed industrial waste to specifically engineered landfill are expected to increase to approximately $100/tonne, in response to market factors such as limited availability and irrespective of this policy.
• Restructuring is occurring in some sectors of the waste management industry in response to declining waste volumes and other market factors. Some waste managers are responding to the associated opportunities by providing integrated waste management services including waste minimisation advice.

A third specifically engineered landfill, the Dutson Downs facility, can accept a small range of prescribed industrial waste compared to Cleanaway–Tullamarine and Pacific Waste Management–Lyndhurst.
• Contaminated soils are largely derived from the redevelopment of former industrial land and hence management of these soils is strongly influenced by the economics of land development.
3. HOW IS PRESCRIBED INDUSTRIAL WASTE REGULATED AND MANAGED IN VICTORIA?

3.1 History of prescribed industrial waste management in Victoria

Victoria has a well-developed regulatory system for the management of prescribed industrial waste. The management of waste has been regulated since 1970 with the introduction of the *Environment Protection Act 1970*, which provides EPA with powers to regulate industrial waste and carry out long range planning in waste management.

In 1985, the *Environment Protection Act 1970* was amended to introduce the works approval process that promoted waste avoidance and cleaner production with works undertaken at facilities. Works approval and licensing for sites storing, treating and disposing of prescribed industrial waste was also introduced.\(^{18}\)

The original Industrial Waste Strategy, introduced in 1986, focused attention on promoting waste minimisation. The strategy established the waste management hierarchy, which has become a key element of the regulatory framework for industrial waste in Victoria. The waste management hierarchy seeks to avoid waste and, where it cannot be avoided, to reduce, recycle and recover waste for energy in preference to disposal. Major advances in the management of prescribed industrial waste were achieved.

Supporting the original Industrial Waste Strategy, the *Environment Protection (Prescribed Waste) Regulations 1987* and *Environment Protection (Transport) Regulations 1987* were introduced to specifically regulate the off-site transport, storage, treatment and disposal of the prescribed industrial waste, and to ensure a robust waste management industry.

In 1989 the *Environment Protection Act 1970* was further amended to introduce the Environment Protection Levy, a 3% levy on the licence fee for all sites handling prescribed industrial waste. Cleaner production demonstration and education programs were also introduced in that year through the Clean Technology Incentive Scheme. This was followed by the introduction of waste management plans and statutory expression of the waste hierarchy through the *Industrial Waste Management Policy (Waste Minimisation) 1990*.

The early 1990s saw further promotion of cleaner production through the EPA Cleaner Production Grants program which provided grants and incentives and the annual EPA Cleaner Production Awards. These activities culminated with the establishment of EPA’s Cleaner Production Partnerships Program in 1995, which provides opportunities in cleaner production through partnerships between Government and large and small businesses.

Today it is recognised by Government, industry and the community that there is a need to move away from disposal of wastes into landfill. A different approach is required for the management of wastes, focusing on the avoidance, reuse, recycling and recovery of energy from wastes, reducing the reliance which we currently have on landfills.

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\(^{18}\) Prior to 1985 a facility handling prescribed industrial waste required a licence if it generated a discharge to air, water or land.
3.2 Zeroing in on waste – A strategy for industrial waste

The Industrial Waste Strategy, *Zeroing in on Waste*, released in April 1998 after an extensive public consultation process, re-emphasises the importance of the hierarchy of waste management practices. The strategy is framed around three basic objectives:

- to achieve the widespread avoidance of waste by facilitating the adoption of cleaner production policies and practices;
- to maximise the economic value of resources during their life cycle through reuse, recycling and energy recovery in preference to disposal; and
- to foster a culture of continuous improvement in the waste management industry to achieve and maintain best practice in the management of residual waste streams in Victoria.

*Zeroing in on Waste* seeks to map out a path for the next 10 to 15 years, highlighting approaches through which industry can increase its profits by avoiding waste and by turning waste into resources.

*Zeroing in on Waste* gives priority to measures which minimise waste generation and maximise the economic value of waste through their reuse, recycling and energy recovery. It also gives priority to safely managing this waste in accordance with world’s best practice. This industrial waste management policy (IWMP) sets a framework for the management of prescribed industrial waste, giving effect to the principles established in *Zeroing in on Waste*. In particular, it reinforces the principle that waste generators are responsible for the proper management of their waste from ‘cradle to grave’ and that waste is most effectively dealt with through avoidance and recovery.

Following the release of *Zeroing in on Waste* the *Environment Protection (Prescribed Waste) Regulations 1998* were introduced, replacing the *Environment Protection (Prescribed Waste) Regulations 1987* and *Environment Protection (Transport) Regulations 1987*. The new Regulations state which wastes are to be regulated and the requirements for their transport, tracking and management which forms part of the implementation of *Zeroing in on Waste*. This policy complements this strategy by giving specific expression to those aspects of the strategy related to the avoidance, reuse, treatment and ultimately containment of prescribed industrial waste.

3.3 The existing regulatory framework for prescribed industrial waste

An outline of the existing framework for the regulation of prescribed industrial waste in Victoria is presented on the following page. This policy seeks to build on this framework to integrate and provide clarity of requirements and to accelerate improvements in the management of prescribed industrial waste.

This policy gives specific expression to general duties related to managing industrial waste under the *Environment Protection Act 1970* and builds on existing waste management programs which seek to promote cleaner production, legitimate diversion of waste and proper management of residual materials.
The Environment Protection Act 1970

The management of prescribed industrial waste in Victoria is regulated under the Environment Protection Act 1970, the cornerstone of Victoria’s environment protection system. The Act establishes the Environment Protection Authority (EPA), defines EPA’s powers, duties and functions, and contains a number of instruments to minimise pollution, waste and environmental risks.

The Act places a number of general duties on people not to cause pollution or cause an environmental hazard, including when handling prescribed industrial waste. In addition, the Act establishes a range of tools which can be used to protect the environment from the hazards posed by prescribed industrial waste, including:

- statutory policies, including industrial waste management policies;
- regulations;
- works approval and licensing of certain premises handling prescribed industrial waste; and
- notices, for example, requiring a person to abate or clean up pollution arising from handling prescribed industrial waste.

Industrial waste management policies are statutory instruments declared by the Governor-in-Council under section 16 of the Act. Provisions within an IWMP are legally enforceable and binding on all citizens.

Industrial Waste Management Policy (Waste Minimisation) 1990

The Industrial Waste Management Policy (Waste Minimisation) 1990 has driven the adoption of cleaner production programs and technologies within Victoria. This IWMP established the waste management hierarchy within statutory policy and promotes the adoption of waste minimisation processes, practices and technologies.

Under the provisions of the IWMP (Waste Minimisation) 1990, businesses applying for works approval under the Environment Protection Act 1970 must:

- provide a waste management plan assessing its waste streams and detailing waste minimisation opportunities; and
- demonstrate that at least commonly available technology is being employed to minimise waste. Where priority wastes are being generated, best available technology must be applied.

Premises subject to licence or notice conditions under the Act, or which generate prescribed industrial waste or discharge to sewer, may also be required to prepare a waste management plan. The policy strengthens this framework by placing responsibility on prescribed industrial waste generators to manage their waste in accordance with the waste hierarchy.

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19 Priority wastes are substances designated in Schedule A to the IWMP (Waste Minimisation) 1990.

20 The term prescribed industrial waste generator is used throughout this policy when referring to obligations on those that generate or produce prescribed industrial waste. This differs from the term prescribed industrial waste producer which is used in the Environment Protection (Prescribed Waste) Regulations 1998 and includes only those premises from which prescribed industrial waste is transported off-site, other than by sewer (ie. generally transported off-site on a highway).

The Environment Protection (Prescribed Waste) Regulations 1998 establish a range of controls aimed at ensuring prescribed wastes are managed so that human health and the environment are protected. While they allow for reuse, recycling and recovery of energy, the regulations do not direct a generator of prescribed industrial waste to adopt options preferred under the waste hierarchy. Instead, the policy is designed to provide such direction.

The Regulations encourage waste generators and managers to adopt a responsible approach to waste management, and facilitate improvements in that management, particularly the legitimate diversion of materials from the waste stream for reuse, recycling or recovery of energy. The key functions and provisions of the Regulations are to:

- Classify certain wastes to be ‘prescribed wastes’ and ‘prescribed industrial wastes’.
- Establish a system of controls over the management of these wastes, including a tracking and vehicle permitting transport system.
  
  The waste producer is responsible for ensuring that their waste is received by an appropriate receiving facility. The transport certificate system requires the waste receiver to advise the waste producer of receipt of their waste.
- Provide for exemptions where waste is destined for reuse, recycling or recovery of energy.21

A person can be granted an exemption from the works approval, licensing and financial assurance that would otherwise apply where the waste is managed so as not result in an unacceptable risk of damage to the environment.22 EPA may impose conditions and reporting requirements around the exemption. Such exemptions streamline the process of obtaining approval for diversion of prescribed industrial waste to productive uses, saving money and encouraging their uptake.

Reuse of low level contaminated soil for an overpass on the Western Ring Road

Approximately 100,000 tonnes of low level contaminated soil was reused by a contractor on behalf of VicRoads in construction overpass abutments in two locations on the Western Ring Road. The low level contaminated soil was placed within an engineered containment system during the construction of the overpasses. In approving the reuse, EPA established conditions including:

- only low level contaminated soil from a nominated site was allowed to be placed in the bridge abutments;
- all works were required to be carried out in accordance with an environment management plan to control dust and other environmental issues;
- the low level contaminated soil was required to be contained using an engineered clay liner; and
- stormwater and groundwater monitoring and reporting was required.

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21 In addition, exemption from requirements of the transport certificate system may be allowed where the producer is granted accreditation.

22 Refer to the Environment Protection (Prescribed Waste) Regulations 1998 for details of the matters to be taken into account by EPA in making a decision whether to provide an exemption.
• Require prescribed waste producers to provide annual returns (ie. reports) on the type and quantity of prescribed industrial waste disposed of on premises and transported from the premises. Producers must include the destination of the waste and state whether it is going for storage, treatment, disposal, reuse, recycling or for recovery of energy.

Annual reporting will generate comprehensive aggregate data from prescribed industrial waste producers, which will assist EPA in setting priorities for cleaner production programs. Information from annual returns will be important in assisting EPA to fulfil its obligations in the policy related to information collection, reporting and review.

Site specific controls

Storage, treatment, reprocessing or disposal facilities handling any prescribed industrial waste not generated at the premises are ‘Schedule 4 premises’ for the purposes of the Environment Protection Act 1970. All prescribed industrial waste must be consigned to a licensed Schedule 4 premises or to an approved reuser or recycler.

Schedule 4 premises are subject to works approval and licensing under sections 19A(3A) and 20(3A) of the Act, which assist in the proper location, design and operation of such premises and require that key aspects of their operations are monitored and reported to EPA. Works approval is required for a new development and for any significant change to plant and equipment or types of waste handled. The works approval process requires businesses to address potential environmental risks to EPA’s satisfaction before any construction begins, and are subject to a public process and appeal. Licences place operating conditions on these premises and are issued once works have been satisfactorily completed. Schedule 4 premises are also subject to the financial assurance provisions23 of the Act.

The Act also makes provision for environment improvement plans (EIPs) and accredited licensee programs. EIPs provide companies with an opportunity to improve their environmental performance through liaison with their local community. An EIP represents a public commitment to improved environmental performance. The accredited licensee program is designed to recognise and reward companies with a demonstrated commitment and capacity to improve their environmental performance. A company’s environmental management system is accredited resulting in a simplified EPA licence and a reduced licence fee.

Key points – Regulatory framework

• A range of statutory tools including, statutory policy, regulation, licences, works approvals and notices are currently used to ensure industrial wastes are managed to protect human health and the environment.

• The IWMP (Waste Minimisation) 1990 first established the waste hierarchy and environment improvement plans in statutory policy.

• The Environment Protection (Prescribed Waste) Regulations 1998 allow for reuse, recycling and recovery of energy and, together with licensing and works approval, provide controls to ensure human health and the environment is protected.

23 See discussion of financial assurances on the next page.
3.4 Other programs for the management of industrial waste

Economic measures

In line with the polluter pays and user pays principles, there are a number of economic measures in place through various statutory mechanisms, working with market forces to ensure that those who generate pollution and waste help to bear the cost of avoidance, containment, or abatement.

Licence fees established under the Environment Protection (Fees) Regulations 1991 are linked to the amount of waste discharged to the environment by a premises. Incentives for reducing waste is therefore established through corresponding reduction of licence fees.

Financial assurances are established for industrial waste treatment and disposal facilities to enable EPA to access funding in the event of a major clean-up operation being required. Where measures are in place to reduce the potential risk posed such as high level environment protection measures, then the value of the financial assurance required is reduced.

The Environment Protection (Amendment) Act 1999 introduces a new landfill levy for prescribed industrial waste, which has been set at a rate of $10 per tonne. The levy will provide a financial incentive to reduce, reuse, recycle or treat this waste. In addition, the funds raised through the levy will be used to meet Government commitments to reduce waste by:

- working with industry to identify opportunities to avoid prescribed industrial waste through cleaner production;
- encouraging industry to identify opportunities for reuse, recycling and recovery of energy; and
- encouraging industry to invest in new technologies for the treatment of prescribed industrial waste, including soil remediation.

The landfill levy for prescribed industrial waste will be rebated where such waste is recovered from a landfill for reuse or reprocessing within three years of disposal. The rebate system reinforces the principle that, where possible, prescribed industrial waste should be considered a resource to be put to productive use. This policy will maximise awareness of existing economic drivers to inform, motivate and enable responsible decision makers to adopt improved management of prescribed industrial waste.

Finance, accounting and business

One of the barriers to industry adopting cleaner production measures is a lack of awareness of the cost of waste generation and management. Traditional accounting mechanisms often only equate the cost of waste disposal as the cost associated with off-site treatment and disposal or trade waste costs. EPA is working with the accounting profession to develop systems for better measurement of the real costs of waste generation, including the loss of raw materials, energy, labour and maintenance costs during manufacture.

Financial institutions are giving increasing scrutiny to environmental risk when assessing the competitiveness of companies. A company’s environmental management, including its management of prescribed industrial waste, can affect the availability and cost of finance and insurance.
Consumer demand for products that have less impact on the environment enables market differentiation. Being recognised as a supplier of sustainable products and services is increasingly acknowledged as a market advantage.

**Cleaner production programs**

Cleaner production refers to an approach by which we produce goods and services with the minimum environmental impact under present technological, economic and social limits. Cleaner production involves management practices, process modifications and product design as well as new equipment and new materials.

The Cleaner Production Partnership Program (CPPP) is an EPA initiative aimed at promoting the adoption of cleaner production by Victorian industry. The objectives of CPPP are to assist industry realise the economic and environmental benefits of cleaner production through partnerships with EPA. CPPP provides catalyst funding and other assistance to particularly help small to medium and regional businesses achieve cost effective reductions in the waste they produce. EPA participates in, supports and publishes the results of cleaner production demonstration projects and case studies.\(^\text{24}\)

CPPP will receive additional funding from the hazardous waste landfill levy.\(^\text{25}\) An expanded range of programs in this area will facilitate the further development of new technologies for waste avoidance and the development of new technologies for the reuse, recycling, recovery of energy and treatment of prescribed industrial waste.

Other Government agencies also promote the adoption of cleaner production and energy efficient practices. Business Victoria operates a cleaner production program as part of its enterprise improvement services, which assist companies to become internationally competitive. The program helps businesses to investigate opportunities for cleaner production and to develop waste management plans. Energy Efficiency Victoria offers a range of services to Victorian businesses to reduce energy costs, operating expenses and the environmental effects associated with energy consumption. Services include membership of the energy Smart Business Program, the development of energy management plans, site visits, technical advice and a small business energy saving hotline. EcoRecycle Victoria focuses on reducing the municipal waste stream and provides assistance for market development of products using recycled materials, regional waste audits and a waste exchange service.

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**Key points – Other programs**

- *EPA has developed a range of programs designed to encourage the management of waste in accordance with the waste hierarchy, dating back to the late 1980s.*
- *Increasingly, information, education and partnerships are used to influence generation and management behaviour, for example, through the Cleaner Production Partnerships Program.*
- *EPA is working with the accounting profession to develop systems that better account for the cost of waste generation as well as management.*

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\(^{24}\) For examples refer to *Cleaner Production Case Studies* (EPA Publication 536).

\(^{25}\) See the next chapter, specifically sections 4.2 and 4.4 for more details on the levy.
4. WHY DO WE NEED AN IWMP FOR PRESCRIBED INDUSTRIAL WASTE?

4.1 What is the problem?

Limited landfill space is available for a broad range of prescribed industrial waste, and the development of new landfills to take this waste has proven to be difficult. In the public debate associated with the Werribee landfill proposal, and from comments received on the draft policy, the community made clear its preference that the generation of prescribed industrial waste should be avoided so that landfill disposal is minimised and in the long term made obsolete. Industry has also generally accepted that it is more cost effective to avoid the generation of waste as opposed to paying for its generation, treatment and disposal. There are widespread concerns about the potential for pollution from landfills accepting prescribed industrial waste and a desire to see future facilities operate to world’s best practice.

Despite these concerns, the production of everyday goods and services continues to generate prescribed industrial waste, which currently requires disposal in a landfill. Substantial change is therefore required.

Since 1995 the generation of liquid prescribed industrial waste has decreased while the generation of solid prescribed industrial waste, with the exception of contaminated soils, has no significant upwards or downwards trends. The diversion of prescribed industrial waste to reuse, recycling, recovery of energy and treatment options is increasing. However, a significant reduction in the generation of solid prescribed industrial waste is required if the aim of eliminating disposal of waste to landfill is to be reached.

In response to market influences, the waste management industry is restructuring, and in some sectors, undergoing rationalisation. Investment will be required as companies seek to take advantage of new opportunities for treatment, reuse, recycling and recovery of energy from waste. Clear direction is needed to ensure that these changes are consistent with community expectations.

To date investment in new facilities has been limited by:
- the perceived lack of commitment by Government to implement statutory measures to reduce the amount of prescribed wastes disposed to landfill;
- community concerns about new facilities;
- high levels of competition and low profit margins in some market sectors making some operators reluctant to invest in the necessary infrastructure;
- the likelihood that waste quantities will decline in the future, shortening the planning horizon for many investment decisions; and
- the relatively high cost of alternatives to landfill.

4.2 The Government

The Government has strong commitment to implementing strategies to encourage reuse, recycling and recovery and minimise disposal of wastes to landfill. The long term aim is to make prescribed industrial waste landfills obsolete.
The introduction of an industrial waste management policy for prescribed industrial wastes sets legislative measures to underpin this strategy. The policy provides a statutory mechanism for diverting wastes away from landfill for legitimate forms of resource recovery.

4.3 What is required to address the problem?

In responding to the issues set out above, it is clear that a range of measures have already provided some direction towards the management of waste. However, there is a specific need for a statutory instrument to:

- Address the community’s expectations on minimising the generation of prescribed industrial waste and ensuring the safe management of any remaining waste to protect human health and environment.²⁶
- Ensure the safety of options for the storage or containment of prescribed industrial waste.
- Integrate existing tools and provide a clear framework surrounding the requirements and expectations in managing prescribed industrial waste, including the requirements for treatment, storage and containment.
- Provide certainty to industry to encourage investment in facilities and technology necessary to:
  - facilitate reuse, recycling, energy recovery and treatment, and
  - enable a move to a more sustainable approach to managing prescribed industrial waste and avoid disruption to the manufacturing industry that may result from an inability to find suitable management options for its waste.
- Establish measures to ensure the disposal of prescribed industrial waste to landfill is eliminated.

Industrial waste management policies are an integral part of environment protection in Victoria and are used to establish consistent goals and directions for managing industrial waste. These policies are developed through an extensive public process, including an analysis of social, environmental and financial considerations. There are many opportunities for interested stakeholders to influence the policy framework that is adopted by Government. The public process is very powerful in that it is able to engender ownership and commitment by stakeholders to the policy directions agreed during the process.

This policy has been designed to specifically meet these requirements and stakeholders (including industry and community) have had an opportunity to contribute to its development through the consultation programs, and more broadly, through the work of the Hazardous Waste Consultative Committee. As described in the Summary of Comment and EPA Response document, there is broad support for the objectives and direction of this policy from both industry and community representatives.

