



Chapter 11

Hazardous substances

Hazardous substances

SUMMARY

Overview

People are in closer proximity to hazardous substances as a result of urban growth, especially around industrial zones. Most spills or incidents involve petroleum products. Records show no improvement in the frequency of spills. Environment Canterbury provides resources and information on safe storage and management, and also runs a 24-hour Pollution Hotline.

Resources

Hazardous substances are used predominantly by industry. Spills can be caused by unsafe practices, unsafe or incorrect use or disposal and by accidental discharge. There is a lack of awareness of what constitutes a hazardous substance.

Processes

Growth in the industrial and agricultural sector since European settlement has led to an increase in the use and storage of hazardous substances in Canterbury.

The growth of the Christchurch urban population has put people in greater proximity to hazardous substance use, which was previously confined to industrial areas on the urban fringes.

Information on the volumes used, stored and transported within Canterbury is limited. Poor management practices and poor application of regulations of hazardous substance use, storage and disposal often leads to an increased risk of substance release into the environment.

There has been an historical lack of education and resources for industries using hazardous substances.

Outcomes

The number of current consents for underground and above-ground storage tanks held in Environment Canterbury's resource consents database is 287. The largest volume of hazardous substances consented in Canterbury is petroleum compounds.

The greatest number of spill incidents recorded by Environment Canterbury involve petroleum compounds.

It is important for businesses to have correct spill procedures in place to manage spills quickly and correctly to reduce the impacts on the environment.

Response

Environment Canterbury is responding to these issues by undertaking the following activities:

- Providing regional information on hazardous substance storage
- Raising awareness of hazardous substances through the Environment Canterbury website
- Producing resources such as the Pollution Prevention Guide and Agrichemical storage on farms (Info sheet 22)
- Business outreach through the Pollution Prevention Guide
- Providing a 24-hour Pollution Hotline service

Key indicators

- The number of underground and above-ground storage tanks currently consented or permitted and the consented hazardous substance
- The volume of hazardous substances stored in currently consented or permitted underground and above-ground storage tanks
- The number of spill incidents involving hazardous substances recorded by Environment Canterbury's Pollution Hotline



THE IMPORTANCE OF MANAGING HAZARDOUS SUBSTANCES

Hazardous substances are common in our daily lives and need to be carefully managed to avoid adverse environmental effects. Under the Hazardous Substances and New Organisms Act 1996, a hazardous substance is any substance that exceeds the level defined in regulations of any of the following properties:

- an explosive nature (including substances, articles and pyrotechnics such as fireworks)
- flammability
- ability to oxidise (that is, to accelerate a fire)
- corrosiveness
- acute or chronic toxicity
- ecotoxicity, with or without bioaccumulation (that is, the substance can kill living things either directly or by building up in the environment)
- can generate a hazardous substance on contact with air or water

The hazardous substances commonly used in the Canterbury region include solvents, household chemicals such as cleaners and detergents, printing inks and dyes, pesticides, diesel and petrol. While it is predominantly industrial activities that are associated with the use of hazardous substances, they are also used in commercial, agricultural and residential land uses or activities.

The two principal pieces of legislation that address the management of hazardous substances are the Hazardous Substances and New Organisms Act 1996 (HSNO) and the Resource Management Act 1991 (RMA). HSNO controls the importation, manufacture, use and handling of hazardous substances in New Zealand. Under the RMA, Environment Canterbury has specific roles in managing the effects of the use, storage, disposal and transport of hazardous substances.

The specific concern of Environment Canterbury is where hazardous substances are used in such a way that adverse environmental effects occur off-site. For example, where the use of hazardous substances results in spillage onto soil, there is potential for the hazardous substance to move downwards through the soil profile to contaminate underlying groundwater.

Table 11.1 outlines the environmental results anticipated by the community.

Table 11.1 Anticipated environmental results for hazardous substances

Reference	Anticipated Environmental Outcomes
The Long Term Council Community Plan (LTCCP) 2006-2016	
Waste, hazardous substances and contaminated sites	<ul style="list-style-type: none"> • Environment, in general, is to be looked after • Business and farming activities do not harm the environment
The Regional Policy Statement 1998	
Waste, hazardous substances and contaminated sites	<ul style="list-style-type: none"> • Reduced actual and potential effects on the environment from the storage, use, disposal and transportation of hazardous substances
Chapter 17.4 (2) Environmental results anticipated	<ul style="list-style-type: none"> • Better management practices adopted when hazardous substances are used
Proposed Natural Resources Regional Plan 2004	
Environmental results anticipated AQL3	<ul style="list-style-type: none"> • Risk from discharges of hazardous air pollutants contained in Schedule AQL2 is reduced to a level where there are no more than minor adverse effects on human health and the health of animals and plants
Environmental results anticipated AQL4	<ul style="list-style-type: none"> • Ground level concentrations of priority hazardous air pollutants remain within concentrations identified in Schedule AQL3
Environmental results anticipated AQL9	<ul style="list-style-type: none"> • By 2010, a 90% reduction in the yearly number of reported incidents of agrichemical spray drifting beyond targeted areas or species resulting in adverse effect (compared to total annual reported incidents until 2005)
Environmental results anticipated AQL10	<ul style="list-style-type: none"> • Discharges into air do not cause corrosive effects on structures
Environmental results anticipated AQL11	<ul style="list-style-type: none"> • No short or long-term contamination of soil and water as a result of the discharge of contaminants to air
Environmental results anticipated WQL6(e)	<ul style="list-style-type: none"> • There are no new discharges directly to groundwater from industrial or trade processes, hazardous substances or hazardous wastes, untreated human sewage effluent or animal effluent from a collection system