²⁶ See the previous discussion under section 4.1 of this chapter.
4.4 What are the alternatives to developing an industrial waste management policy?

A range of alternatives to meet these aims have been considered and evaluated.

The key policy options identified and considered included:

- do nothing and rely on the existing framework; or
- implement a more extensive enforcement program based on the *IWMP (Waste Minimisation)* 1990.

The advantages and disadvantages of each option are discussed below.

**Alternative 1: Do nothing and rely on the existing regulatory framework**

This option would retain the existing arrangements for regulating the management of prescribed industrial waste including disposal to landfill.\(^{27}\)

The effect of the ‘do nothing’ option is that the existing mechanisms (such as the hazardous waste landfill levy) would continue to provide the whole system for guiding the development of prescribed industrial waste management in Victoria. The hazardous waste levy began on 1 July 1999 and is currently set at $10 per tonne of prescribed industrial waste disposed to landfill.

The levy provides a financial incentive for the development of innovative ways to avoid, reuse, recycle or treat prescribed industrial waste. In addition, the funds raised from the levy augment resources invested into EPA cleaner production programs.\(^{28}\)

Community interest in hazardous waste management issues is strong. The ongoing viability of the manufacturing sector in Victoria may be threatened if alternative means of dealing with industrial wastes are not developed. The ‘problem’ set out above would therefore not be adequately addressed by reliance on existing mechanisms.

Based on trends in prescribed industrial waste generation,\(^{29}\) significant reductions in waste generation and the elimination of landfill will not be achieved unless a coordinated set of measures is introduced to further encourage, or require, management of prescribed industrial waste in accordance with the principles of the waste hierarchy. While the levy is designed to send a strong signal to industry to consider alternatives to landfill disposal, of its accord, it is unlikely to bring about a significant reduction in the generation of prescribed industrial waste.

This option would not address the requirement to integrate the existing tools to provide a clear and consistent framework for the management of prescribed industrial waste, and would not provide the certainty sought by industry to encourage the necessary investment.

The existing regulatory system has been successful in the past making Victoria a leader in the adoption of progressive waste avoidance and waste management approaches. However, failing to take the opportunity to build upon this existing system would see Victoria starting to fall behind other jurisdictions and countries.

\(^{27}\) The existing regulatory framework is discussed in chapter 3 of this PIA.

\(^{28}\) See chapter 3, specifically section 3.4 for more information about where the levy funds are going.

\(^{29}\) See chapter 2, specifically section 2.5 for more information on prescribed industrial waste generation trends.
Alternative 2: Initiate a more extensive enforcement program based on the *IWMP (Waste Minimisation)* 1990

The *Industrial Waste Management Policy (Waste Minimisation)* 1990 is a key component of the existing framework for environment protection in Victoria, and is particularly important in minimising the generation of hazardous waste and promoting the reuse, recycling or recovery of energy in preference to disposal.\(^{30}\)

A more extensive program of implementation and enforcement by EPA has the potential to further improve Victoria’s progress in reducing the amount of prescribed industrial waste generated and disposed to landfill.

However, the *IWMP (Waste Minimisation)* 1990 sets a generic framework for industrial waste management. As such it does not specifically target prescribed industrial waste. Use of statutory tools, including waste management plans established under the *IWMP (Waste Minimisation)* 1990, together with current cleaner production programs, such as demonstration projects, case studies and partnerships, would continue to minimise waste. However, these programs rely largely on cooperative approaches and therefore can only provide part of the solution. Further clarity in the statutory requirements for managing prescribed industrial waste, such as that provided by the policy, is required.

Sole reliance on the *IWMP (Waste Minimisation)* 1990 will therefore result in a missed opportunity to develop a statutory policy to provide Government, industry and the community with a clear, integrated framework for managing prescribed industrial waste, and an increased sense of certainty and direction.

### 4.5 Hazardous Waste Consultative Committee

The Hazardous Waste Consultative Committee (HWCC) was formed in 1999 to provide advice to the Government on issues relating to waste management in Victoria. The Committee was reconvened in February 2000. Its terms of reference are to provide advice on:

- the development of a statutory industrial waste management policy which will facilitate resource recovery by setting clear requirements for the treatment and management of hazardous waste as well as clear criteria for storage and disposal to safeguard the environment;
- the review of current and future waste generation trends;
- world’s best practice in all aspects of design and operation of repository/landfill facilities to ensure protection of the environment; and
- options for disposal and management of industrial wastes and appropriate sites.

The Committee received 137 submissions from industry, community, non-Government organisations, academia, local government and other Government agencies in response to its discussion paper on hazardous waste management in Victoria. As part of the review of the draft policy, EPA took these comments into consideration along with submissions sent directly to EPA. A summary of these comments can be found in the Summary and Response to Comments document.

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\(^{30}\) See chapter 3, specifically section 3.3 for more information on the *IWMP (Waste Minimisation)* 1990.
The HWCC has provided a report to Government with recommendations as to the future management of hazardous waste. This report recognises that a statutory policy on prescribed industrial waste is crucial to successfully delivering the Government’s commitments towards hazardous waste.

The Committee also provided a response to EPA on the draft policy. The response highlighted the Committee’s overall support of the principles of the policy, in particular, the emphasis on promoting avoidance and legitimate diversion of waste. The response also identified that the policy is consistent with the Government’s objective of making hazardous waste landfills obsolete.

The HWCC made a number of recommendations on the draft policy including a recommendation that the policy move away from focusing on disposal and emphasise the concept of short term storage and long term containment of wastes and product stewardship. These recommendations have been incorporated into the policy.

### Key points – Why develop an IWMP for prescribed industrial waste?

- *The production of everyday goods and services continues to generate prescribed industrial waste.*

- *Limitations in the existing landfill space available for the disposal of prescribed industrial waste, difficulties in establishing new facilities and expectations that prescribed industrial waste be minimised, managed in a safe manner and that storage and containment be only considered as a last resort, have highlighted the need for changes in the way prescribed industrial waste is managed.*

- *Recognising the need for changes in the management of prescribed industrial waste, the Government has made it clear that no hazardous waste should be disposed to landfill.*

- *An IWMP for prescribed industrial waste is necessary to bring about improved management of prescribed industrial waste, integrate the existing tools and provide a clear framework for managing prescribed industrial waste. An IWMP will also deliver certainty to industry to encourage investment and achieve a significant reduction in the generation and disposal of prescribed industrial waste.*

- *The existing regulatory framework does not provide a sufficient level of assurance that the policy objectives will be achieved. However, existing tools including works approval, licences, notices and waste management plans will be used to complement and give effect to elements of this policy.*
5. OVERVIEW OF POLICY FRAMEWORK

The direction and intent of this policy is to protect human health and the environment from hazards that may be posed by prescribed industrial waste, to minimise the generation of prescribed industrial waste and to eliminate as soon as practicable the disposal of prescribed industrial waste to landfill. The policy will give rise to a range of benefits and costs, primarily by setting a clear direction for, and by encouraging change in, the management of prescribed industrial waste.

5.1 Direction and intent of the policy

The policy has been designed to specifically address the issues set out in the previous chapter, by providing a clear framework for protecting human health and the environment from hazards that may be posed by prescribed industrial waste, minimising the generation of prescribed industrial waste and eliminating waste disposal to landfill.

These policy goals lie in the context of achieving sustainable social and economic development in Victoria.

While waste avoidance and reuse provide direct benefits to the environment, they also make good business sense. A key direction within the policy is to assist businesses to realise the economic benefits of waste avoidance, reuse, recycling and recovery of energy from wastes.

The direction and intent of the policy is set out in the clauses below. Further explanation is provided where necessary.

Preamble

In line with community expectations, this industrial waste management policy seeks to protect people and the environment from the risks posed by prescribed industrial waste. This is achieved by specifically providing a framework and tools to implement the waste management hierarchy for prescribed industrial waste, consistent with ecologically sustainable development.

This policy seeks to facilitate waste reduction and diversion of wastes from landfill for productive purposes and will ensure safe containment of remaining wastes.

The preamble has been moved to the front of the policy and altered to reflect changes made in the policy, resulting from comments received by the public and HWCC.

Objectives

Clause 5: The objectives of this policy are to:

(a) protect human health, amenity and the environment from hazards that may be posed by prescribed industrial waste;

(b) minimise the generation of prescribed industrial waste through all aspects of design, raw material selection, production and use of goods and services; and

(c) eliminate as soon as practicable the disposal of prescribed industrial waste to landfill.
This policy seeks to achieve the objectives by encouraging, facilitating and, in some cases, requiring those who produce and manage prescribed industrial waste to undertake certain actions. The 50% reduction in prescribed industrial waste to landfill has been replaced with sub-clause 5(b), which focuses on minimising the generation of waste. It is expected that a reduction in the level of waste generated will result in a reduction in the amount of waste requiring management (including containment or disposal). Sub-clause 5(c) states the long term aim of the policy to eliminate the disposal of prescribed industrial waste to landfill.

Principles

Clause 6: This policy applies the following principles which reflect community expectations about how prescribed industrial waste should be managed. These principles must be used to guide decisions about managing these wastes.

1. **Waste management hierarchy**: prescribed industrial waste should be managed in the following order of preference:
   - (a) avoidance
   - (b) reuse
   - (c) recycling
   - (d) recovery of energy
   - (e) repository storage
   - (f) treatment
   - (g) containment.

   The waste management hierarchy is well-established both internationally and in Victoria. It was integral to the original 1986 Industrial Waste Strategy and was reinforced through the IWMP (Waste Minimisation) 1990. When applying the waste management hierarchy to prescribed industrial waste management, the concept of reuse, recycling and energy recovery may include any necessary pre-treatment, including pre-treatment necessary to protect human health and the environment. The concept of ‘waste treatment’ in the hierarchy refers to treatment to destroy a prescribed industrial waste or render it safe for containment. Disposal has been omitted from the waste hierarchy however, it is expected in the short to medium term that disposal to landfill will continue for some wastes awaiting the development of management alternatives.

2. **Eco-efficiency**: Individuals and businesses should produce competitively priced goods and services that satisfy human needs and bring quality of life, while progressively reducing ecological impacts and resource intensity throughout their life cycle to a level at least in line with the Earth’s carrying capacity.

3. **Product stewardship**: producers and users of goods and services have a shared responsibility to manage the environmental impacts of goods and services throughout their life cycle, including the ultimate treatment and containment of any wastes.

This principle acknowledges that unless all participants play their role and fulfil their responsibilities the environmental results will be less than optimal.

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31 Refer to appendix 2 for further information about the application of the waste hierarchy to the largely historical issues of contaminated soils.
(4) **Integration of Economic and Environmental Considerations:**

(a) Sound environmental practices and procedures should be adopted as a basis for ecologically sustainable development, which will benefit both the Australian people and environment, and the international community and environment. This requires the effective integration of economic and environmental considerations in Government decision-making processes at all levels, in order to improve community well-being and to benefit future generations.

(b) Measures adopted should be cost-effective, and not be disproportionate to the significance of the environmental problems being addressed.

(5) **Precautionary principle:** where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

In the application of the precautionary principle, public and private decisions should be guided by: careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment and; an assessment of the risk-weighted consequences of various options.

(6) **Intergenerational equity:** the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

(7) **Conservation of biological diversity and ecological integrity:** conservation of biological diversity and ecological integrity should be a fundamental consideration.

(8) **Valuation, Pricing and Incentive Mechanisms**

(a) environmental factors should be included in the valuation of assets and services.

(b) those who generate pollution or waste should bear the cost of containment, avoidance or abatement.

(c) the users of goods and services should pay prices based on the full lifecycle costs of providing those goods and services, including the use of natural resources and assets and the ultimate treatment and containment of any wastes.

(d) environment goals, having been established, should be pursued in the most cost-effective way by establishing incentive structures, including market mechanisms, which enable those best placed to maximise the benefits and/or minimise costs to develop their own solutions and responses to environmental problems.

Integration of economic and environmental considerations, the precautionary principle, intergenerational equity, and valuation, pricing and incentive mechanisms have been accepted by all Australian Governments through the Intergovernmental Agreement on the Environment (IGAE). These principles are framed in terms of environment protection but apply equally to the protection of human health and amenity.

(9) **Enforcement:** Enforcement of environmental requirements should be actively undertaken to:

(a) better protect the environment and its associated environmental, economic and social beneficial uses;

(b) ensure no commercial advantage is obtained by failing to comply with the requirements; and
(c) influence the attitude and behaviour of those whose actions may have adverse environmental impacts, and those who develop, invest in, purchase or use goods and services which may have adverse impacts.

(10) Accountability

(a) Community aspirations for environmental quality should drive environmental improvement. The community should therefore have a good understanding of environmental issues, share responsibility for policy and program development, and be willing to act to improve environmental quality.

(b) Reliable and comprehensible information is the basis of the community’s understanding, aspirations and ability to make constructive inputs and informed decisions.

(c) Government should therefore:

(i) provide ready public access to useful information and advice on environmental quality, risks and improvement options;

(ii) ensure that policy development is open and transparent, and effectively involves all stakeholders;

(iii) invite public comment and feedback on its priorities, strategies and programs; and

(iv) ensure that its decisions and actions are accountable to the community and open to public review.

Enforcement and accountability have been added to the policy principles based on feedback from consultation on the draft policy. Industry and community commented on the need for fair and consistent enforcement of the policy, and for open and transparent processes in policy development and implementation.
Use of the waste management hierarchy restricts placement of wastes in containment facilities for which there is no other environmentally acceptable and practicable option. This minimises the liability posed by containment facilities on future generations.

The policy seeks to harness commercial market forces to bring about improved management of prescribed industrial waste, thus reflecting the principles of cost-effectiveness and improved valuation, pricing and incentive mechanisms. The market is underpinned by statutory requirements to ensure that waste is managed in such a manner that human health and the environment are protected.

**Policy intent**

The policy intent is a plain English statement making clear the direction and expectations for managing prescribed industrial waste.

Clause 7:

*The intent of the policy is that:*

(a) Human health and the environment are protected through the avoidance, reuse and recycling of and recovery of energy from prescribed industrial waste.

(b) The generation of prescribed industrial waste is avoided or minimised through product design, process design, selection of raw materials, process management, and use of goods and services consistent with the social and economic development of the State of Victoria.

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**Case study: Product stewardship and waste management in the plastics and chemicals industry**

Membership of the Plastics and Chemicals Industry Association (PACIA) is conditional on adherence to ‘Responsible Care’, which was established in Australia in 1989. Eight Codes of Practice have been developed, including: community right to know; research and development; manufacturing; emergency response and community awareness; waste management; warehousing and storage; and transportation and product stewardship. Implementation and compliance auditing with the codes of practice through the industry is progressing.

Product stewardship is designed to reduce product risks by ensuring that health, safety and environmental issues arising at any stage of the product life cycle are handled in socially and environmentally acceptable ways. This requires recognition of the responsibility shared by industry and consumers for wastes generated throughout the product life cycle.

*Product stewardship in action*

When Orica’s Stelco business conducted a life cycle assessment of Perclean, a solvent it supplies to the dry cleaning industry, it identified some areas where greater responsibility could be shown by the company during the product’s life.

Of greatest concern was the disposal of residues from the dry cleaning process, waste which contains up to 20% Perclean. The standard practice among Stelco’s customers was to collect this waste in heavy-duty garbage bags for council collection and disposal to landfill, a practice leading to a potential environmental hazard as the organic solvent evaporated.

In conjunction with the Dry Cleaners Association, the company developed a risk management plan for the product that included collecting the waste in approved containers, having licensed contractors transport it to solvent reclamation specialists, recycling the reclaimed solvent and disposing of the inert residues.

This action greatly reduced the potential environmental damage associated with the product.

This example illustrates how product stewardship can resolve potential threats to the sustainable use of a product.
(c) Social and economic development of the State of Victoria is facilitated by avoidance, reuse and recycling of and recovery of energy from prescribed industrial waste, or where this is not practicable, the safe treatment and/or containment of prescribed industrial waste.

(d) Those who commission and/or produce goods and services which give rise to prescribed industrial waste have the primary responsibility to:

(i) avoid the generation of that waste, and
(ii) maximise the reuse and recycling of, and recovery of energy from that waste for productive purposes

Where this is not practicable the generator of prescribed industrial waste has the primary responsibility to ensure that the waste is treated and/or contained in a manner that protects people and the environment.

(e) Prescribed industrial waste generators retain responsibility for their waste throughout its life cycle.

(f) Meaningful and relevant information on all aspects of the generation, reuse, recycling, recovery of energy, treatment and containment of prescribed industrial waste is made available to the community, government and industry in a useable manner.

(g) The efficiency of resource use through the life cycle of products and services is maximised through all aspects of the design, production, sale and use of products and services and through the management of any resulting prescribed industrial waste.

(h) Prescribed industrial waste is managed to retain and realise its full economic value and to recognise the social, environmental and economic costs of poor management.

(i) Prescribed industrial waste is treated, handled and stored so as to maximise practicable recovery options in accordance with this policy.

(j) Prescribed industrial waste that is assessed as having no practicable reuse, recycling or recovery options available with the foreseeable future is made safe prior to long term containment. Containment systems at any facility receiving prescribed industrial waste for long term containment are to provide a significant margin of safety to protect human health and the environment.

(k) Facilities receiving prescribed industrial waste are designed, operated and maintained to provide a high level of protection of people and the environment, and protection of the beneficial uses of the environment.

(l) Design, operation and maintenance of facilities receiving prescribed industrial waste will have regard to:

(i) the nature and severity of the hazard posed by the waste; and
(ii) the environmental benefit achieved by reuse, recycling and energy recovery options, through increased efficiency of resource use.

Additional sub-clauses have been added based on comments received on the draft policy and further reflect the views of the Authority.
Key points

- The ‘Objectives’, ‘Principles’ and ‘Policy Intent’ clauses establish the key aims of this policy.
- Key objectives are to ensure human health, amenity and the environment are protected from hazards that may be posed by prescribed industrial waste, to minimise the generation of prescribed industrial waste, and to eliminate as soon as practicable disposal of prescribed industrial waste to landfill.
- The principles underlying this policy are derived from nationally and internationally accepted principles of environment protection.

5.2 Impacts of the policy direction and intent

Many of the varied benefits and costs associated with implementation of the policy flow from its general direction and intent rather than any specific clause. These broad benefits and costs are considered in this section.

Aligning prescribed industrial waste management decisions with the waste management hierarchy, achieving a significant reduction in the volume of waste generated and shifting focus towards containment rather than disposal will require substantial changes to waste generation and waste management. These changes need not represent a major burden on Victorian industry because they will lead to economic benefits from waste avoidance. Industry will also benefit from greater certainty, and new investment within the waste management industry is likely to enhance waste reuse and recycling opportunities.

The policy sees sound management of prescribed industrial waste as a key element of sustainable social and economic development. The benefits to business of sound and sustainable environmental management are increasingly recognised:

‘It’s not a choice between profitability or sustainability: the two go hand in hand’

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Case study: Waste avoidance and reuse at ConAgra Wool Pty Ltd

ConAgra Wool Pty Ltd supplies scoured and carbonised wool to the global market.

The scouring process involves washing the wool in a number of open tanks containing various cleaning solutions. This generates 400 tonnes of sludge and 750 tonnes of solid waste per annum, involving disposal costs of over $260,000.

The company has combined solid wastes from the scouring process with solids from the grease plant to produce a material suitable for compost or compost additive. It is investigating the commercial opportunities this provides.

ConAgra has also boosted the recovery of grease from the wool to 35–40% by improving monitoring practices and tightening centrifuge maintenance. This has reduced the amount of suspended solids in the final effluent discharge, and correspondingly decreased trade waste charges.

The annual savings at ConAgra’s Laverton plant are about $110,000.

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32 Charles Millar-Smith, Chief Executive ICI, 1998.
(There is) ‘... sufficient evidence to conclude that share-value output correlates positively with better environmental management and performance’

Protecting the environment

Implementation of the policy will yield benefits to the community from improved environmental quality, both now and in the future, by:

- reducing use of resources and generation of waste;
- reducing the hazard posed by wastes requiring containment; and
- ensuring safe containment of wastes that cannot be avoided, reused or treated.

Prescribed industrial waste minimisation should also reduce the burden on future generations of cleaning up and managing wastes and contaminated sites (a burden which has been significant in recent years due to the poor practices of the past). In particular, landfills and former landfills often require ongoing management to ensure they do not adversely affect local environmental quality. Improving the standard of existing landfills and waste management is reducing this ongoing liability, as will the diversion of wastes to reuse options and containment.

Case study: Waste avoidance at Carstrip Pty Ltd

Carstrip specialises in stripping paint from cars, trucks, buses and aluminium-hulled boats.

The company had been soaking car bodies in chemical strippers to car bodies then removing the strippers by scraping and water washing. This required about 10 litres of stripper per car, generating large amounts of hazardous waste which required specialist disposal. It also adversely affected the respray quality as the stripper was working its way into the car body. The company found that stripping in acid baths produced similar problems.

To eliminate the generation of hazardous sludge, reduce labour time and introduce a safe and clean working environment, Carstrip introduced a new stripping process employing finely ground plastic to remove the paint coating via a mild abrasive action.

The plastic used is a thermoplastic acrylic resin made from plastic scrap. The irregular shape of the plastic particles provides a sharp cutting edge which cuts and lifts the paint without damaging the surface underneath. After the stripping process, the plastic grit generated is collected for reuse.

The company has avoided the use of caustic chemicals and organic strippers and has reduced its waste, avoiding all gaseous or liquid wastes. The paint dust residue produced by the new process is suitable for non-specialist disposal within the normal industrial waste stream.

The new operating method has yielded economic, environmental and health benefits. A hazardous process generating large amounts of waste has been replaced with one that is clean and efficient. Savings have been realised from the elimination of chemicals and waste and reduced labour requirements. The capital investment of $140,000 will be recouped in about 2–3 years.

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Eco-efficiency

The concept of eco-efficiency derives from extensive empirical evidence demonstrating that waste avoidance generally brings direct financial benefits. To be eco-efficient means to maximise the economic value obtained from raw material, energy and other inputs to products, processes and services by avoiding waste. The economic benefits flow from lower input costs from raw materials, energy, labour and maintenance in making a product, and reduced waste storage, treatment, transport and containment costs.

The policy is aligned with the concept of eco-efficiency, seeking both to avoid wastes and to reuse, recycle and recover energy from residual wastes to further capture economic value and enhance the efficiency of resource use.

The World Business Council for Sustainable Development is a coalition of 120 international companies and associated organisations such as the Business Council of Australia. In its recent publication, *Signals for Change, Business Progress Towards Sustainable Development*, the Council states that 'programs to cut waste to a minimum showed that environmental performance could be improved at little or no cost, and often at a profit'. It states that 'cutting cost and making efficient use of raw materials has always made good business sense. The increasing cost of waste disposal...has underlined the financial benefits of waste reduction and therefore improved value to shareholders.' Reuse, recycling or recovery of energy from waste products similarly helps to maximise the economic benefit from resources. However, experience shows that such opportunities are often not straightforward in relation to prescribed industrial waste. Businesses need to be proactive in investigating opportunities within their own facility and with potential external clients.

Sustainable waste management

The greatest risk to a socially and economically sustainable prescribed industrial waste management industry would be a failure in the capacity to provide safe management of current waste streams. This would lead to severe disruption in some industries and would significantly impact on the State economy. It would also probably lead to increased illegal dumping with consequent impacts on human health and the environment. The viability of some treatment facilities is currently threatened by reduced waste streams.

Adoption of the policy will encourage the investment needed to guarantee a sustainable prescribed industrial waste management industry.

Costs for disposing of prescribed industrial waste are likely to increase due to the shortage of landfill space, making alternatives to landfill more attractive. Indeed, price increases have already started to occur. However, these have so far been insufficient to lead to significant investment in alternatives. In addition, because the establishment time for alternatives to landfill can be lengthy, even a market responding to the increasing cost of landfilling may still

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34 A number of case studies of successful waste avoidance through cleaner production can be found in EPA Publication 563, *Cleaner Production Case Studies*.

35 *Signals of Change, Business Progress Towards Sustainable Development, World Business Council for Sustainable Development* – World Business Council for Sustainable Development members are drawn from 35 countries and 20 major industrial sectors, including major Australian companies and international companies operating in Australia.

36 See discussion under sections 4.1, 4.3 and 5.1 for more information.
not provide a disruption-free transition to alternative waste management technologies. In most industries, where waste is a relatively minor part of overall business costs, alternatives may not be considered until there is an immediate risk that no facility is available to accept a waste stream. The market response to the banning of liquid waste disposal to landfill in the late 1980s provides an illustration.37

Simply constructing further disposal facilities, the historical practice, would not be in line with or deliver the many benefits from the waste management hierarchy, including industry eco-efficiency and community desire for waste reduction. An integrated approach to prescribed industrial waste management, involving avoidance, reuse and safe containment is necessary to ensure sustainable waste management in Victoria.

The waste management industry is going through a period of substantial structural change and rationalisation. Certainty in the regulatory framework and policy direction for managing prescribed industrial waste is needed to enable operators to respond appropriately in restructuring their activities and investing in new facilities for reuse, recycling, energy recovery or treatment of wastes currently disposed to landfill.

Adoption of this policy will provide managers of prescribed industrial waste with the regulatory certainty they need to move towards an integrated, sustainable industry in line with community expectations.

Other commercial benefits to industry

- **Market access:** Best practice management of prescribed industrial wastes is important in gaining and maintaining access to some important export markets. Good environmental performance is increasingly a key performance objective for exporters.

- **Costs of insurance and finance:** Sound waste management can substantially reduce the risk of spills and other problems leading to financial liability. There is increasing scope for this to be reflected in insurance and finance markets, both in improved access and cheaper premiums.

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37 See the case study in chapter 6 for more information on the ban of liquid waste disposal at landfill.
Share value: Environmental performance is increasingly used as a factor in selecting investment opportunities. Low environmental liabilities often indicate a well-managed company. Investor interest can support companies who are improving their environmental performance and reduce their cost of capital.

Consumer expectations: Consumers are demanding improved environmental performance. Companies able to respond can gain competitive advantage and customer loyalty.

Reputation and downstream impacts of products: Adopting a product stewardship approach protects public reputation and reduces the chance of unforeseen environmental liabilities.

‘Licence to operate’: Sound environmental management, particularly in relation to prescribed industrial waste, helps to establish and maintain a level of public confidence which allows an industry to operate in the community. In essence it provides a ‘licence to operate’. If public confidence is diminished, an industry may face public opposition, Government intervention and increased costs for future approvals, etc.

Some companies have already begun to reap the benefits of providing better environmental performance by winning market share from traditional brands. These companies have recognised that their consumers, suppliers, and shareholders expect environmental quality and economic progress to go ‘hand in hand’.

‘We are reaping both the environmental and economic benefits of cleaner production at all our plants.’

Henry Beresford, General Manager, Operations Bonlac Foods Limited.

‘It is important that we recognise the value of adopting environmental initiatives and appreciate that good environmental practices are key to business success and competitiveness.’

David Morgan, President, Ford Australia

Direct costs to industry

While in many cases the policy will save money through eco-efficiency gains, in some other cases costs will increase. However, these cost increases are expected to be marginal in the context of steeply rising costs for landfill disposal of prescribed industrial waste, which are occurring due to market factors. At the expected landfill price level of $100/tonne and anticipated higher costs for containment facilities, a number of treatment alternatives become more competitive and may be considered practicable.

Costs to business are tempered by the proviso that alternatives must be used only when they are practicable.38

38 Practicability is discussed in more detail in section 6.1 of this PIA.
### Key points

The policy framework, and in particular the requirement to manage prescribed industrial waste in accordance with the waste hierarchy, provides the basis for:

- Protecting the environment by reducing prescribed industrial waste disposed to landfill, and changing emphasis towards containment of wastes.
- Maximising the eco-efficiency of products and processes, thus protecting the environment and saving money for businesses.
- Encouraging the further development of a sustainable waste management industry able to support continued economic development in Victoria.
- Encouraging businesses to realise a range of other commercial benefits from improved management of prescribed industrial wastes including improved access to markets, reduced costs for insurance and finance, improved share value, consistency with consumer expectations and the consequent marketing advantage, enhanced public reputation and maintenance of a ‘licence to operate’.

In many cases, adopting a management option preferred in accordance with the waste management hierarchy will save money. Where this is not the case, the increased cost is limited by the notion of ‘practicability’. Increasing landfill prices are also making alternatives to landfilling more attractive.
6. OUTLINE OF POLICY ATTAINMENT PROVISIONS

Overview

The purpose of this chapter is to explain each of the components of the Attainment Program of the IWMP (Prescribed Industrial Waste) and describe their likely impacts. Most costs and benefits arise from the principle requirement to manage prescribed industrial wastes in accordance with the waste hierarchy, as reflected in Clauses 5 to 7 of the policy framework and discussed in the previous chapter.

6.1 Attainment measures

Clause 8:

(1) The Authority will adopt a strategic approach to the attainment of the policy objectives, designed to inform, motivate, enable and require responsible decision makers to adopt improved management of prescribed industrial waste by:

(a) developing partnerships between industry and the Authority and between industry groups and the community to inform and develop a capacity for change;

(b) fostering the application of the product stewardship principle by business, in particular to provide information, assistance and facilities to achieve life cycle management (including its generation) of a waste;

(c) seeking to use consumer preference and behaviour to influence the waste avoidance and management practices of providers of products and services;

(d) maximising awareness of and encouraging decision makers to respond to economic drivers which promote avoidance and sound management of prescribed industrial waste;

(e) auditing and public reporting of avoidance, reuse, recycling, energy recovery and treatment; and

(f) using enforcement and related measures including financial assurance to prevent and rectify environmental damage.

Clause 8 commits EPA to a strategic approach for attaining the policy framework. The approach is designed to inform, motivate and enable responsible decision makers to improve their prescribed industrial waste management.

Sub-clauses (e) and (f) are the attainment measures to be used to achieve the two new principles included in the policy about enforcement, auditing and public reporting.

This policy recognises that the most effective way to bring about sustainable changes in prescribed waste management is not to establish new regulatory hurdles, but to use those factors that directly influence business decision making.

In 1996, the Australian Centre for Cleaner Production (ACCP) conducted a survey on the uptake of cleaner production initiatives in industry. The survey showed that in the context of

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daily business pressures, as long as waste disposal was affordable, there was little impetus to change waste generation practices. The ACCP found that in order to bring about such change, businesses needed to be informed and motivated and needed to possess the financial and technical capacity.

This policy approach attempts to meet the key drivers for change identified by ACCP by:

1. Assisting businesses to recognise the opportunities to save money and improve competitiveness through implementation of avoidance and reuse activities, by accounting for the full cost of waste.

2. Seeking to influence the waste management practices of product and service providers through customer preference. Customer preference is an important driver for business decision making. Providing public information will help people to buy and invest in line with their preference for waste to be minimised, creating opportunities for businesses best able to respond.

This approach applies to intermediate customer/supplier relationships as well as end point customers. Increasingly, businesses that have adopted sound environmental management practices are requiring similar practices of their suppliers.

3. Making the adoption of waste avoidance and improved waste management easier by encouraging partnerships that build the capacity for change. For example, through the exchange of technical information.

The approach outlined in this clause commits EPA to work with industry and is designed to maximise improvement in the management of prescribed industrial waste. It tries to minimise the burden on industry and Government by utilising existing economic signals and statutory tools.

(2) **The Authority will employ a coordinated range of measures to achieve the policy objectives and intent including:**

(a) the provision of information;
(b) educating and informing industry, employees and consumers;
(c) incentives for change;
(d) economic measures (including financial assurance);
EPA will adopt a coordinated range of measures including using economic signals (eg. cost of waste generation and management) that are likely to lead to behavioural change. However, EPA will seek to ensure other drivers in business decision making, such as the capacity to change and public opinion, are also addressed. Many of the proposed measures focus on influence, capacity building and providing information which will play a key role in generating increased awareness of the benefits of adopting cleaner production and resource recovery approaches.

Key financial factors that may influence the management of prescribed industrial waste include:

(1) **Savings associated with waste avoidance.**

EPA will seek to encourage recognition of cost savings by:

- the provision of information, demonstration programs and partnerships to build the capacity of generators to change;
- seeking to influence accounting practices to include the full cost of waste generation and management; and
- encouraging investment in and providing incentives for the adoption of new waste avoidance technology.

(2) **Savings associated with reuse, recycling and recovery of energy.**

EPA will seek to encourage the adoption of reuse, recycling and recovery of energy options and recognition of the subsequent economic benefits resulting from the maximum use of resources by:

- the provision of information;
- streamlined approvals processes; and
- encouraging investment in and incentives for the establishment of new facilities to enable reuse, recycling and recovery of energy.

EPA will also work with education and research bodies to encourage further development of and communication about best practice approaches to waste avoidance and reuse.

Where necessary, these actions will be supported by the use of statutory tools to require prescribed industrial waste generators to manage wastes in accordance with the waste hierarchy. Available tools include licences, works approvals, notices, waste management plans, annual returns and environmental audits. In particular, EPA will use these tools to

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40 Public opinion relates to community expectations as to how prescribed industrial waste is managed but also includes customer and shareholder response.

41 Refer to section 3.4 for more information on cleaner production programs funded by the new levy.

42 Refer to section 3.3 of the PIA for further information about the range of statutory tools provided under the *Environment Protection Act* 1970.
ensure particular wastes are managed in accordance with the decision framework given in Schedule 2 of the policy.

These tools may be used to ban the depositing of some wastes to containment facilities and/or landfills where practicable alternatives exist, which are preferred. Exemptions from this requirement will be considered where a generator is able to demonstrate that the alternatives to containment and/or landfill are not practicable or do not result in the best environmental outcome.

(3) The Authority will apply the policy intent and principles to achieve the best environmental outcome in making decisions about the minimisation and management of prescribed industrial waste.

This sub-clause has been drawn from sub-clause 9(1) – Responsibilities for Management of Prescribed Industrial Waste – in the draft policy. Comments received on the draft policy stated that technical and economical factors feature strongly in the policy, while environmental and social factors do not. In response to this, sub-clause 10(1) has been changed into an attainment measure to explicitly state that the Authority shall ensure the best environmental outcome when making decisions about prescribed industrial waste.

**Practicability**

(4) The Authority will have regard to factors including environmental hazard, technical, logistical and financial considerations in making decisions about the

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**Case study: Banning liquid waste disposal at landfill**

This case study illustrates an approach to use EPA statutory tools to bring about change in the management of prescribed industrial waste, and the industry’s response to that action.

As part of the Industrial Waste Strategy released in January 1986, EPA foreshadowed a phasing out of disposal of liquid waste to landfill. A phase out period of five years was nominated. The Cleanaway–Tullamarine landfill was at the time the only facility licensed to receive such wastes. In response to the release of the Industrial Waste Strategy, Cleanaway immediately increased prices for disposal of liquid waste at their Tullamarine facility from approximately five cents per litre to 11 cents per litre and foreshadowed that they would cease to accept liquid waste for disposal in two years.

The price increase and impending unavailability of landfill disposal resulted in a decrease in the generation of liquid wastes from 98,200 m$^3$ in 1985 to 72,700 m$^3$ in 1987. This represented a reduction of 26% and is believed to have largely resulted from reduced use of water for washing purposes and de-watering of some waste streams.

While five years provided sufficient time for industry to respond, two years was not. In response, Melbourne Water established the VicWaste liquid treatment facility which operated from 1988 to 1990. The private waste management industry also developed over this period, and by 1990 the sector had established facilities able to treat liquid wastes, so that the Melbourne Water facility was no longer required. Treatment prices for most liquid wastes were in the range of 10 to 20 cents per litre.

Surveys at the time indicated waste disposal costs were not a substantial business cost. The threat of reduced receival facilities rather than the increase in price was seen to be the driving force behind the reduction in waste generation. This is probably still the case today. Increases in waste disposal costs would have been partly off-set by the reduced resource use which mirrored the waste reduction.

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43 See the discussion under section 6.3 of this chapter for more information.
practicability of options for the minimisation or management of prescribed industrial waste.

The concept of practicability is important and flows through this policy. It places a boundary on the limits to which a prescribed industrial waste generator must go to manage their wastes in accordance with the waste hierarchy. This policy does not require a waste generator to adopt an option where it is not practicable to do so.

In assessing whether an option is practicable, the following issues may be considered:

- Practicability does not mean that the option is the lowest cost option. A preferable option which costs more may still be practicable.
- The expectation regarding the level of expenditure that is practicable will increase as the hazard of the waste increases.\(^4\)
- Practicability will generally be considered in terms of what is ‘affordable’ in the context of the relevant industry sector, rather than what may be affordable for the individual business.
- The program for implementation of a preferred option may take into account the timing of facility upgrades related to improved management of prescribed industrial waste.
- Logistical considerations include issues of location of the waste and facilities and the quantity of waste. This is a significant issue in Australia given our large landmass and small population. For many waste streams, it is expected that only one or two facilities may be established nationally due to the small market size. Where these facilities are accessible and preferred in accordance with the waste hierarchy, such an option should be adopted.
- Technical considerations include a wide range of issues which may render an option not able to adopted, or which may increase the cost of adoption.

The concept of ‘best practicable environmental outcome’ is an extension to the concept of practicability, and is referred to in Clause 16 of this policy. In specific circumstances, an option preferred in accordance with the waste hierarchy may not result in the best environmental outcome. For example, the recovery of energy from oils containing chlorinated organics may form hazardous by-products when burnt, as opposed to treating the oils to remove or destroy the chlorinated organic. In such cases the best overall environmental outcome should be adopted.

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44 This corresponds to this policy principle that ‘Measures adopted in the management of prescribed industrial waste should be cost-effective and not disproportionate to the significance of the environmental problem being addressed’.
(5) The Authority will establish an advisory committee to provide advice to the Authority on all aspects of the implementation of this policy and associated programs including consultative mechanisms to support decisions made under Clauses 10, 11 and 12. This committee will be broadly representative of stakeholders in prescribed industrial waste management and will have access to high level technical advice through the establishment of a Technical Advisory Committee.

The establishment of an advisory committee for the implementation of the policy will provide a means for interested parties to assist EPA in developing programs to implement the policy. This could include advice to the Authority on a number of issues, such as classification of wastes and the development of waste reduction target programs (aimed towards implementing the objectives of this policy). It is envisaged that the committee will also assist EPA by providing advice on appropriate consultative processes.

### Key points

- This policy commits EPA to a strategic approach designed to inform, motivate and enable responsible decision makers to improve their prescribed industrial waste management.
- This approach seeks to bring about improvements in management of prescribed industrial waste by using a range of tools focused on key factors affecting business decision making.
- EPA will undertake a series of actions including providing information to industry and the community, encouraging the development of new technologies and the inclusion of waste avoidance and waste management issues in educational programs and research programs.
- EPA will establish an advisory committee to focus on aspects of the implementation of the policy, including consultative processes.
- Existing statutory tools may also be used to ensure the adoption of best practice management of prescribed industrial wastes.
- In making decisions as to whether an option is practicable, EPA will consider technical, logistical and financial considerations in order to achieve the best environmental outcome.

### 6.2 Responsibilities for management of prescribed industrial waste

Clause 9:

(1) Prescribed industrial waste generators must ensure their waste is managed:

*(a)* in accordance with the order of preference indicated in the policy principles and intent; and

*(b)* in a manner consistent with achieving the best environmental outcome.

Clause 9 assigns responsibilities for management of prescribed industrial waste. Costs and benefits for individual businesses are considered in the context of the specific requirements set out in subsequent clauses.
Some businesses may wish to be assured that they are appropriately exercising their responsibilities under Clause 9 to avoid enforcement action by EPA and for due diligence purposes. The preparation of a waste management plan and the certification of this by an EPA appointed environmental auditor provide a means of doing this.\textsuperscript{45}

Draft sub-clause 9(1) has been amended and moved to sub-clause 8(3) – Attainment Measures. This was done to explicitly state that decisions made by the Authority about prescribed industrial waste need to have the best environmental outcome.

### 6.3 Establishing waste reduction targets

Clause 10:

1. The Authority may establish, in consultation with generators of prescribed industrial waste and the community, specific targets for avoidance, reuse and recycling of and/or recovery of energy from prescribed industrial waste and targets for reduction in the need for long term containment of prescribed industrial waste.

2. The Authority will publish any target established in accordance with sub-clause (1) in the Authority’s annual report to Parliament.