RESOURCES

The predominant users of hazardous substances are businesses such as electroplaters, petrol stations and timber treatment sites. Hazardous substances are also used in agricultural and other commercial practices, and in households (including paint, garden sprays and some cleaning products).

The use, storage and handling, transport or disposal of hazardous substances presents the greatest risk of hazardous substances entering the environment. Hazardous substance spills can be caused by unsafe practices, incorrect use or disposal, or by accidental discharge through a lack of awareness of appropriate hazardous substance management.

Acceptable practices have changed over the years. Adverse environmental effects used to be poorly understood and what was acceptable practice 20 years ago may no longer be acceptable today. However, there is still a lack of awareness of what constitutes a hazardous substance, which will affect how things are managed. For example, some wastes such as electronic waste or asbestos can contain hazardous substances that are only exposed when the item is broken or disposed of.

PROCESSES

Hazardous substances have been used in Canterbury since European settlement. It is the extent of hazardous substances use that has changed. Growth in the industrial and agricultural sector has led to an increase in the use and storage of hazardous substances. However, little historical information on the storage and use of hazardous substances exists.

The growth of the Christchurch urban population has also put people in greater proximity to hazardous substance use. People are now living closer to industrial areas that used to be on urban fringes. This can also lead to reverse sensitivity, ie where incompatible land uses are sited next to each other and result in conflict between property users.

Large volumes of hazardous substances are used and transported within the Canterbury region. However, there is a lack of monitoring of the hazardous substances used and transported. Data on the volumes transported within the region are not readily available. Therefore, information on the volumes used, stored and transported within Canterbury is limited.

Every day, business activities impact on the environment, often without people knowing. Regardless of size, any business that uses hazardous substances has the potential to cause pollution. Poor management practices can lead to an increased risk of environmental impact.

There has been an historical lack of education and resources for industry using hazardous substances. Anyone who uses or is involved with hazardous substances needs good information on their potential risks and how to use them safely. This lack of knowledge and best practice procedures can lead to spills of hazardous substances not being dealt with correctly and impacting on the environment.

Table 11.2 The number of currently consented or permitted underground and above-ground storage tanks, and the consented hazardous substance (Canterbury region)

Hazardous Substance	Above-ground tanks		Underground tanks	
	Number of Tanks	Volume (L)	Number of Tanks	Volume (L)
Aviation Fuel/ Kerosene	1	30,000	0	0
Kerosene	1	50,000	0	0
Bitumen	1	38,000	0	0
Diesel	65	19,143,250	88	1,973,406
Petrol	3	9,640,000	87	2,593,000
Bulk Fuel	6	32,470,000	0	0
Other Hydrocarbon	8	6,63,240	10	167,000
Timber-Antisapstain Chemicals	5	79,500	0	0
Timber-Boron Compounds, Water Borne	9	121,000	0	0
Timber-CCA Formulation	8	184,000	0	0
Timber-LOSP Formulations	15	570,000	0	0
Timber-other	9	239,481	0	0
Waste ¹	6	150,000	19	185,200
Total	137	62,715,231	204	4,918,606

¹Waste hazardous substances held for treatment and landfill leachate held for disposal.

OUTCOMES

Hazardous substance storage information

Environment Canterbury's resource consents database (RCDB) records information on hazardous substance storage in Canterbury. Hazardous substances, such as petrol and diesel, are often stored in underground or above-ground storage tanks. These require consent from Environment Canterbury if they contain more than a certain volume of hazardous substance.

The RCDB currently lists 184 consents for underground and above-ground storage tanks in Canterbury.

Table 11.2 shows the number of underground and above-ground storage tanks currently consented or permitted in Canterbury. It shows the hazardous substance, the number of tanks and the combined volumes. There are 67.6 million litres of hazardous substances in consented underground and above-ground storage tanks recorded on the RCDB. The largest volume of hazardous substances consented is petroleum compounds.