The establishment of waste reduction targets will assist in focusing EPA’s attention on those industries or industry sectors producing significant proportions of the total prescribed industrial waste stream. By focusing on each waste, those industries that send a large amount of a particular waste to landfill can be required to reduce their volumes of waste generated. The setting of blanket targets may have disadvantaged those industries and companies that have already significantly reduced their waste levels, or that do not make up a significant proportion of the waste stream.

### 6.4 Prescribed industrial waste decision framework and classification

Clause 11:

1. The Authority may classify prescribed industrial waste in accordance with the criteria presented in Schedule 1 and will publish any such classification in the Government Gazette.

EPA will classify a prescribed industrial waste in situations where it poses a high or common hazard, has raised significant levels of community concern or is being inappropriately classified by generators. Such classification will be given effect through policy and specific tools such as the development of best practice guidelines and licence amendments.

An EPA classification is expected to benefit the community by providing assurance that prescribed industrial waste will be safely managed and closely regulated, and that disposal to landfill and placement of wastes in containment facilities will be reduced in line with waste reduction targets. The long term aim is to eliminate prescribed industrial waste being disposed to landfill.

\textsuperscript{45} Refer to the discussion of waste management plans in section 6.7 of this chapter for further details.
(2) When making decisions affecting the management of prescribed industrial waste, the Authority will:

(a) Have regard to the waste classification in accordance with Schedule 1 and any classifications published by the Authority pursuant to sub-clause (1); and

(b) Apply the prescribed industrial waste management decision framework set out in Schedule 2.

The decision framework set out in Schedule 2 to this policy gives specific expression to the waste management hierarchy and will assist EPA and generators of prescribed industrial waste to determine the preferred management option.\(^{46}\)

The classification system and decision framework presented in Schedules 1 and 2 express the policy intent and principles. The costs and benefits associated with management of prescribed industrial waste in accordance with the schedules relate to the overall impact of this policy.\(^{47}\)

A business may incur costs in determining the preferred management option, and in some cases managing waste in accordance with the waste management hierarchy may also increase costs. However, any increase in the later is tempered by the requirement to only do so to the extent practicable. Moreover, changes to waste avoidance and management practices are expected to increase eco-efficiency, in many cases saving money.\(^{48}\) The costs associated with consideration of the management of prescribed industrial waste are likely to be partly or completely off-set by the benefits derived from improved knowledge and understanding of business costs. Some businesses may experience an improvement in their business sustainability through sound environmental management.

(3) The Authority will ensure that all licences and works approvals are consistent with any classification published by the Authority pursuant to sub-clause (1).

(4) Subject to sub-clause (5), a prescribed industrial waste generator must manage its prescribed industrial waste in accordance with any relevant classification published by the Authority.

(5) Where the Authority has classified a prescribed industrial waste in accordance with sub-clause (1), the Authority may allow an alternative classification on application from a prescribed industrial waste generator, where:

(a) the application is in a manner approved by the Authority;

(b) the alternative classification is consistent with the intent and principles of this policy; and

(c) the alternative classification achieves the best environmental outcome.

EPA will allow for an alternative classification if it can be demonstrated that such a classification will achieve the best environmental outcome and is consistent with this policy. Applications from generators would need to be in a manner approved by EPA. EPA may require the proposal to be certified by an environmental auditor appointed under section 57 of the Environment Protection Act 1970. Alternative classifications will generally be specific to a waste from an individual generator.

\(^{46}\) See section 6.9 – principally the discussion under ‘Schedule 2: Prescribed industrial waste decision framework’ – for the key features of the decision framework.

\(^{47}\) See section 5.2 for further details of these impacts.

\(^{48}\) See section 5.2 for the discussion on eco-efficiency and section 3.4 for the discussion on cleaner production.
A cost of between $1000–$3000 to prepare a case for an alternative classification is estimated. Generators would be required to bear the cost of any review and certification by an environmental auditor.

(6) Where the Authority has not classified a prescribed industrial waste in accordance with sub-clause (1), a prescribed industrial waste generator:

(a) should classify its waste in accordance with the requirements of Schedule 1; and
(b) should manage its waste in accordance with the prescribed industrial waste management decision framework in Schedule 2.

In the absence of an EPA classification, prescribed industrial waste generators should classify their waste in accordance with Schedule 1. It is expected this process would take in the order of 0.5 to 5 person days per waste stream at a cost of $300 to $3,000. Most generators already have detailed knowledge about their waste and some have waste management plans. Where a large number of businesses generate a common waste stream (for example, grease trap wastes from fast food outlets), industry associations are encouraged to classify these waste streams on behalf of their members and obtain review of this classification by an environmental auditor or EPA.

(7) Where a prescribed industrial waste generator fails to manage its waste in accordance with the prescribed industrial waste decision framework, the Authority may, by works approval, licence or notice, require the waste generator to:

(a) adopt a minimisation or management option specified by the Authority; or
(b) cease a waste generation or management activity.

Where a generator fails to manage their wastes in accordance with the requirements of this policy, EPA may require them to do so by licence or notice. The generator will incur minor costs from the serving of and response to the notice. EPA will publish guidelines to assist generators to classify prescribed industrial waste.

**Key points**

- **EPA may classify prescribed industrial waste according to the classification system set out in Schedule 1 to this policy.**
- **EPA will classify waste where there is a high or common hazard, significant community concern or inappropriate classifications are taking place. This will ensure safe management of this waste.**
- **A generator may choose to seek an alternative to an EPA classification. Preparing a case for alternative classification will cost about $1,000–$3,000.**
- **Once a waste has been classified, the waste must be managed in accordance with the prescribed industrial waste decision framework set out in Schedule 2 of this policy.**
- **Managing waste in accordance with the waste management hierarchy may increase waste management costs but this is tempered by the element of practicability. Changes to waste management practices are expected to increase eco-efficiency.**
- **Where a waste has not been classified by EPA, generators of that waste are expected to classify the waste and manage it in accordance with the decision framework. This is expected to cost $300–$3,000 per waste stream.**
So what do I have to do if I generate prescribed industrial wastes?

1. Design any new process, product, service or activity to avoid the generation of prescribed waste and to maximise reuse, recycling or recovery of energy.

2. Review existing processes, products, services and activities to identify and characterise waste streams containing prescribed industrial waste.

3. Review the waste streams to identify opportunities to avoid generation of prescribed industrial waste and to maximise reuse, recycling or recovery of energy. Implement these opportunities where practicable.

4. Identify any relevant classification published by EPA.

5. Classify remaining waste streams with respect to opportunity for reuse, opportunity for treatment in accordance and hazard (refer to Schedule 1), according to:
   - Review Material Safety Data Sheets and other physico-chemical, biological and toxicological information.
   - Assess the hazard of the waste based on broad guidance prepared by EPA, published classifications for other similar wastes and other information.
   - Assess the nature of the waste to determine whether it has an inherent potential for reuse, recycling, recovery of energy or treatment.
   - Review facilities for reuse, recycling, recovery of energy or treatment to determine the availability of suitable facilities for the specific waste. Consideration should be given to other facilities or projects that may be able to reuse the waste, but do not currently hold an exemption.
   - If no facilities are available for reuse, recycling or recovery of energy, review published information regarding the management of prescribed industrial wastes overseas.
   - If options are identified in development or use overseas then assess the likelihood of these being commercially viable and available in Australia in the foreseeable future.

6. Identify the preferred option for management of the prescribed industrial waste based on the decision framework presented in Schedule 2, taking into account the classification indicated above and the concept of practicability.

7. Manage in accordance with the preferred option.

8. Periodically review the opportunities for avoidance, the classification of the prescribed industrial waste and the resulting preferred management option.

You may choose to formalise this classification and decision process in a waste management plan and have this certified by an appointed environmental auditor.
6.4 Information, reporting and review

Clause 12:

(1) The Authority will collect information on the generation and management of prescribed industrial waste for purposes including:

   (a) auditing of waste management practices;
   (b) provision of information to the public;
   (c) setting priorities for cleaner production programs;
   (d) evaluating the effectiveness of this policy; and
   (e) assisting planning of waste management infrastructure.

EPA will collect this information using existing regulatory mechanisms including waste transport certificates and annual returns required under the *Environment Protection (Prescribed Waste) Regulations 1998*.49 The hazardous waste landfill levy introduced on 1 July 1999 will provide for reports outlining the volumes of prescribed industrial wastes deposited at each landfill licensed to accept such wastes. Some additional information is obtained through reporting and monitoring requirements set out in the licences of individual facilities.

(2) The Authority will:

   (a) review aspects of the management of prescribed industrial waste;
   (b) report on the generation of prescribed industrial waste and waste management practices; and
   (c) develop programs focused on specific wastes or waste streams.

It is anticipated that EPA will use its annual report to provide summaries on generation and management trends and an assessment on the implementation of this policy. EPA will also produce more detailed periodic reports outlining trends in prescribed industrial waste generation and management and related details such as trends in compliance with regulatory requirements. The inclusion of information in EPA’s annual reports is expected to represent only a small marginal cost but the development of more detailed public reports may cost as much as $20,000 per report.

EPA is currently developing a program targeting the top 30 generators of prescribed industrial waste for assistance with waste minimisation initiatives. This is an example of the type of program that EPA will initiate under this policy.

(3) The Authority will provide information on the availability of facilities for the reuse, recycling, recovery of energy, treatment, storage, and containment of prescribed industrial waste.

This information will assist generators in making their management decisions under the decision framework. Containment facilities have been included in the list of facilities that the Authority will provide information on. EPA publications 50 providing this information will be

49 See the discussion surrounding the *Environment Protection (Prescribed Waste) Regulations 1998* in chapter 3 for more information.

Environment Protection Authority

regularly updated. The Industrial Waste Database\textsuperscript{51} provides online information on facilities licensed to receive prescribed industrial waste.

EPA will incur costs in collecting and providing information but will receive funding from the new levy to offset this, in line with the polluter pays principle. Further, the costs are offset by the benefits to industry of reliable information.

(4) Occupiers of premises receiving prescribed industrial waste for reprocessing, treatment, storage or containment, including premises receiving prescribed industrial waste discharged to sewer, must:

(a) prepare an annual environmental performance report including, but not limited to:
   (i) the quantity and type of prescribed industrial waste received;
   (ii) the treatment and fate of prescribed industrial wastes received;
   (iii) results of environmental monitoring required by the Authority;
   (iv) details of community liaison;
   (v) a record of complaints; and
   (vi) details of any enforcement action by the Authority;

(b) cause the report to be signed by the Chief Executive Officer of the occupier of the premises (or their delegate); and

(c) submit two copies of the report to the Authority.

(5) The Authority will make available to the public all annual environmental performance reports received in accordance with Clause 12(4).

Environmental performance reports can improve public confidence in premises accepting prescribed industrial waste, potentially streamlining future approvals and other processes. They provide an opportunity for companies to showcase their ‘beyond compliance’ activities, such as programs to enhance the recovery of resources from waste materials.

This information will help allay community concerns about possible adverse human health and environmental impacts.

Occupiers of premises receiving prescribed industrial waste are already required to obtain the information needed for an environmental performance report, which is already necessary for sound business management.\textsuperscript{52} The additional burden is therefore restricted to the production of the public report and is expected to be less than $5,000.

EPA will make use of a number of avenues, including electronic mechanisms such as its website to ensure that it meets its responsibility to make environmental performance reports available to the public.

(6) The Authority will

(a) set, on an annual basis, the priorities for the classification of prescribed industrial waste;

(b) review every three years, from the date of the commencement of this policy, progress toward meeting the policy objectives; and

(c) publish the results of any such reviews.

\textsuperscript{51} This database can be accessed through the EPA website at www.epa.vic.gov.au
\textsuperscript{52} For example, through environment management plans or environment improvement plans.
(7) Notwithstanding any requirement for review of this policy under the Act, this policy will be reviewed if monitoring indicates that significant reduction in the generation and the need for long term containment of prescribed industrial waste is not being achieved.

Draft sub-clauses 12(6) and 12(8) have been changed and sub-clause 12(7) removed to reflect the omission of the 50% reduction target (under section 6.5 of this PIA). The amended sub-clauses set the priorities for the classification of prescribed industrial waste.

Key points

- EPA will collect information on the generation and management of prescribed industrial wastes and ensure that it is provided to the community.
- EPA will review aspects of the management of prescribed industrial waste, report on its generation and management practices and develop programs focused on specific wastes or waste streams.
- If monitoring indicates that waste reduction targets are unlikely to be achieved, EPA is committed to review the policy.
- EPA costs for producing detailed reports on the generation and management of prescribed industrial waste are expected to cost about $20,000 per report.
- All premises licensed to receive prescribed industrial waste must prepare an environmental performance report which will be made publicly available by EPA. The associated cost is expected to be less than $5,000 per report.

6.5 Finance, accounting and business

Clause 13:

(1) The Authority will investigate and develop programs to influence the management of prescribed industrial waste designed to make best use of:
   (a) the economic consequences of waste generation; and
   (b) other factors in business decision making.

(2) The Authority will establish partnerships with relevant organisations in the finance and accounting sectors to promote change in systems and practices to better recognise the costs and benefits associated with avoidance and management of prescribed industrial waste.

(3) The Authority will work with other Government agencies involved in planning, industry facilitation, development and the provision of infrastructure to assist in achieving the policy objectives.

‘Businesses that do not have a demonstrable appreciation of the environmental issues associated with their activity will find credit more difficult to obtain. [As a consequence,] businesses using such strategies as environmental management plans, best practice and benchmarking will find themselves categorised as lower risk than those which ignore these approaches.’

Chris Davey, National Australia Bank
Clause 13 centres on the role of EPA and other Government organisations in helping generators of prescribed waste:

- improve their eco-efficiency and sustainability;
- recognise existing economic drivers arising from the cost of waste which mean that waste avoidance and resource recovery can save money; and
- ensure ongoing access to finance and insurance at competitive rates, where sound management of prescribed industrial waste reduces exposure to environmental risks and improves public profile.

Waste generators will reap substantial benefits from a greater recognition of the real costs of waste. Any initial costs incurred in modifying accounting and other systems should be offset by efficiencies, reduced environmental liabilities and better access to competitive finance and insurance.

Finance, business and accounting are key sectors in recognising and promoting the benefits of eco-efficiency, facilitating its uptake and rewarding eco-efficient businesses. EPA commits to work with these sectors to bring about change.

There is increasing recognition in the financial sector of the importance of environmental criteria in sound business management. For example, insurance discounts have been given to companies which have a certified environmental management system, and lending decisions can be influenced by the assessed environmental risk and liability. EPA will encourage the financial sector to reward good environmental performers in order to influence industry’s waste management practices.

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**Case example: Swiss Bank Corporation**

When the Swiss Bank Corporation started to integrate environmental aspects into its business in 1992, many assumed that by using environmental principles, banks and financial institutions would soon bridge the gap between ecology and economics.

However, commonly agreed environmental performance accounting standards are yet to emerge, making it difficult for industry and financial services sectors to evaluate precisely the effects of environmental factors on performance. In saying this, there have been some major developments.

- Industry has moved from describing environmental performance by positive stories to assessing its eco-efficiency and the impact of environmental risks on financial performance.
- The banking sector is increasingly refining its credit approval by assessing environmental risks, such as contaminated sites. Banks are also identifying market opportunities from environmental market development.
- Shareholders are requesting more information about the environmental performance of investments in stocks.

We feel sure that these trends will lead in the near future to standards that will make it easier to account for the full impact of environmental issues on financial performance.

*Georges Blum, Chairman, Swiss Bank Corporation.*


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53 See discussion about eco-efficiency and the benefits which flow from this policy in sections 5.2 and 6.3.
(4) Charges for the treatment and containment of prescribed industrial waste, including treatment through sewerage systems, should be set at levels that reflect the full cost of treatment and containment, including all measures necessary to protect human health and the environment.

Charging the full cost, without cross subsidisation, of waste treatment and containment sends appropriate economic signals to waste producers, encouraging waste avoidance and legitimate diversion of wastes. This requirement extends to charges for the disposal of trade wastes to sewer, reflecting practices already occurring since the commercialisation of sewerage businesses in Victoria. The clause re-emphasises a pre-existing requirement of the IWMP (Waste Minimisation) 1990, so it involves no additional cost impacts.

(5) All Government agencies must have regard to the intent, principles and objectives of this policy in making decisions related to purchasing and/or provision of goods or services. This new sub-clause reflects current Government policy that all Government departments, agencies and contractors adopt purchasing and management strategies that minimise environmental impacts.

Key points

- EPA will seek to work through the finance, accounting and business sector to bring about improvements in prescribed waste management.

- Key areas to address include accounting for the cost of waste generation and rewarding business for the lower risk associated with sound management of prescribed industrial waste, for example, by access to cheaper insurance and finance.

- The full cost of waste treatment or containment should be charged by waste treatment and containment facilities, including all measures necessary to protect human health and the environment.

6.6 Facilities for containment of prescribed industrial waste

Clause 14 sets out requirements for the management of waste storage and containment facilities and EPA’s obligations in ensuring that best practice is achieved.

Clause 14:

(1) Facilities receiving prescribed industrial waste for containment must be designed, operated, and maintained throughout the life of the facility (including post closure) in accordance with any relevant environment protection guidelines approved by the Authority from time to time.
EPA will develop an environment protection guideline for the siting and design repositories and containment facilities receiving prescribed industrial waste as part of the implementation of this policy. The improved design and operation of these facilities will affect the cost of storage and containment but this is expected to be marginal compared to the impact of market factors (see discussion under Schedule 3 of the policy).

(2) The Authority will classify all facilities for the containment of solid prescribed industrial waste in accordance with Schedule 3 to this policy.

The impacts of this requirement are discussed in the later section on Schedule 3.

(3) The Authority may prohibit by licence, works approval or notice the deposit of specified prescribed industrial waste in containment facilities or landfill where a practical alternative exists.

Works approvals and licensing provide EPA with a powerful tool for ensuring sound environmental management at facilities accepting prescribed industrial waste. The policy will help operators of these facilities to understand EPA’s approach to these tools by clarifying the storage facility classification system in Schedule 3 and by setting out clear management principles.

(4) The Authority may require, by licence, works approval or notice, treatment of specified prescribed industrial waste prior to containment in a containment facility if such treatment is both practicable and necessary to:

(a) maximise opportunities for reuse, recycling or recovery of energy;
(b) reduce the hazard; or
(c) reduce the requirement for ongoing management.

This clause flags EPA’s intention to use its existing powers to prohibit disposal of prescribed industrial waste to landfill (or placement of wastes in containment facilities) where there are preferred and practicable alternatives. In such circumstances EPA would address both generators and those who accept the waste to achieve consistent outcomes. This action would be undertaken in situations where a preferred management option is either available in Australia or is in existence but not yet available in Australia. In either situation, sufficient lead time will be given to alter its management of those waste streams. Longer lead times will be required where practicable technologies exist but are not yet available in Australia. The policy also signals that EPA may require treatment of some prescribed industrial waste prior to containment.

These are not new powers or practices; EPA has previously prohibited landfill disposal of some wastes or required treatment prior to disposal. For example, EPA announced in 1986 that disposal of liquid wastes to landfill would be phased out (over a five-year period to allow
time for the establishment of a treatment industry\textsuperscript{54}). Another example is the prohibition of the disposal of whole tyres to landfill (to reduce the fire risk).

This policy is expected to provide greater certainty to waste generators and those accepting waste because it provides clear guidance as to how EPA will use its existing powers to prohibit disposal or require waste treatment.

### Key points

- **Clause 14** requires the safe containment of prescribed industrial wastes which cannot be practicably avoided, reused, recycled or used for recovery of energy.
- This clause also requires facilities to be designed and operated in accordance with Environment Protection guidelines published by EPA.
- EPA will classify and licence facilities for the containment of prescribed industrial waste in accordance with the classification system set out in Schedule 3.
- The policy flags EPA’s intention to use its existing powers to amend licences to prohibit facilities from accepting prescribed industrial waste for containment where preferred management options are practicable.
- The policy is expected to provide greater certainty to waste generators and those accepting waste on how EPA will use its existing powers to prohibit containment or require treatment.

### 6.7 Environment improvement plans

Clause 15:

(1) A prescribed industrial waste generator must submit to the Authority an Environment Improvement Plan, in a manner approved by the Authority:
   - (a) when making an application for works approval; or
   - (b) if required to do so by the Authority by licence or notice.

(2) To demonstrate that it is meeting the objectives, intent and principles of this policy, generators of prescribed industrial waste are encouraged to voluntarily develop an Environment Improvement Plan and to have that plan certified by an environmental auditor appointed by the Authority.

Environment improvement plans (EIPs) have replaced waste management plans (WMPs) to provide a common framework with other instruments developed under the Environment Protection Act 1970. This requirement reflects well-established industry practice based on existing obligations under the IWMP (Waste Minimisation) 1990 and EPA’s powers under the Environment Protection Act 1970. Environment improvement plans (EIPs) involve an audit of waste streams and identification of opportunities to avoid, reduce and reuse waste, which are normally required while new infrastructure developments or major process changes are being planned. Waste issues are then considered from the outset and improvements are built into the new works from the start. This saves time and money, since changes to infrastructure or

\textsuperscript{54} For more information, see the case study presented in this PIA during the discussion of draft Clause 9 in section 6.1.
management processes after major works have been completed are more expensive and time consuming.

EPA may also use its existing powers to require a prescribed industrial waste generator to produce an environment improvement plan at some other time, for example, if EPA believes that opportunities to reduce waste generation and maximise waste reuse in accordance with the policy have not been properly assessed.

The cost of preparing an environment improvement plan typically ranges from $1,500 for a small manufacturing facility to more than $25,000 for a large and complex manufacturing or similar facility. The cost of review and certification of an environment improvement plan by an appointed environmental auditor is expected to range from $500 to $5,000. However, since the requirement for EIPs pre-dates the policy, this cost should not be seen as an impact of the policy. Moreover, detailed consideration of waste management is integral to good environmental and financial management and leads to operational cost savings. This is particularly true for prescribed industrial wastes, which require special handling.

Many companies will have already addressed some or all of the components of an EIP through the development of tools such as environmental management systems (EMS) and similar processes. In these circumstances there would be no requirement to produce a separate EIP.

### Key points

- **Environment improvement plans** assess opportunities for waste avoidance, reuse, recycling and recovery of energy and improve the handling, storage, treatment and containment of wastes.
- A prescribed industrial waste generator must submit an environment improvement plan to EPA when making an application for works approval or if required to do so by EPA under a licence amendment or notice.
- Producing an environment improvement plan is expected to cost in the order of $1,500 to more than $25,000 for a large and complex site, but this is not a new cost resulting from this policy since EPA’s powers to require a plan already exist and are widely used.

### 6.8 Other requirements

Clause 16:

1. Prescribed industrial waste must not reused, recycled, used as a source of energy or otherwise minimised, stored, transported, reprocessed or treated in such a way that contaminants are transferred to other environmental media unless this results in the best practicable environmental outcome.

2. Prescribed industrial waste must not be diluted, mixed or otherwise treated where this reduces the potential for the reuse, recycling or recovery of energy of that waste unless:
   (a) reuse, recycling or recovery of energy is not practicable; or
   (b) the treatment is necessary to obtain the best practicable environmental outcome.

This provision requires waste producers to ensure the best environmental outcome is achieved at their facility. Wastes must not be diverted from one type of environmental media to
another, for example, from air to water, must not occur unless there are sound environmental reasons for doing so. This is based on existing and established principles and as such should have no direct costs where sound environmental management is already occurring.

Wastes should also not be diluted to reduce practicable options that are preferred to containment. This does not preclude legitimate mixing of wastes or diversion to other waste streams where this does not affect the potential for reuse and results in the best practicable environmental outcome.

Where mixing, treating or otherwise handling prescribed industrial waste discharged to sewer limits the potential for practicable reuse or recycling of the waste, a generator may be required to adopt alternative practices.

Where discharge of a prescribed industrial waste to sewer limits the potential for reuse or recycling of effluent or sludge from the sewerage treatment plant, and a practicable alternative exists, a generator may be required to cease discharging the prescribed industrial waste to sewer. Similarly, an operator of a sewerage treatment plant may be required to cease receiving prescribed industrial waste as part of the trade waste stream, if a practicable alternative exists, where this limits the potential for reuse or recycling of sewerage treatment plant effluent or sludge.

Key points
- Prescribed industrial waste should not be transferred from one environmental media to another unless this results in best practicable outcome.
- Prescribed industrial waste should be treated to maximise the practicable reuse options.
- This clause is based on existing and established principles and should have no direct costs where sound environmental management is already occurring.

6.9 Schedules

The schedules are tools designed to give specific expression to the policy objectives, intent and principles. The tools work together to help EPA and industry determine the preferred management option for a prescribed industrial waste based on the waste management hierarchy.

The schedules can be used to:
- Classify a prescribed industrial waste (using Schedule 1).
- Determine the appropriate management option (based on the waste classification system in Schedule 1, and using the decision framework in Schedule 2).
- Identify the types of facility able to receive a waste if no recycling, reuse or energy recovery options are available (using the hazard classification from Schedule 1, together with the facility classification system in Schedule 3).
Schedule 1: Classification of wastes

**Purpose**

Schedule 1 provides the basis for EPA and prescribed industrial waste generators to classify waste in accordance with the requirements of clause 11.\(^{55}\) Once a waste has been assigned to a specific classification, it must be managed in accordance to the requirements on that classification.

The classification system establishes a range of classifications based on key determinants of the management option, so that a specific classification can be assigned based on the nature of the waste and the availability of facilities. This in turn determines the range of appropriate management options.

Where EPA determines the classification of a prescribed industrial waste, that information will be published. EPA will also publish guidelines to help generators classify their waste where EPA has not done so.

**Basis for classification**

Schedule 1 to the *Environment Protection (Prescribed Waste) Regulations 1998*\(^ {56}\) lists wastes that are prescribed for the purposes of the *Environment Protection Act 1970*.

Schedule 1 establishes factors used to clarify wastes which directly affect the selection of management options, namely:

- the potential for reuse, recycling or recovery of energy;
- the potential for treatment; and
- the level of hazard.

In classifying a waste with respect to its potential for reuse, recycling, recovery of energy or treatment, consideration should be given to the inherent properties of the waste, the availability of technologies and the availability of facilities. Under these headings, three broad classifications have been established:

- currently available;
- available in the foreseeable future; and
- not available in the foreseeable future
  - *Developmental* (ie. there is inherent potential to reuse, recycle, recover energy from or treat the waste, but the necessary technology is still under development)
  - *No opportunity identifiable*.

Incorporated in this classification system is the notion of practicability. For a reuse, recycling, energy recovery or treatment option to be classified as *currently available* or *available in the foreseeable future*, it must be practicable.

The level of hazard is used to determine the suitability of management facilities and the management necessary to ensure appropriate environmental protection. This is particularly

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\(^{55}\) See discussion under section 6.4.

\(^{56}\) Reproduced in appendix 3.
relevant in the context of containment of wastes. A three-level hazard classification system is proposed in the schedule as follows.

A. Prescribed industrial wastes which require a very high level of control and ongoing management to protect human health and the environment. For solid prescribed industrial waste the level of control exceeds that able to be achieved in a Class 1 facility (refer to Schedule 3) without prior treatment to reduce or control the hazard.

B. Prescribed industrial wastes which require a high level of control and ongoing management to protect human health and the environment.

C. Prescribed industrial wastes which pose a low hazard or only exhibit any offensive aesthetic properties and which require control and/or ongoing management to protect human health and the environment.

Category C is sub-divided into two classes based on the different management requirements of the waste:

- C (1) – waste with potential amenity effects, non-persistent organic wastes
- C (2) – other low environmental risk wastes.

Example: Classifications

The following examples of possible prescribed industrial waste classifications illustrate the effect of the waste facility classification system in Schedule 3. They are indicative only and should not be relied upon for compliance purposes.

Scallop shell wastes: Category C, opportunities for disposal only (Class 2 landfill).

Low level contaminated soils (metal contamination): Category C, opportunities for reuse and disposal (Class 2 landfill). Facilities for reuse off-site are opportunistic (may or may not be available at a specific point in time).

Gasworks contaminated soils: Category A or B (depending on concentrations of contaminants), opportunities for disposal (with pre-treatment for Category A), treatment and energy recovery. Energy recovery established overseas, treatment established overseas and in Australia. Facilities for both available in the foreseeable future.

Filter cake (low metals content): Category C, opportunity for disposal only (Class 2 landfill).

Filter cake (high metals content): Category A or B depending on the elutriable fraction. Treatment to reduce hazard classification and render safe for disposal is currently available. Opportunity for recovery of metals if metals content is high enough, but facilities not currently available or likely to be available in the foreseeable future.

Unused arsenical/organochlorine agricultural chemical: Category A, opportunity for treatment to reduce hazard classification and render safe for disposal (recycling not practicable due to mixture). Treatment facilities not currently available. Store pending availability of treatment technology.

The application of the hazard classification to contaminated soils is illustrated below:

Category A: Contaminated soil with elutriable fractions exceeding the limits for disposal to a specifically engineered landfill (or Class 1 landfill).

Category B: Contaminated soil acceptable for disposal to a specifically engineered landfill (or Class 1 landfill).

Category C: Low level contaminated soil.
Classifying a prescribed industrial waste

Classifying a waste requires detailed consideration of the factors given under the heading ‘Basis for Classification’ on page 60.

EPA will maintain a list of facilities able to accept waste for reuse, recycling, recovery of energy and treatment activities.

Determination of whether facilities will be available in the foreseeable future should involve a review of appropriate technologies, including overseas management practices.

Determination of a waste’s hazard classification should involve consideration of the properties of the waste having potential to affect human health or the environment, including:

- toxicity
- corrosivity
- leachability
- explosivity
- infectivity
- flammability
- biodegradability
- odour
- other aesthetic properties.

The requirement to classify prescribed industrial wastes in accordance with the policy does not involve significant cost. The major impacts flow from the responsibility placed on waste generators to manage wastes in accordance with the waste management hierarchy. The classification system is intended to assist generators in fulfilling this responsibility, and may be regarded as a more specific expression of the decision framework given in Schedule 2 of the policy. The information requirements for both are the same.

Key points

- The waste classification system is designed to assist EPA and generators of prescribed industrial waste determine the appropriate waste management option.
- EPA will publish classifications of prescribed industrial waste in accordance with Schedule 1 and guidance to help generators classify wastes for which there is no EPA classification.
- The requirement to classify prescribed industrial wastes in accordance with the policy will not involve significant cost.

Schedule 2: Prescribed industrial waste decision framework

The prescribed industrial waste decision framework presented in Schedule 2 is provided to assist generators of prescribed industrial waste work out the preferred management option in

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57 Biodegradable or putrescible wastes can adversely impact the environment in a range of ways including aesthetic impacts and depletion of oxygen in water bodies to which the waste may have been released.

58 See section 6.3 for a discussion of these costs.
accordance with the policy objectives, intent and principles. The decision framework is presented as a flow chart leading the user through the required decision making process.

Key features of the decision framework include:

- first priority is minimisation of waste generation;
- adoption of options lower on the waste management hierarchy is not permitted until it can be determined that other higher options are not available or are not practicable;
- practicabilities of options will be assessed; and
- treatment of waste is required, where practicable, to reduce the hazard associated with managing remaining wastes.

**Key points**

- *The prescribed industrial waste decision framework is a decision making tool to assist generators of prescribed industrial waste to determine the preferred management option for that waste.*
- *The prescribed industrial waste decision framework should be used in conjunction with the concept of practicability, the waste classification system and the classification system for facilities storing or disposing prescribed industrial waste.*
- *No costs are anticipated as a direct result of this schedule.*

**Schedule 3: Classification of facilities for the storage and/or containment of solid waste**

Application of the decision framework given in Schedule 2 may determine that there is no practicable reuse, recycling or recovery of energy options available for a solid prescribed industrial waste. In this case, Schedule 3 sets out the class of facility able to accept the waste, based on its hazard classification.

Schedule 3 introduces a procedure for classifying containment facilities and landfills.

EPA will, in consultation with key stakeholders, develop further guidance on design standards for repositories and containment facilities.
Facility classes

The facilities classification system included in this policy represents a shift from the types of landfills currently available, reflecting the shift towards repository and containment facilities. The categories used in the policy are as follows:

Short term storage facilities

Short term prescribed industrial waste storage facilities (ie. repository) able to accept waste for short term storage pending reuse, recycling, energy recovery or treatment.

Containment facilities

Class 1: Prescribed industrial waste containment facilities accepting a wide range of prescribed industrial wastes for long term storage.

Municipal landfill

Class 2: Municipal landfills accepting municipal waste and a restricted range of prescribed industrial wastes.

The introduction of a containment classification system in itself is not expected to result in significant cost to industry or Government. Costs and benefits are expected to include:

- clarity regarding containment and landfill requirements and acceptance of wastes, benefiting EPA, industry and the broader community;
- administrative efficiencies for both EPA and industry in determining appropriate management options for specific wastes; and
- administrative costs to EPA in determining the classification of a particular containment facility or landfill and amending landfill licences as required to reflect the classification system.

Case example: Repository design for resource recovery

The AVR-Chemie C-2 landfill near Rotterdam in The Netherlands is designed to receive solid industrial wastes with leachable components. It is a large, open, above-ground concrete box approximately 300 m long, 50 m wide and 12–13 m high. The facility receives up to 20,000 tonnes per year of C-2 waste (waste containing leachable components) at a cost of 600–700 Guilders/tonne ($480–560/tonne). A separate cell is located at one end of the facility for storage of wastes that may have some future value – generally limited to wastes containing more than 2% heavy metals. Wastes placed in other parts of the facility are not intended to be recovered.

The AVR-Chemie facility was the only example of a repository identified in a recent EPA study of European and US industrial waste landfill practice.

An alternative repository design proposed for use in France for the storage of hazardous wastes was estimated to cost $1,600/tonne.

Case example: Recovery of gypsum waste from landfill for reuse

Before Western Recycle opened their landfill in the western suburbs of Melbourne, a former quarry at the site was used for the disposal of waste gypsum from the manufacture of phosphoric acid. This operation had the potential to have an adverse impact on groundwater quality.

Current demand for gypsum means the recovery of this waste is economic, and it is now being excavated by Sunshine Gypsum for use as a soil conditioner.

The operation will create more landfill volume for Western Recycle, groundwater quality is protected and gypsum supplies elsewhere are preserved.

This is an example of how the opportunistic recovery of industrial waste can benefit the environment.
Containment facilities will adopt best design, construction, operation and post-closure management processes to maximise the level of containment of prescribed industrial wastes. Containment facilities will be designed for a broad range of prescribed industrial wastes, and will be the primary destination for the long term storage of treated category A wastes for which there is no other management option now or in the foreseeable future.

### Key points

- **Schedule 3** establishes a classification system for prescribed industrial waste storage or containment facilities, which broadly reflects existing, informal categorisations made for the purposes of EPA licensing.
- **Class 1** facilities are containment facilities dedicated for receipt of hazard Categories B and C prescribed industrial waste.
- **Class 2** facilities are well-engineered municipal landfills which may accept hazard Category C prescribed industrial waste.
- Prescribed industrial waste placed in containment facilities must be safe for containment or be treated to render it safe prior to containment. Barriers incorporated in containment facility design, such as liners, provide a further level of assurance of environmental protection.
- Significant improvements in the design, construction, operation and post-closure care of Class 1 facilities are foreshadowed which are likely to lead to increases in prescribed industrial waste disposal costs
- The impact of this policy on Class 1 facility prescribed industrial waste disposal costs is expected to be marginal compared with the effect of market forces, which are already increasing prices.
7. SUMMARY OF POLICY IMPACTS

7.1 General

Achieving the objectives of this policy, in particular the long term aim to eliminate as soon as practicable the disposal of prescribed waste to landfill, will require changes to:

- our collective mindset with respect to the efficiency of resource use in many industrial processes;
- perceptions of wastes as potential resources; and
- priorities for the long term management of wastes which, for the present, cannot be avoided or used as a resource.

Some provisions of this policy will impact generally across a range of business sectors and the community. Avoidance, reuse, recycling, energy recovery and treatment of prescribed industrial waste, together with containment of prescribed industrial waste, will help protect human health and the environment and will ensure greater consistency with community expectations.

This chapter summarises the impacts of the policy in various sectors – manufacturing and service provision, contaminated land development, waste management and impacts on the community. For a more detailed analysis of the impacts of this policy, refer to chapters 5 and 6.

7.2 Manufacturing and service provision

The availability of infrastructure to enable the safe, sustainable and cost-effective management of prescribed industrial waste is of primary concern to the manufacturing sector. While cost increases and changes in management practices will affect industry, these are secondary compared with the impacts on this sector and the broader economy that would arise if the waste management industry does not or cannot provide the necessary facilities for management of waste generated by industry.

Improved prescribed industrial waste management should been seen as an important step towards achieving long term sustainability of operations. This policy will encourage the transition to sustainable management practices for prescribed industrial wastes, thus avoiding disruption and enabling industry to continue to operate with confidence that facilities will be available to accept prescribed industrial waste that is not able to be avoided or recovered on-site.

A key premise of the policy is that waste avoidance and reuse improves efficiency and saves money for businesses. Avoidance, reuse, recycling and energy recovery is encouraged by the policy and will lead to improved eco-efficiency, benefiting the environment and saving money at the enterprise level. In some cases, the costs of waste management are small compared to the total operating costs of industry, so that the economic imperative for waste avoidance is often not sufficient, in itself, to result in a decision for change.
However, the benefits to industry associated with improved management of prescribed industrial waste go beyond the direct financial savings from waste avoidance. Some of these may include:

- market advantage through accessing purchasing preferences of consumers for environmentally sound products and services; and
- access to markets that are sensitive to environmental issues and would not otherwise represent an opportunity;
- access to finance and insurance at lower rates which reflect the low environmental risks;
- minimised liabilities for companies and directors associated with managing hazardous wastes; and
- community ‘licence to operate’ arising from conformity with community expectations for sustainable and socially responsible industry operations.

The adoption of waste avoidance through cleaner production practices and technologies has consistently reduced industry costs, while reuse, recycling and recovery of energy ensure that the retained economic value of resources can be realised. The actual cost and benefit to industry associated with changes in generation and management of prescribed industrial waste resulting from this policy will vary from one business to another depending on the nature and quantity of the waste involved and on the approach adopted. Where avoidance is employed to meet policy objectives, experience indicates that very short payback periods for the investment are common (eg. one to three years) together with high benefit to cost ratios.

Where external facilities are employed to enable reuse, recycling or recovery of energy from wastes, costs are likely to exceed present costs of landfill disposal. However, landfill costs are rising and are expected to continue rising independently of the implementation of the policy, thus reducing the cost differential between disposal and resource recovery options. Furthermore, price increases are limited to those that are consistent with ‘practicability’.

The development of accounting practices which reflect the full cost of waste production and management does not impose any new cost on industry but rather aims to provide individual companies with the necessary financial information to make sound and cost-effective business decisions.

The impact of this policy on the prices charged for disposal of prescribed industrial waste is expected to be marginal. While this policy will affect the underlying cost of operating a Class 1 facility by requiring improved design and operation, the price charged for disposal of prescribed industrial waste is likely to be determined largely by:

- Market factors, including the limited availability of disposal facilities able to accept a broad range of prescribed industrial waste.
- The $10/tonne levy on disposal of prescribed industrial waste to landfill.

On this basis, industry sources indicate that disposal prices in order of $100/tonne may be expected in the short term.

While costs for disposal to an existing Class 1 facility may be expected to rise, further adoption of the waste management hierarchy will result in reduced volumes being consigned

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59 A review of projects undertaken as part of the Cleaner Production Partnerships Program indicates industry partners have saved $4 for every dollar they have invested, and $30 for every dollar invested by EPA.
to landfills and containment facilities. In some cases, increased waste management costs will be offset by reduced waste generation.

Direct costs to industry include:

- A small cost in classifying a prescribed industrial waste where EPA has not done so.
- Where a generator wishes to propose an alternative classification, a cost in the order of $1,000 to $3,000 may be incurred in preparing the application.
- Where a generator is required to prepare an environment improvement plan, a cost of $1,500 to $25,000 may be incurred depending on the size and complexity of the premises. This reflects existing requirements under the *IWMP (Waste Minimisation)* 1990 and therefore is not a new cost. Experience with implementing these existing requirements shows that generators can expect to obtain substantial benefit in understanding of their waste streams and savings through reduced waste as a result of preparing an environment improvement plan.
- Where an environment improvement plan is certified by an environmental auditor, a cost of $500 to $5,000 may be incurred.

As previously discussed, these costs are expected to be relatively minor compared with the potential disruption to industry that would occur if they were unable to dispose of their wastes and with the potential savings that may be realised through waste avoidance. Further, the policy will provide the necessary certainty to the waste management industry to invest in new facilities for recovering resources from the waste stream. Such facilities will increase the management options available to waste generators.

Under the policy, generators are required to ensure that they do not mix or dilute prescribed industrial waste such that the potential for reuse or recycling is reduced. For example, prescribed industrial waste should only be discharged to sewer where there is no practicable option for reuse or recycling. Where discharge of a prescribed industrial waste to sewer limits the reuse of sewerage treatment plant effluent or sludge, and a practicable alternative exists, a generator may be required to adopt the alternative management option if this achieves the best practicable environmental outcome. This requirement is consistent with the provisions of the *IWMP (Waste Minimisation)* 1990.

### 7.3 Contaminated land development

The impacts of this policy on contaminated soil management should be considered particularly in the context of redevelopment of former industrial sites. The ‘drivers’ underlying management of contaminated soils differ from those of wastes from the manufacturing sector, in that the origin of the wastes is largely historical. Redevelopment of former industrial land generally results in a community benefit through returning a disused, aesthetically impacted site affecting the broader environment, to a new use, with the anticipated return from development used to fund the works required to restore and protect the environment.

The impacts of the policy on the management of contaminated soil and the development of former industrial sites are summarised as follows:

- It requires developers and others to adopt alternatives to containment, such as on-site management or off-site reuse or treatment, where these are practicable.
• It will increase the cost of operating a Class 1 facility, albeit marginally in comparison to current prices and expected increases occurring irrespective of the policy.

• Increased costs for the disposal/containment of soils will make some treatment technologies more competitive, creating opportunities for diverting contaminated soil away from specifically engineered landfills. Land development economics are already forcing developers to seek more efficient means of delivering remediated sites, particularly through reuse and on-site management of contaminated soil.

• The adoption of treatment as an alternative to landfill disposal/placement in containment facilities in general is not expected to substantially reduce the cost of site remediation. However, where practicable, treatment to enable reuse of soil often yields a better environmental outcome than disposal/containment. Other benefits include:
  – preservation of space in existing landfills/containment facilities for wastes that cannot practicably be treated;
  – cost savings from a reduced need for imported clean fill to replace contaminated soil placed in a landfill/containment facility;
  – reduced ongoing liability; and
  – competitive advantage arising from adopting environmentally sound approaches.

• Off-site reuse and on-site management of contaminated soil are likely to increase substantially, especially through use of repositories or leaving contaminated soil in place where it does not pose an unacceptable risk to human health or the environment. This is already occurring in response to increased landfill disposal prices, particularly for large developments. The policy highlights the requirement for planning and other mechanisms to ensure long term maintenance and monitoring of reuse and on-site management schemes.

• Adoption of on-site management and off-site reuse of contaminated soil will in part depend on market acceptance of sites on which contaminated soil is being managed or reused. Some discount on the purchase price of the land may be anticipated, though industry comments to date indicate that these tend to be small provided that any restrictions on site use are reasonable.

• The net effect of the above changes on the cost of redeveloping former industrial land, and therefore on the number of sites being redeveloped, is dependent on:
  – the manner in which developers and others responsible for remediating former industrial sites respond to the challenge of delivering remediated sites for development, and
  – the response of the market to sites on which contaminated soil will be managed on an ongoing basis.

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60 Contaminated soils most likely to be diverted to treatment are those contaminated by organics only. These comprised 31% of the contaminated soil disposed to specifically engineered landfill in 1998.

61 If the costs of redevelopment, including remediation, increase it may be expected that some sites will not be economic to develop in the short term. Redevelopment of these sites may depend on subsequent increases in land value to support the higher costs.
7.4 Waste management

The waste management industry is a key element of the infrastructure required to support continued economic development in Victoria. It is important that this industry is able to assist the manufacturing and related sectors with the management of wastes that cannot be avoided or reused on-site. Structural change is occurring in the waste management industry, challenging the viability of some activities, resulting in price increases for some services, and creating significant opportunities for investment and capacity development in other areas.

This policy is designed to provide direction and certainty to the waste management sector. These are essential to facilitate investment in the new facilities required to meet increasing community expectations and requirements for the safe long term management of prescribed industrial waste, and to enable the industry to respond to market-driven structural change.

Environment performance reports prepared by receivers of prescribed industrial waste will assist in providing a level of assurance to the community regarding the protection of human health and the environment. This will in turn benefit industry through improved community relations and ongoing acceptance of facility operation. Preparation of an environmental performance report for a facility receiving prescribed industrial waste is expected to cost less than $5000, given the report does not require the collection of any new information. This requirement applies to all facilities receiving prescribed industrial waste, including landfills, commercial waste treatment providers and operators of sewerage treatment plants receiving prescribed industrial waste as part of the trade waste stream.

Other impacts specific to containment facility and landfill operations, and waste treaters/managers are outlined below.

Containment facility/landfill operations

- Implementation of this policy is designed to achieve significant reductions in the volume of waste currently disposed to landfill and adoption of the best design, operation and post-care of containment facilities.

- These improvements will enhance protection of the environment in accordance with community expectations. This is likely to be an important factor influencing community attitudes towards the establishment of any containment facilities.

- Higher landfill standards, coupled with a diminishing volume of waste consigned to existing Class 1 facilities, are expected to increase the underlying cost of disposal. However, disposal prices are expected to be largely governed by market forces in the short to medium term.

- A reduction in disposal prices may occur for some low hazard prescribed industrial wastes suitable for acceptance at a Class 2 facility, but this may be offset by the requirement for improved design and operation of these facilities.

- Diversion of some prescribed industrial waste from Class 1 to Class 2 facilities is likely to affect the operation of these facilities. Change may be needed to management procedures for particular wastes (eg. immediate burial of odorous wastes), to infrastructure requirements in order that prescribed wastes can be received (eg. use of TRANCERT system), and training of staff.

- EPA may, where a higher practicable alternative exists, prohibit the disposal to landfill/containment of specified prescribed industrial wastes. This will be done by
licence amendment and may affect the volumes of prescribed industrial waste consigned to landfill and/or containment facilities.

**Waste treaters/managers**

- Implementation of the policy is expected to provide the waste treatment sector with the certainty required to sustain commitment to investment in new facilities for treatment, reuse, recycling and recovery of energy. Waste treatment businesses should recognise significant opportunities in these changed market conditions.
- Some reduction in waste volumes requiring treatment may follow the renewed focus on waste avoidance and reuse, recycling and recovery of energy. This may be offset by increases in waste volumes diverted from containment facilities for pre-treatment enabling reuse, recycling or recovery of energy, or treatment required to reduce hazard prior to long term storage.
- Current restructuring activities in the waste treatment sector will not be affected by implementation of the policy, other than through the provision of direction and certainty to encourage new investment.
- Investment in new technologies to treat, reuse, recycle and recover wastes will be encouraged in programs to be developed by EPA.
- Where acceptance of prescribed industrial waste for treatment as trade waste in a sewerage treatment plant precludes the reuse of effluent or sludge from the plant, a treater may be required to reject the waste, so long as this results in the best practicable environmental outcome.

**7.5 Impacts on the community**

The impact of this policy on the broader community may be summarised as follows:

- The policy provides mechanisms to ensure that prescribed industrial wastes are avoided or reused, recycled or subject to energy recovery, and that residual wastes are managed safely, in accordance with community expectations, thereby assuring the community that the environment is being protected.
- Reductions in the quantity of waste disposed to landfill and adoption of best standards of design and operation of containment facilities will improve environmental quality and reduce the burden on future generations for management of those facilities.
- The policy supports economic development in Victoria, to the benefit of all Victorians, by promoting efficient resource use and by encouraging innovation and competition in the waste management industry.
- The policy encourages the public in their role as consumers to influence industry’s waste management practices through purchasing preferences.
- The cost of managing prescribed industrial waste is, in general, a marginal component of overall industry costs, so any changes in these costs in response to the policy will have negligible effect on the price of consumer goods and services.
APPENDIX 1: BACKGROUND DATA ON GENERATION AND MANAGEMENT OF PRESCRIBED INDUSTRIAL WASTE

Generators of prescribed industrial waste

Table A1.1 presents a breakdown of generators of prescribed industrial waste who transport prescribed industrial waste off-site other than by sewer, by the number of transport certificates. This may be used as an indicator of the relative quantity of prescribed industrial waste generated, as each consignment must be accompanied by a transport certificate.

Table A1.1: Distribution of Producers by Number of Transport Certificates Used

<table>
<thead>
<tr>
<th>No. transport certificates per year</th>
<th>Average no. of certificates per year</th>
<th>Proportion of waste producers</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>2</td>
<td>83%</td>
</tr>
<tr>
<td>10–99</td>
<td>21</td>
<td>15%</td>
</tr>
<tr>
<td>100–999</td>
<td>250</td>
<td>2%</td>
</tr>
<tr>
<td>&gt;1,000</td>
<td>2,000</td>
<td>0.05%</td>
</tr>
</tbody>
</table>

Generation of prescribed industrial waste by waste type

Estimates of the quantities of prescribed industrial waste transported off-site other than by sewer, as reported from the TRANCERT database, are presented in the following section. The information is presented by waste type with charts showing the breakdown of the quantities of prescribed industrial waste for 1995 and 1998. It allows some understanding of the trends in prescribed industrial waste generation and management.

Approximately 255,000 tonnes and 356,000 tonnes of liquid and solid prescribed industrial waste were waste transported off-site other than by sewer in 1998. The breakdown by waste type is presented in figures A1.1 and A1.2. Figure A1.3 presents further detail on the breakdown of solid/sludge waste requiring special handling that was transported off-site in 1998.
Figure A1.1: Liquid Prescribed Industrial Waste Transported Off-site (other than by sewer) in 1998 (255,000 tonnes)

Figure A1.2: Solid Prescribed Industrial Waste Transported Off-site in 1998 (356,000 tonnes)
Figure A1.3: Solid and Sludge Wastes Requiring Special Handling Transported Off-site in 1998

Approximately 285,000 tonnes and 315,000 tonnes of liquid and solid prescribed industrial waste were waste transported off-site other than by sewer in 1995. The breakdown by waste type is presented in figures A1.4 and A1.5.
Figure A1.4: Liquid Prescribed Industrial Waste Transported Off-site (other than by sewer) in 1995 (285,000 tonnes)
Transported Off-site in 1998 (315,000 tonnes)

**Figure A1.5: Solid Prescribed Industrial Waste Transported Off-site in 1998 (315,000 tonnes)**
Figures A1.1 to A1.5 use general descriptions of waste types, derived from the coding system used to construct the TRANCERT database. Examples of specific waste streams included in general waste type descriptions used in figures A1.1 to A1.5 include:

<table>
<thead>
<tr>
<th>Solid/sludge waste</th>
<th>Contaminated soil</th>
<th>Asbestos</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Filter cake (from treatment of waste waters)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chemically fixed wastes (treatment plant sludges treated to reduce leachability)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Containers and drums</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Solidified or polymerised wastes (eg. oily sludge from petroleum/chemical industry solidified with cement kiln dust)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inert wastes</th>
<th>Clay and ceramic sludges</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Inorganic chemicals</td>
<td>Dross and slag from non-ferrous metal (eg. aluminium) smelting</td>
<td></td>
</tr>
<tr>
<td>Putrescible organic wastes</td>
<td>Food processing wastes (eg. scallop shell wastes)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Oils/ Hydrocarbons</th>
<th>Waste oil</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Oily sludges from tank bottoms in petroleum industry</td>
</tr>
<tr>
<td></td>
<td>Waste cutting oils</td>
</tr>
<tr>
<td></td>
<td>Tarry residues from distillation processes</td>
</tr>
<tr>
<td>Washwaters</td>
<td>Equipment and vehicle washwater from various industries</td>
</tr>
<tr>
<td>Acids</td>
<td>Waste solvent from range of industries including dry cleaning, electronic, paint</td>
</tr>
<tr>
<td>Organic solvents</td>
<td>Pickling liquor from steel processing</td>
</tr>
<tr>
<td></td>
<td>Solutions and rinses from the plating and metal finishing industry</td>
</tr>
<tr>
<td>Alkalis</td>
<td>Scrubber liquor from petroleum and other industries</td>
</tr>
</tbody>
</table>

**Trends in generation of prescribed industrial waste**

Estimates of the quantities of prescribed industrial waste transported off-site other than by sewer since 1990, as derived from the TRANCERT database, are shown in tables A1.2 and A1.3 for liquid and solid prescribed industrial waste respectively. There are some significant limitations in these data as discussed at the end of this appendix.
Table A1.2: Liquid Prescribed Industrial Waste Transported Off-site (other than by sewer) by Waste Type from 1990 to 1998 (tonnes)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface treatment and heat</td>
<td>1,782</td>
<td>1,202</td>
<td>739</td>
<td>919</td>
<td>748</td>
<td>220</td>
<td>102</td>
<td>208</td>
<td>51</td>
</tr>
<tr>
<td>heat treatment wastes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acids</td>
<td>8,456</td>
<td>8,952</td>
<td>9,029</td>
<td>9,630</td>
<td>9,329</td>
<td>15,236</td>
<td>10,452</td>
<td>13,013</td>
<td>11,994</td>
</tr>
<tr>
<td>Alkalis</td>
<td>10,511</td>
<td>9,039</td>
<td>15,959</td>
<td>22,590</td>
<td>17,603</td>
<td>15,912</td>
<td>12,319</td>
<td>11,873</td>
<td>10,623</td>
</tr>
<tr>
<td>Inorganic chemicals</td>
<td>6,159</td>
<td>5,726</td>
<td>3,901</td>
<td>4,360</td>
<td>3,126</td>
<td>9,538</td>
<td>4,655</td>
<td>3,720</td>
<td>2,968</td>
</tr>
<tr>
<td>Reactive chemicals</td>
<td>304</td>
<td>162</td>
<td>224</td>
<td>98</td>
<td>55</td>
<td>43</td>
<td>30</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td>Photographic waste</td>
<td>4,575</td>
<td>11,480</td>
<td>7,646</td>
<td>8,321</td>
<td>8,217</td>
<td>7,297</td>
<td>7,552</td>
<td>6,181</td>
<td>6,734</td>
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<tr>
<td>Paints, resins, inks, dyes</td>
<td>14,104</td>
<td>13,026</td>
<td>16,529</td>
<td>13,626</td>
<td>14,649</td>
<td>19,249</td>
<td>14,442</td>
<td>16,863</td>
<td>16,308</td>
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<tr>
<td>and adhesives</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organic solvents, solvent</td>
<td>5,311</td>
<td>5,907</td>
<td>6,358</td>
<td>5,544</td>
<td>4,119</td>
<td>4,930</td>
<td>3,577</td>
<td>3,557</td>
<td>4,843</td>
</tr>
<tr>
<td>residues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pesticides</td>
<td>18</td>
<td>51</td>
<td>99</td>
<td>42</td>
<td>202</td>
<td>272</td>
<td>88</td>
<td>216</td>
<td>150</td>
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<tr>
<td>Oils, oil/water mixtures and</td>
<td>51,531</td>
<td>63,003</td>
<td>58,866</td>
<td>62,055</td>
<td>71,427</td>
<td>72,616</td>
<td>76,414</td>
<td>68,427</td>
<td>70,814</td>
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<tr>
<td>oily residues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Textile wastes</td>
<td>6,264</td>
<td>10,010</td>
<td>2,994</td>
<td>3,455</td>
<td>7,899</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Putrescible organic wastes</td>
<td>29,491</td>
<td>38,646</td>
<td>64,559</td>
<td>64,038</td>
<td>66,520</td>
<td>67,009</td>
<td>68,509</td>
<td>68,562</td>
<td>93,046</td>
</tr>
<tr>
<td>Washwater and effluent</td>
<td>8,725</td>
<td>8,845</td>
<td>12,091</td>
<td>11,681</td>
<td>30,033</td>
<td>67,832</td>
<td>31,028</td>
<td>24,771</td>
<td>31,748</td>
</tr>
<tr>
<td>Inert wastes</td>
<td>6,921</td>
<td>1,842</td>
<td>2,954</td>
<td>3,925</td>
<td>1,553</td>
<td>1,237</td>
<td>1,313</td>
<td>1,557</td>
<td>1,949</td>
</tr>
<tr>
<td>Organic chemicals</td>
<td>806</td>
<td>1,941</td>
<td>6,302</td>
<td>5,294</td>
<td>4,712</td>
<td>1,955</td>
<td>1,144</td>
<td>1,081</td>
<td>1,151</td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>1,739</td>
<td>831</td>
<td>214</td>
<td>527</td>
<td>130</td>
<td>114</td>
<td>3,760</td>
<td>2,265</td>
<td>2,265</td>
</tr>
<tr>
<td>Total</td>
<td>156,697</td>
<td>180,663</td>
<td>208,464</td>
<td>216,105</td>
<td>240,322</td>
<td>283,460</td>
<td>235,385</td>
<td>222,319</td>
<td>254,659</td>
</tr>
</tbody>
</table>
Table A1.3: Solid Prescribed Industrial Waste Transported Off-site by Waste Type from 1990 to 1998 (tonnes)

<table>
<thead>
<tr>
<th></th>
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<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface treatment and heat treatment wastes</td>
<td>153</td>
<td>164</td>
<td>18</td>
<td>43</td>
<td>58</td>
<td>61</td>
<td>9</td>
<td>11</td>
<td>10</td>
</tr>
<tr>
<td>Acids</td>
<td>25</td>
<td>39</td>
<td>131</td>
<td>87</td>
<td>174</td>
<td>156</td>
<td>246</td>
<td>33</td>
<td>31</td>
</tr>
<tr>
<td>Alkalis</td>
<td>810</td>
<td>1,524</td>
<td>2,026</td>
<td>13,910</td>
<td>2,966</td>
<td>7,598</td>
<td>2,879</td>
<td>2,226</td>
<td>3,126</td>
</tr>
<tr>
<td>Inorganic chemicals</td>
<td>16,033</td>
<td>25,873</td>
<td>28,091</td>
<td>39,527</td>
<td>40,436</td>
<td>31,365</td>
<td>35,025</td>
<td>33,905</td>
<td>36,926</td>
</tr>
<tr>
<td>Reactive chemicals</td>
<td>34</td>
<td>40</td>
<td>48</td>
<td>112</td>
<td>60</td>
<td>19</td>
<td>36</td>
<td>29</td>
<td>12</td>
</tr>
<tr>
<td>Paints, resins, inks, dyes and adhesives</td>
<td>3,276</td>
<td>4,211</td>
<td>4,196</td>
<td>7,697</td>
<td>4,954</td>
<td>12,679</td>
<td>6,996</td>
<td>6,142</td>
<td>6,998</td>
</tr>
<tr>
<td>Organic solvents, solvent residues</td>
<td>143</td>
<td>1,604</td>
<td>212</td>
<td>129</td>
<td>151</td>
<td>86</td>
<td>47</td>
<td>51</td>
<td>144</td>
</tr>
<tr>
<td>Pesticides</td>
<td>74</td>
<td>8</td>
<td>74</td>
<td>11</td>
<td>168</td>
<td>241</td>
<td>49</td>
<td>291</td>
<td>345</td>
</tr>
<tr>
<td>Oils, oil/water mixtures and oily residues</td>
<td>354</td>
<td>360</td>
<td>1,161</td>
<td>1,339</td>
<td>1,071</td>
<td>2,577</td>
<td>3,040</td>
<td>2,639</td>
<td>1,785</td>
</tr>
<tr>
<td>Textile wastes</td>
<td>1,164</td>
<td>5,645</td>
<td>8,467</td>
<td>7,702</td>
<td>4,590</td>
<td>9,508</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Putrescible organic wastes</td>
<td>2,571</td>
<td>3,694</td>
<td>8,818</td>
<td>10,637</td>
<td>4,808</td>
<td>6,372</td>
<td>15,357</td>
<td>18,621</td>
<td>16,236</td>
</tr>
<tr>
<td>Inert wastes</td>
<td>1,450</td>
<td>12,797</td>
<td>12,890</td>
<td>17,090</td>
<td>1,020</td>
<td>270</td>
<td>5,414</td>
<td>6,973</td>
<td>1,468</td>
</tr>
<tr>
<td>Organic chemicals</td>
<td>2,876</td>
<td>1,464</td>
<td>804</td>
<td>873</td>
<td>1,484</td>
<td>1,261</td>
<td>551</td>
<td>416</td>
<td>713</td>
</tr>
<tr>
<td>Contaminated containers</td>
<td>6,473</td>
<td>12,758</td>
<td>19,754</td>
<td>22,805</td>
<td>31,435</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immobilised wastes</td>
<td>6,276</td>
<td>31,502</td>
<td>20,110</td>
<td>33,823</td>
<td>35,123</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid/sludge waste requiring special handling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>185,610</td>
<td>194,275</td>
<td>276,025</td>
<td>252,169</td>
<td></td>
</tr>
<tr>
<td>Miscellaneous</td>
<td>63,302</td>
<td>112,549</td>
<td>94,618</td>
<td>135,491</td>
<td>77,560</td>
<td>32,136</td>
<td>5,646</td>
<td>5,224</td>
<td>5,567</td>
</tr>
<tr>
<td>Clinical wastes/pharmaceutical wastes</td>
<td>15,995</td>
<td>15,743</td>
<td>15,131</td>
<td>23,933</td>
<td>24,415</td>
<td>22,542</td>
<td>27,370</td>
<td>30,096</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>105,014</td>
<td>230,227</td>
<td>217,161</td>
<td>306,407</td>
<td>229,991</td>
<td>314,354</td>
<td>292,112</td>
<td>379,956</td>
<td>355,626</td>
</tr>
</tbody>
</table>
Treatment/disposal of prescribed industrial waste

The proportion of prescribed industrial waste undergoing each treatment/disposal option is presented for 1998 and 1995. Again, the information is derived from the TRANCERT database and does not account for wastes discharged to sewer or managed on-site. Frequently treatment of liquid prescribed industrial wastes results in a solid prescribed industrial waste requiring further treatment or disposal.\(^{62}\)

The treatment and/or disposal options adopted for liquid and solid prescribed industrial wastes transported off-site other than by sewer in 1998 are shown in figures A1.6 and A1.7 respectively.

![Pie chart showing treatment/disposal options for prescribed industrial waste.]

**Figure A1.6: Liquid Prescribed Industrial Waste Transported Off-site (other than by sewer) in 1998 by Treatment/Disposal Type**

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\(^{62}\) A limited amount of double counting therefore occurs in estimates of the generation of prescribed industrial waste.
Figure A1.7: Solid Prescribed Industrial Waste Transported Off-site in 1998 by Treatment/Disposal Type

The treatment and/or disposal options adopted for prescribed industrial wastes transported off-site other than by sewer in 1995 are shown in figure A1.8. Figure A1.8 presents the combined data for solid and liquid prescribed industrial waste.
Figure A1.8: Prescribed Industrial Waste Transported Off-site (other than by sewer) by Treatment Type for 1995
**Trends in generation and management of prescribed industrial waste 1995–1998**

Figure A1.9 shows the generation of solid prescribed industrial waste from 1995 to 1998, divided into:

- prescribed industrial waste (excluding contaminated soil) disposed to specifically engineered landfill;
- contaminated soil disposed to specifically engineered landfill; and
- prescribed industrial waste managed by other routes, including treatment, reuse and disposal to landfills other than a specifically engineered landfill.

![Data Chart](image)

**Figure A1.9: Off-site Transport and Management of Solid Prescribed Industrial Waste from 1995 to 1998**

**Prescribed industrial waste received by landfill**

Disposal to landfill has historically been the most common means by which solid prescribed industrial wastes have been managed. Liquid industrial waste was also disposed to landfill until the late 1980s. Two engineered landfills are licensed to receive a broad range of prescribed industrial waste in Victoria: Cleanaway–Tullamarine and Pacific Waste Management–Lyndhurst. Data for prescribed industrial waste received by specifically engineered landfill presented below relates only to prescribed industrial waste received by Cleanaway–Tullamarine and Pacific Waste Management–Lyndhurst.

A number of well-engineered municipal landfills across Victoria are also licensed to receive selected prescribed industrial wastes, typically food processing wastes, asbestos and/or low level contaminated soils.
The quantity of prescribed industrial waste received, broken-down by waste type, is presented in this section as follows:

- Figure A1.10 Received by landfill (of any type) in 1998 (254,000 tonnes)
- Figure A1.11 Received by specifically engineered landfill in 1998 (208,000 tonnes)
- Figure A1.12 Received by specifically engineered landfill in 1995 (225,000 tonnes).

Figure A1.10: Prescribed Industrial Waste Received by All Landfills in 1998 (254,000 tonnes)
Figure A1.11: Prescribed Industrial Waste to Specifically Engineered Landfill in 1998 (208,000 tonnes)

Figure A1.12: Prescribed industrial waste to specifically engineered landfill in 1995 (225,000 tonnes)
Prescribed industrial waste received and generated by waste treaters

Providers of treatment services for prescribed industrial waste receive a wide range of wastes and the residues of treatment are a major contributor to the prescribed industrial waste received by specifically engineered landfills. An understanding of the waste received by waste treaters is important in developing an understanding of the original source of wastes received by specifically engineered landfills.

The following information is derived from that obtained from the TRANCERT database for the five waste treaters contributing the largest quantities of prescribed industrial waste to specifically engineered landfill. The five waste treaters together account for approximately 80% of the prescribed industrial waste disposed to specifically engineered landfill by waste treaters.

Analysis of the data in this manner excludes those treaters or reprocessors which do not generate large quantities of prescribed industrial waste. As previously noted, examples include:

- facilities for the treatment/disposal of clinical and pharmaceutical wastes; and
- facilities reprocessing prescribed industrial waste to produce a product, eg. waste derived fuel produced by Teris Pty Ltd.

The following information is presented in this section:

- Figure A1.13 Prescribed industrial waste received by waste treaters by waste type
- Figure A1.14 Prescribed industrial waste ‘generated’ by waste treaters by waste type
- Figure A1.15 Prescribed industrial waste ‘generated’ by waste treaters by treatment/disposal type
- Figure A1.16 Prescribed industrial waste disposed to specifically engineered landfill by waste treaters by waste type.
Managing Prescribed Industrial Waste – Policy Impact Assessment

Figure A1.13: Prescribed Industrial Waste Received by Major Waste Treaters by Waste Type in 1998 (125,000 tonnes)

Figure A1.14: Prescribed Industrial Waste Generated by Major Treaters by Waste Type in 1998 (65,000 tonnes)
Figure A1.15: Prescribed Industrial Waste Generated by Major Treaters by Treatment Type in 1998 (65,000 tonnes)

Figure A1.16: Prescribed Industrial Waste to Specifically Engineered Landfill by Major Waste Treaters in 1998 (52,000 tonnes)
Source and limitations of data

The information on generation (or transport off-site other than by sewer) and management of prescribed industrial waste presented on the previous page is largely derived from the TRANCERT database. The TRANCERT database contains information from the prescribed waste transport certificate system which is designed primarily to provide a level of surety that wastes are transported by and received by appropriate persons (ie. in permitted trucks and at facilities with a licence or an exemption allowing reuse, recycling or recovery of energy). The TRANCERT database, by aggregating the information provided in individual transport certificates, provides information on the generation and management of prescribed industrial wastes in Victoria. However, there are limitations in the use of the data for this purpose, as summarised below.

- TRANCERT only records prescribed industrial waste transported off-site, other than by sewer. It does not account for the discharge of prescribed industrial waste in trade waste or prescribed industrial wastes which are managed on-site.

- The transport certificates are completed by a representative of the waste generator. The accuracy of the information derived from the database is therefore dependent on the accuracy of information reported in the transport certificates.

- The transport certificate system is designed to track wastes rather than estimate generation. Therefore, a separate transport certificate is generated each time a consignment of waste leaves a premises, whether or not it is the original generator or an intermediate storage facility. This results in some double counting of the waste. Where practical, correction of the raw data has been undertaken to account for this.

- The regulatory system introduced in 1987 took some time to ‘bed in’. In the late 1980s, prescribed industrial waste producers, transporters and receivers were less familiar with how to record quantities and types of waste, and the accuracy of the information is therefore likely to change over time.

- The number of waste categories has increased over time.

- The surge in inner city property development in the 1990s, in parallel with increased requirements for the identification and management of contaminated soils, has had a large impact on the quantities of ‘solid/sludge waste requiring special handling’.

- Isolated incidents can significantly affect the data such as waste generated as a result of emergency incidents (eg. fire water from the Coode Island fires).
APPENDIX 2: CONTAMINATED LAND DEVELOPMENT

Background

Context

Contaminated soils are mainly derived from redevelopment of old industrial sites, old service stations and similar properties, and represent the largest single category of prescribed industrial waste disposed to landfill. Contaminated waste soil differs from other prescribed industrial wastes in a number of ways, and for this reason is considered separately here.

Most other prescribed industrial wastes derive from the ongoing manufacturing of goods and services, but contaminated soils are a more finite waste source, being largely a historical legacy of practices that are no longer acceptable, such as spills that were not cleaned up, leaking storage tanks or improper waste disposal.

Consequently, application of the policy – particularly the waste management hierarchy – will be different for contaminated soils. At first sight it does not appear possible to apply waste avoidance to a historical problem. However, it is possible to minimise the amount of contaminated soil requiring management by careful assessment and management of on-site works. Also, many treatment technologies allow reuse of the resulting clean soil without additional restrictions, so that these may be preferred under the waste hierarchy.

Unlike most other prescribed industrial waste streams, generation of contaminated waste soil often directly corresponds with a significant environmental benefit, since remediation reduces the environmental liability of a contaminated site and allows disused industrial properties to return to productive use.

Finally, the amount of waste contaminated soil generated in any period is more variable than other prescribed industrial waste streams because it depends entirely on the amount of development occurring at the time. A major site remediation project can readily generate 100,000 tonnes of contaminated and low level contaminated soil. A number of planned site redevelopments in Melbourne have the potential to generate large quantities of contaminated soil requiring management over the next several years. For example, in the order of 200,000 to 300,000 m$^3$ of contaminated soil requires management as part of the redevelopment of the West Melbourne Gasworks in the Docklands Project.

Contaminated site remediation is largely driven by land value and the economics of land development. An understanding of these matters is therefore critical to an understanding of the impacts of the policy.

The industry

The land development industry generating contaminated soils broadly consists of:

- A small number of major developments involving the remediation of contaminated sites (eg. City Link, Docklands, South Melbourne Gasworks, Albion Explosives Factory, ADI – Footscray).
- A relatively large number of small to medium-sized developments, typically involving medium density housing redevelopment of former inner city industrial or warehouse properties.
Major divestment programs resulting in development of sites for either commercial or residential purposes (e.g. divestment of service station sites by the oil industry, divestment of school and works depot sites by Government).

Remediation of contamination can also occur at sites where no change of use is proposed, typically at industrial sites or service stations. Often this is opportunistic or in response to company policies or regulatory requirements. However, these sites contribute only a small fraction of Victoria’s contaminated waste soil.

Key players in the land development industry are:

- property owners, including major corporations, Government and individual owners;
- developers, both major and small; 53
- assessment and remediation consultants and contractors, who typically direct remediation works and, in some cases, apply technologies for on-site remediation;
- financial institutions; and
- the waste management industry, including specifically engineered landfills, landfills accepting low level contaminated soils, and off-site treaters of contaminated soil (e.g. stabilisation prior to land filling).

Management of contaminated soils

Much of the contaminated soil currently encountered in redevelopment sites is landfilled, as this delivers a site with minimal restrictions, is relatively quickly implemented, and until recently was moderately priced. In 1998, 72,000 tonnes of contaminated soil and approximately 250,000 tonnes of low level contaminated soil was disposed to landfill.

Significant quantities of contaminated soil and low level contaminated soil have also been managed by:

- **Bioremediation/landfarming on-site** – This treatment is typically applied to soils removed during service station remediation, allowing reuse on-site. It is estimated that 75,000 to 120,000 m$^3$ of contaminated soil was treated or otherwise managed on-site in 1998 as part of retail and regional distribution network divestment programs in the petroleum industry.

- **Thermal treatment, stabilisation and other treatment** – A relatively minor amount of soil (likely to be less than 20,000 tonnes per year) is treated by these processes. About 5,000 tonnes were stabilised or chemically fixed prior to disposal at a specifically engineered landfill in 1998. Thermal desorption was applied to some 20,000 tonnes of contaminated soil from the former St Mary’s munition factory in Sydney and is currently being applied to soil from Sydney’s former Mortlake gasworks site.

- **On-site management/reuse** – This is increasingly used to minimise waste generation. Typically low level contaminated soil may be left at depth beneath a concrete foundation slab as part of a commercial or medium density residential development. EPA’s contaminated land audit system provides certainty regarding the suitability of such sites for use.

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53 Smaller developers typically focus on redevelopment of inner city property for medium density housing use, and are frequently represented by architects project managing works.
• *On-site repository* – Where large quantities of contaminated soil are generated and there is enough room, an on-site repository can be a practical alternative. The area may later be used as a passive recreational area as part of the redevelopment. The proposed repository at the Albion Explosives Factory is designed to receive about 200,000 m$^3$ of contaminated soil and low level contaminated soil.

• *Off-site reuse* – Generally minor quantities to date, though some 100,000 tonnes of low level contaminated soil were entombed beneath a bridge on the Western Ring Road.

A range of alternatives available for management of contaminated soils is summarised in table A2.1, together with indicative costs and comments on applicability.

The relative cost of landfilling, compared to other options, has historically precluded the establishment of economically viable soil treatment systems, other than relatively low cost on-site bioremediation and related technologies. In the face of landfill disposal costs which, for a variety of reasons, are increasing, some companies are investigating the broader costs and benefits, including potential liability, of various management alternatives, rather than simply selecting the option with the lowest up-front cost.
### Table A2.1 – Summary of Selected Remediation Technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Cost</th>
<th>Applicability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landfill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Contaminated coil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>– Low level contaminated soil</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$65/tonne (projected to reach $90/tonne in 2000)</td>
<td>Most contaminants and soil types</td>
</tr>
<tr>
<td></td>
<td>$3–25/tonne</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Add $10/tonne levy for disposal of prescribed industrial waste to landfill</td>
<td></td>
</tr>
<tr>
<td>On-site repository</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$30–50/tonne</td>
<td>Most contaminants. Concentrations limited by setting and design of repository</td>
</tr>
<tr>
<td>Bioremediation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$20–50/tonne</td>
<td>Light hydrocarbons</td>
</tr>
<tr>
<td></td>
<td>$50–100/tonne</td>
<td>Heavy hydrocarbons, polycyclic aromatic hydrocarbons ¹</td>
</tr>
<tr>
<td></td>
<td>$400/tonne</td>
<td>Upper range, chlorinated organics ¹</td>
</tr>
<tr>
<td>Thermal desorption</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$90–130/tonne – direct</td>
<td>Organics (not chlorinated)</td>
</tr>
<tr>
<td></td>
<td>$130–250/tonne – indirect ²</td>
<td>Organics, including chlorinated organics</td>
</tr>
<tr>
<td>Co-burning</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$50/tonne (approx)</td>
<td>Organics (not chlorinated)</td>
</tr>
<tr>
<td>Base catalysed dechlorination (BCD)³</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$250–350/tonne</td>
<td>Chlorinated organics</td>
</tr>
<tr>
<td>Soil washing</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$100–150/tonne</td>
<td>Most contaminants, limited to soils with low fines content</td>
</tr>
</tbody>
</table>

Notes:

1. Although a cost is given for treating these types of contaminated soil, there is a significant risk that remediation objectives will not be achieved.
2. Generates a concentrate requiring further management, eg. treatment using another technology.
3. Incorporates indirect thermal desorption. Some treatment occurs within the thermal desorber. A condensate can be collected for further treatment if required.
4. Generally, costs relate to gate prices for landfill disposal and co-burning, and ‘stockpile to stockpile’ costs for treatment technologies. Additional costs may be incurred in excavation, transport and other handling.

Several large remediation projects have adopted alternatives to landfill disposal due to the significant disposal cost, and, in particular, the relatively high marginal cost of disposal, when additional materials are uncovered requiring management. On-site management, including use of engineered repositories, is increasingly common and off-site reuse is also increasing. Management of contaminated soil on-site or reuse off-site may require ongoing

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64 Based on current rather than anticipated prices.
management, for example, maintenance of a cap and monitoring of groundwater, to ensure protection of the environment. It is important that systems are established and maintained to ensure these options are appropriately managed into the long term.

The increases in landfill disposal prices are now making treatment of some contaminated soil, such as thermal desorption systems, more competitive. While there is a significant establishment cost associated with many treatment technologies, the lower marginal cost of treatment makes them more attractive for large projects. However, there is frequently significant technical risk associated with implementation of technology-based solutions, though this is likely to diminish over time.

Cost considerations have already resulted in diversion of much of the relatively easily treated contaminated soil from specifically engineered landfill. Soil which continues to be disposed to specifically engineered landfill is either more difficult to treat (and hence treatment is currently not economically viable) or cannot be practicably treated (e.g., mixed metals and organics in clay soils). Treatment technologies for some difficult

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**Case example: On-site management of hydrocarbon contaminated soils by Mobil Oil Australia**

Mobil, along with the other major petroleum companies, have in recent years undertaken a major program of divestment and remediation of sites from their retail and regional distribution networks. The divestment programs are expected to continue for two to three years.

Hydrocarbon contaminated soils can be managed in a number of ways including on-site management, on-site treatment by landfarming or other methods or off-site disposal to landfill. In an effort to reduce their remediation costs, Mobil reduced the disposal of contaminated soil to landfill by:

- improved segregation of contaminated and uncontaminated materials, thus minimising the quantity of soils requiring treatment;
- matching remediation standards to the setting and likely use of the site, and matching the likely use to the condition of the site, resulting in some contaminated soils being left *in situ* where they did not adversely affect the environment, public health or use of the site; and
- maximising on-site treatment of soils.

Soil disposal (landfill) costs were reduced from $1,500,000 in 1997 to $300,000 in 1998 nationally.

The average remediation project is expected to generate 500 to 750 m$^3$ of contaminated soil that needs management. About 50 sites were remediated in Victoria in 1998, so the total contaminated soil managed was an estimated 25,000 to 38,000 m$^3$. However, only about 5000 tonnes of contaminated soil were disposed to landfill nationally, mostly from sites where time or space constraints made on-site treatment impractical.

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65 Prior to development of the policy, industry foreshadowed further increases in the landfill disposal price for prescribed industrial waste, with costs of $100/tonne anticipated in the short to medium term.

66 Technology risks are expected to decrease over time.
to treat contaminant mixtures and soil types are expected to remain significantly more expensive than landfill disposal in the short term. Particular challenges include:

- **Heavy metal contamination of fine grained soils.** A common technology proposed for the remediation of metal contaminated soils is soil washing. This approach relies on separating out the fine particles to which the metals preferentially adhere. This is not a practicable solution where the fines component is significant, say greater than 15–25%, due to the volume of sludge produced. Much of Melbourne is located on soils with a significant fines component. Heavy metal contaminated soil together with soil contaminated by a mixture or organics and heavy metals represents approximately 60% of the soil received at specifically engineered landfill in Victoria in 1998.

- **Mixed heavy metal and organic contaminated soils.** Frequently soils contaminated by a mixture of metals and organics require a two-stage process in order to achieve the nominated acceptance criteria. This significantly increases the cost of treatment. Approximately 33% of contaminated soil received by specifically engineered landfill in 1998 contained a mixture of heavy metals and organics.

However, treatment and on-site management has the advantage of not requiring imported fill, which may cost in the range of $5 to $25/m^3 depending on the quality required.

**Nature and quantity of contaminated soil transported off-site**

Estimates of the quantities of contaminated soils consigned to specifically engineered landfill since 1995 are presented in table A2.2. Low level contaminated soil received by landfills represented an additional estimated 250,000 tonnes in 1998\(^\text{67}\).

**Table A2.2 – Quantity of Contaminated Soil Received by Specifically Engineered Landfill**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tonnes</td>
<td>54,000</td>
<td>66,000</td>
<td>95,000</td>
<td>72,000</td>
</tr>
<tr>
<td>% Prescribed waste</td>
<td>24</td>
<td>37</td>
<td>39</td>
<td>34</td>
</tr>
</tbody>
</table>

Figure A2.1 gives a breakdown of contaminated soil transported off-site (mostly to landfill) in 1998 by contaminant type. Non-halogenated organics include hydrocarbons, aromatics and phenols, but much of this is probably heavier fraction hydrocarbons (as opposed to petrol) and polycyclic aromatic hydrocarbons (PAHs) as opposed to benzene and other simple aromatics. The halogenated organics are predominantly recorded as PCBs, although some halogenated solvents are included. Simple hydrocarbons are generally not disposed to landfill in significant quantities due to the relative ease of volatilisation and bioremediation, reducing contaminant levels to a point where the soil can either be classified as low level contaminated soil or fill material.

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\(^{67}\) The quantity of low level contaminated soil disposed to landfill in 1998 appears to have increased due to major infrastructure and development projects.
How much contaminated soil will require management in the future?

The quantity of contaminated soil likely to require future management (including treatment, containment, reuse or on-site management) will depend on the land redevelopment market, which is difficult to predict. The current trend toward on-site management replacing off-site disposal of contaminated soil is making it increasingly difficult to estimate the quantity of contaminated soil managed and the quantity of contaminated soil that may require management in the future. However, the following general comments may be useful.

• Conservative industry estimates indicate that over 1,000,000 m$^3$ of contaminated soil will require management over the next 3–5 years, much of this coming from a few large projects such as the former Albion Explosives Factory and the Docklands redevelopment. Substantially less than 1,000,000 m$^3$ is likely to be placed in containment facilities or landfill.

• The current cycle of redevelopment of former industrial land is expected to last another 3–5 years, although activity on some projects such as Docklands will continue beyond this. The amount of further development will then depend on trends in land value and the availability of appropriate land. Land availability, particularly in the inner to middle suburbs, will depend, in part, on closure and divestment of further industry or public sector assets. In general, the extent of contamination at these sites is likely to be less than sites with a longer history of industrial activity and waste disposal.

• Closure of a major manufacturing, chemical or petroleum facility in Victoria could substantially affect the amount of waste contaminated soil generated.

• A retail petroleum sector site divestment program has been in progress for a number of years, and industry estimates suggest it will continue for 2–3 years at current or near current levels. Generation of significant contaminated soil quantities may continue after this time if there is further rationalisation of the petroleum distribution and retail networks.
Impact of the policy

Application of the waste management hierarchy to contaminated soils

The policy establishes the waste management hierarchy as a guiding principle in the management of prescribed industrial wastes. We must therefore consider how the waste management hierarchy relates to contaminated soils. We should also consider its relationship with the site management hierarchy established in the ANZECC/NHMRC (1992) *Australian and New Zealand Guidelines for the Assessment and Management of Contaminated Soils* and the draft *State Environment Protection Policy (Prevention and Management of Contamination of Land)* 1998.

Contaminated soil becomes a prescribed industrial waste, and hence potentially subject to the provisions of the policy, when it is surplus to requirements or otherwise unwanted. This may occur because:

- the contamination makes the soil unsuitable for the current or intended use, so it must be managed, treated or removed; and
- the soil is excess to requirements, eg. excavation of a basement for car parking.

For the purposes of the policy, the ‘generator’ of the prescribed industrial waste contaminated soil is the occupier of the premises at the time the soil is excavated or determined to be in excess of requirements.

Judgement is required in applying the waste management hierarchy to contaminated sites. The following general principles should be considered:

- The goal of optimising the potential future uses of a site must be balanced against the goal of minimising generation of prescribed industrial waste. In all cases, the best practicable environmental outcome should be sought.
- In some cases it is a better environmental outcome to leave contaminated soil undisturbed and manage it on-site, rather than excavating and transporting it for placement in containment facilities. While the waste management hierarchy provides a useful guide in determining the option providing the best practicable environmental outcome, it should not be followed slavishly where other environmental issues need to be considered.
- On-site management is generally preferred to off-site management.
- Treatment of contaminated soil is preferred where it enables reuse of the soil and minimises restrictions.
- Treatment enabling soil reuse is preferable to treatment rendering soil safe for containment.
- When considering alternatives, the full life cycle impacts of each option should be considered (eg. requirement for ongoing management where a containment option is pursued).
- Reuse of contaminated soil with restrictions on land use is only acceptable if long term management systems are established to control such restrictions.
• Containment of contaminated soil, whether on-site (eg. in a repository) or off-site, is the option of last resort where this is not associated with the beneficial reuse of the containment location.

Factors affecting management of contaminated soil in accordance with the waste management hierarchy

Economic considerations

Most contaminated soil and low level contaminated soil derive from projects redeveloping former industrial land or other contaminated land for a higher value use, such as residential or commercial. Decision making in these projects is influenced by timing, cost and environmental factors. Important issues are:

• the total cost of remediation compared to the value of the remediated land, including the holding costs associated with the time taken to remediate the site;

• market acceptance and cost associated with any restrictions associated with residual contamination such as ongoing management requirements and, increasingly, liability for any future contingencies; and

• the degree of certainty associated with cost estimates and timing – Will the technology work? Can the remediation meet timing required by the property market? What if it turns out there is more contaminated soil than was estimated?

Case examples in on-site management: Albion Explosives Factory

The 400 ha former Albion Explosives Factory is currently being redeveloped for mixed commercial, residential and open space development, necessitating management of several hundred thousand cubic metres of contaminated soil. The development plan includes:

• low to medium density residential use on areas of minor contamination and clean soil;

• commercial development over areas of low to moderate contamination, to minimise the amount requiring removal or treatment; and

• construction of an on-site repository for about 200,000 m$^3$ of contaminated soil which will subsequently be maintained as open space and parkland. The repository does not reduce the area available for development since open space is a requirement for such major developments.

Inner-urban warehouse

Former industrial or warehouse sites in the inner city – the focus of much development activity – are often contaminated with a range of heavy metals or polycyclic aromatic hydrocarbons. A common remediation and redevelopment scenario for such sites involves:

• removal of ‘hot spots’ of contaminated soil;

• management of low level contaminated soil on-site beneath building slabs or pavement;

• garden areas excavated to a depth or 0.5–1 m and replaced with fill material;

• redevelopment for medium or high density residential use, with restrictions on subsurface activities; and

• issue of a Statement of Environmental Audit.
nature and mix of contaminants, the nature of the soils and other site-specific factors. However, the significance and impact of these technical factors must be appreciated in the context of the land redevelopment business.

Whether a contaminated site is redeveloped depends on the economics of land remediation, development and sale. Land prices reflect market demand and availability rather than the cost of getting land to market, so unless prices increase in response to market demand, there is limited scope for remediation costs to increase without affecting development activity. There is scope, however, for improved management in line with the waste management hierarchy that does not markedly increase costs in comparison with the traditional ‘dig and dump’ option, particularly in the context of rising landfill prices for prescribed industrial waste and the transition from landfills to containment facilities.

**Technical considerations**

Technologies enabling remediation or reuse of contaminated soil with minimal restriction will be employed if their costs are comparable with competing approaches, particularly containment facilities and landfill, and if allowed by time, space and other logistical constraints. The risk must be taken into account that a treatment option will fail to achieve the design remediation objectives. This risk is greatest for new technologies, but even tried and tested techniques can fail because contaminated soils are so variable. For example, fine grain Melbourne soils are typically more difficult to treat by technologies such as soil washing and bioremediation.

Increasingly developments at contaminated sites leave some contaminated soil on-site, either *in situ* or reused on-site following excavation. The extent to which soil can be left on-site depends on the nature of the development and the conditions on use of the land that can be accepted. The environmental audit system provides a safeguard, ensuring that potentially contaminated land being redeveloped for a sensitive use (including residential use) is suitable for that use. By selecting a less sensitive landuse, where practical, and designing the development carefully (eg. placing building slabs over contaminated soil), the quantity of soil requiring management is reduced.

Low level contaminated soil is most amenable to reuse and on-site management. On-site management of more heavily contaminated soil is generally more suited to areas of public open space, which limits its practical use to large redevelopments with the necessary space.

**Logistical considerations**

Logistical considerations such as time, available space and capacity of existing facilities can be important factors in remediation decision making.

For example, it is becoming more difficult for waste facilities to handle major developments generating large quantities of prescribed industrial waste on a once-off basis without disrupting the availability of disposal facilities for other waste generators. Often the most practicable approach is to establish facilities or an approach tailored to the particular development. Currently, a major development generating 200,000 to 300,000 m$^3$ of contaminated soil for disposal in a short period of time would swamp existing facilities and systems. The construction of a dedicated repository to receive about 200,000 m$^3$ of contaminated soil as part of the redevelopment of the former Albion explosives factory is an example of one alternative to landfill disposal and placement of wastes in off-site containment facilities.
Further, some technologies such as bioremediation require substantial space and time for successful implementation. Development constraints frequently mean these are not available at the site, raising the option of off-site treatment facilities being established where time, space and requirements are available.

**Market and public perception**

Adoption of practices which avoid prescribed industrial waste generation frequently depend on the willingness of the market to accept the restrictions associated with leaving contaminated soils on-site. For example, the financial institutions underwriting the development of the Crown Casino insisted the site receive a Certificate of Environmental Audit indicating the site was suitable for any use, irrespective of any other technical, environmental or economic reasons. This required removal and landfill disposal of a large volume of contaminated soil.

Market perceptions about soil contamination and consequent impacts on sale price are important in determining the preferred management strategy.

A greater acceptance of residual contaminated soil management is now appearing in the market. According to a major developer ‘the market is prepared to accept statements of environmental audit and the consequent restrictions on the site where some contaminated soil remains, as long as those restrictions are reasonable in the context of the development. Where those restrictions are reasonable and do not greatly affect use of the site for the proposed use, the site does not attract any significant discount when marketed. It is difficult to see, however, significant restrictions on site use being accepted by the market for low density, single dwelling developments. Significant benefit can be obtained, however, in the context of medium to high density residential and commercial developments’.

Community perceptions can also be important in determining the acceptability of the beneficial reuse of contaminated soil off-site. Comments from industry suggest perceived regulatory impediments to the establishment of alternative management options for contaminated soils including off-site reuse (eg. requirement for works approval, uncertainty in process for reuse approval) are significant. The provisions enabling reuse exemptions under the *Environment Protection (Prescribed Waste) Regulations* 1998 are important in addressing this matter.

**Change in practice anticipated due to the IWMP (PIW)**

Implementation of the policy is expected to result in:

- A significant reduction in the volume of contaminated soil received by specifically engineered landfills and in the near future containment facilities. Contaminated soil received by such landfills and containment facilities is expected to be limited to soils contaminated by inorganics (eg. heavy metals) and some recalcitrant organics (eg. pesticides) posing a moderate to high hazard.

- Substantial and continuing increase in on-site management of contaminated soils (including on-site repositories for major developments), subject to market acceptance of the consequent restrictions on use and requirements for ongoing management. This is expected to principally involve inorganic (including heavy metal) and PAH contaminated soils exhibiting low to moderate hazard. Such practices will require the establishment of ongoing management systems at these sites.
• Increased on-site treatment of soils contaminated with volatile hydrocarbons or other hydrocarbons amenable to biodegradation. In some areas this will be limited due to site constraints, timing and soil conditions (eg. clay soils are less amenable to bioremediation).

• Greater certainty about the regulatory direction of contaminated soil management, encouraging industry to invest in establishing off-site facilities or transportable on-site facilities for the treatment of contaminated soils, possibly including:
  – a bioremediation centre for soils contaminated with hydrocarbons and other organics amenable to bioremediation;
  – a facility for energy recovery from soils heavily contaminated with organics (eg. tars, heavy oils); and
  – other thermal treatment systems for the treatment of soils contaminated by organics not readily amenable to bioremediation and not suitable for energy recovery.

How much contaminated soil can be diverted from landfill/containment facilities?

Contaminated soils most immediately amenable to treatment are those contaminated by non-halogenated organics. Of these, soils amenable to treatment using simple landfarming techniques have already been diverted from landfill, leaving soil contaminated with the more recalcitrant compounds. There is scope for treatment – or at least partial treatment of these soils – to allow some form of reuse, although this may be more expensive and time consuming than the simple landfarming treatment implemented to date.

Of the 72,000 tonnes of contaminated soil received by specifically engineered landfill in 1998, the potential for diversion from landfill and containment facilities is outlined as follows.

• Non-halogenated organics (31%): Significant potential for diversion using bioremediation, thermal processes and other treatment technologies.

• Inorganics (28%): Limited prospect of diversion from landfill and containment facilities in the short term. Most are not amenable to treatment that destroys the contaminant. Options are available for concentration of the contaminants resulting in reduced volume and possible stabilisation. The fine-grained soils throughout much of Melbourne make volume reduction more difficult. There may be some scope for reuse of contaminated soil following stabilisation or other treatment processes (eg. conversion of hexavalent chromium to trivalent chromium), but the reuse market is likely to be filled by low level contaminated soils which will not significantly affect the volume of soil disposed to specifically engineered landfill and containment facilities.

• Inorganics and non-halogenated organics (33%): Comments as above apply. Treatment of such soils is more difficult and expensive, generally requiring a two-stage process.

• Halogenated organics (1%): These are mainly PCB contaminated soil, with some chlorinated solvent contaminated soils. Technologies are being established in Australia for the treatment of such soils, however, this is largely in the context of treatment of soils at large sites, rather than operation of a centralised facility. Given the relatively small volume of these soils currently disposed to specifically engineered landfill, establishment of a facility in Victoria in the short term is unlikely, although there may be scope to link with interstate operations.
• **Inorganics and halogenated organics (1%)**: As above, small volume. Some processes for the treatment of halogenated hydrocarbons are adversely impacted by the presence of inorganics. Usually would require a two-stage process. Diversion from landfill and containment facilities unlikely in the short term.

The most effective way of reducing contaminated soil disposed to landfill and placement in containment facilities is to minimise off-site transport to the extent practical, consistent with the need to ensure a high level of protection of human health and the environment, and to maximise off-site treatment and reuse of contaminated soil.

**Summary of impacts on contaminated land development**

The policy will encourage the adoption of a range of approaches to avoid generating contaminated soil requiring off-site management, promote treatment and reuse, and minimise the disposal of contaminated soil to landfill and placement in containment facilities. A wider range of options will become available to managers of contaminated land, allowing more sustainable practices to substitute for landfilling.

The policy will promote serious consideration of alternative options by requiring generators to select the best practicable waste management option in accordance with the waste management hierarchy. The policy will also provide certainty for investment in alternatives to landfill disposal of contaminated soil.

The cost of managing some waste soils is expected to increase following implementation of the draft policy. However, this will be offset, in part, by increased use of lower cost on-site management and reuse options. The practice of diverting low hazard soils to other suitable landfills will continue.

The overall cost to the contaminated land development industry (as a whole) may be minor depending on the uptake of lower cost management and reuse options. The extent of uptake of on-site management and reuse is uncertain, in part depending on the willingness of the market to invest in sites with some restriction and requirement for ongoing management.

While a more sustainable overall approach to redevelopment of contaminated sites is expected as a result of the policy, the cost of remediation works associated with some specific redevelopments may increase (e.g., former gasworks in low value locations, where the scope for on-site management is limited) rendering them uneconomic. The number of redevelopments affected in this way is likely to be very small and is dependent on property prices, particularly in the inner city area.

The benefits of the policy may include:

- establishment of a sustainable range of management options providing the necessary infrastructure to enable the ongoing development of contaminated land;
- increased impetus for on-site management of soils, influencing community opinion and market sentiment and allowing adoption of lower cost approaches for delivering a redeveloped site;
- certainty associated with the reuse of contaminated soils;
- establishment of facilities for soil treatment which may also treat other wastes;
- valuable space in landfills and containment facilities is conserved; and
- increased focus on managing soils according to the risk posed.
The disadvantages of the policy may include:

- increased costs associated with treatment or disposal of some contaminated soils;
- possible devaluation of developments involving on-site management of soils due to ‘risk aversion’ in the property market and the requirement for some ongoing management; and
- time and cost requirements in determining preferred management options under the policy. While this is expected to be a minor addition to the existing cost of determining a site management strategy, it may concern smaller developers and their architect/project managers. Classification of prescribed industrial waste by EPA would reduce this time and cost.
APPENDIX 3: LIST OF PRESCRIBED INDUSTRIAL WASTE

The following list of prescribed industrial waste is reproduced from Schedule 1 of the Environment Protection (Prescribed Waste) Regulations 1998.

Prescribed industrial wastes

Acids in a solid form and acidic solutions with a pH value of 4 or less
Alkaline solids and alkaline solutions with a pH value of 9 or more
Animal and vegetable oils and derivatives
Animal effluent and residues including abattoir effluent, poultry and fish processing wastes
Antimony and antimony compounds
Any congener of polychlorinated dibenzo-furans (PCDFs)
Any congener of polychlorinated dibenzo-p-dioxins (PCDDs)
Arsenic and arsenic compounds
Asbestos (all forms)
Barium and barium compounds
Beryllium and beryllium compounds
Boron and boron compounds
Cadmium and cadmium compounds
Caustic neutralised wastes containing metallic constituents
Ceramic-based fibres with physico-chemical characteristics similar to those of asbestos
Chromium compounds
Clinical and related wastes (not otherwise specified)
Cobalt and cobalt compounds
Contaminated soils (low level) with contaminant concentrations exceeding those specified in table 2 of EPA Publication 448, Classification of Wastes, published by the Authority in 1995 as amended from time to time or republished by the Authority, but with contaminant concentrations and elutriable fractions not exceeding those specified in table 3 of that publication as amended from time to time or republished by the Authority
Contaminated soils with contaminant concentrations or elutriable fractions exceeding those specified in table 3 of EPA Publication 448, Classification of Wastes, published by the Authority in 1995 as amended from time to time or republished by the Authority
Copper compounds
Cyanides (inorganic)
Cyanides (organic)
Detergents and surface active agents (surfactants)
Filter cake
Fly ash
Grease interceptor trap effluent
Halogenated organic chemicals (not otherwise specified)
Halogenated organic solvents
Heterocyclic organic compounds containing oxygen, nitrogen or sulfur
Highly odorous organic chemicals (including mercaptans and acrylates)
Highly reactive chemicals (not otherwise specified)
Inert sludges or slurries
Inorganic chemicals (not otherwise specified)
Inorganic fluorine compounds (excluding calcium fluoride)
Inorganic sulfur containing compounds
Isocyanate compounds
Lead and lead compounds
Mercury and mercury compounds
Metal carbonyls
Nickel compounds
Non-halogenated organic chemicals (not otherwise specified)
Non-toxic salts
Organic solvents (excluding halogenated solvents)
Oxidising agents including chlorates, perchlorates, peroxides
Phenols and phenol compounds (including halogenated phenols)
Phosphorus and phosphorus compounds
Prescribed industrial wastes that are encapsulated, chemically fixed, solidified or polymerised
Residues from industrial waste treatment or disposal operations (not otherwise specified) including filter backwash waters
Selenium and selenium compounds
Silver and silver compounds
Spent catalysts
Tannery wastes (not otherwise specified) including leather dust, ash, sludges and flours
Tellurium and tellurium compounds
Textile effluent and residues (not otherwise specified)
Thallium and thallium compounds
Vanadium compounds
Vegetable, fruit, food processing effluent
Vehicle, machinery and industrial plant washwaters with or without detergents
Waste chemical substances arising from research and development or teaching activities (not otherwise specified) that are new or unidentified substances with unknown human health or environmental effects
Waste from the production, formulation and use of biocides and phytopharmaceuticals (not otherwise specified)
Waste from the production, formulation and use of inks, dyes, pigments, paints, lacquers and varnish (not otherwise specified)
Waste from the production, formulation and use of organic solvents (not otherwise specified)
Waste from the production, formulation and use of photographic chemicals and processing materials
Waste from the production, formulation and use of resins, latex, plasticisers, glues and adhesives (not otherwise specified) excluding solid inert polymeric materials
Waste from the production, formulation and use of wood-preserving chemicals (not otherwise specified)
Waste oils unfit for their original intended use
Waste oil and water mixtures or emulsions and hydrocarbon and water mixtures or emulsions
Waste from the production, preparation and use of pharmaceutical products (not otherwise specified)
Waste resulting from surface treatment of metals and plastics
Waste substances and articles containing or contaminated with polychlorinated biphenyls (PCBs) or polybrominated biphenyls (PBBs)
Waste tarry residues arising from refining, distillation, and any pyrolytic treatment
Wastes of an explosive nature not subject to other legislation including azides
Wool scouring wastes
Zinc compounds