There are a number of inaccuracies and gaps in data in the RCDB that make it difficult to produce an accurate picture of hazardous substance storage and use in Canterbury. Consents are only required for certain hazardous substances and for storage over a certain volume. Permitted activities that are not audited are not recorded on the RCDB. Therefore, there are very likely more hazardous substances stored in Canterbury than are recorded in the RCDB.

There are also some gaps in the RCDB due to some data fields being incomplete. Monitoring records also show that storage tanks are not always installed even if they have a current consent; and unless a consent is monitored, it is not guaranteed that the tank is installed. Further work is needed to improve the quality of the data in the RCDB.

Table 11.3 Spill incidents involving hazardous substances recorded by Environment Canterbury (2000-2007)

Year	Petroleum compound	Timber treatment chemical	Agrichemicals and agrichemical containers	Spray drift
2000/01	97	1	37	38
2001/02	91	0	39	31
2002/03	105	5	75	18
2003/04	154	0	56	17
2004/05	144	4	46	22
2005/06	160	1	10	13
2006/07	143	3	14	22



Pollution prevention work

Environment Canterbury has produced the Pollution Prevention Guide (PPG) for businesses in the region. The purpose of the guide is to provide business and industry with practical and simple advice on how to minimise their impacts on the environment (Environment Canterbury 2003b). The Pollution Prevention Guide is designed as an environmental self-auditing tool and covers six main areas: drainage, storage and handling, spills, air, housekeeping and waste. It provides a set of checklists for each of these management areas and some best practice advice. At the completion of the checklists for each module, a business will be able to produce an action plan for ensuring their activities are not causing pollution.

Environment Canterbury currently employs three full-time staff members to undertake pollution prevention work with industry using the PPG as an auditing tool. See Case Study 11.1 for an example of the use of the PPG.

24-hour Pollution Hotline

Environment Canterbury provides a Pollution Hotline, which is available 24-hours per day, for pollution response. The Pollution Hotline receives about 70 calls a week, and for each reported incident, a decision is made within 30 minutes on the course of action to be followed.

Table 11.3 shows the number of spill incidents involving hazardous substances recorded by Environment Canterbury's Pollution Hotline from 2000 to 2007. It should be noted that not all of these incidents involved a site visit and more than one call may be received for an incident.

It is clear that the greatest number of spill incidents recorded by Environment Canterbury involve petroleum compounds.

This information does not indicate improvement in the use of hazardous substances in the Canterbury region. Increases or decreases in calls may simply be due to awareness of the Pollution Hotline service. There may also be spills that are not reported to Environment Canterbury, in some cases because they occur in remote places.

RESPONSES

Responses to hazardous substances management issues, including the actions taken by Environment Canterbury and its partners to change social attitudes and behaviour towards hazardous substance management in the region, are summarised in Table 11.5 below.

Table 11.5 Responses to hazardous substance management issues

Issue	Investigations & Monitoring	Policy & Planning	Regulation & Enforcement	Advocating & Education
Safe use, storage, handling, transport and disposal of hazardous substances in Canterbury	Collecting and collating available hazardous substance data	<p>Policy evaluation</p> <p>District planning liaison</p> <p>PNRRP Chapter 4</p> <ul style="list-style-type: none"> - Manage or prohibit discharges of hazardous substances to surface water, groundwater, and land where it could enter groundwater or surface water (WQL 1,2,3,4,6,7,8,9,10,11) - Set storage and management requirements for tanks and large containers of hazardous substances (WQL 8,9,12) <p>PNRRP Chapter 3</p> <ul style="list-style-type: none"> - Avoid agricultural spray drift (AQL 7) - Prohibit combustion of specified materials (AQL 1,4) - Control the burning of some hazardous substances, and materials that produce hazardous substances when burnt (AQL 1,4,12) - Controlling the discharge of contaminants to air. (AQL 8, 9,10,12) <p>Regional Policy Statement Chapter 17</p> <ul style="list-style-type: none"> - Prevent or mitigate the effects of hazardous substances on the environment (Policy 1) - Promote good management practices (Policy 2) - Prevent spills and accidental discharges, and manage the effects of permitted discharges. (Policy 3,4) 	<p>Resource consent processing and monitoring (hazardous substance land use consents, discharge consents – hazardous substance storage)</p> <p>Providing a 24-hour pollution hotline service for spills</p>	<p>Education and training. Raising awareness of hazardous substances through Environment Canterbury's website; business outreach through the Pollution Prevention Guide (PPG)</p> <p>Advocacy. Co-ordinating and participating with regional and national groups on hazardous substances issues</p> <p>Producing resources such the Pollution Prevention Guide and "Info sheet 22"</p> <p>Resourcing for PPG new work</p>

CASE STUDY 11.1

Johns Road Pollution Prevention Guide project

This project was undertaken by Environment Canterbury to review the environmental management of the organisation's leasehold properties adjacent to Johns Road and Chaney's Corner.

The environmental practices of 26 leasehold businesses were audited with the purpose of outlining how Environment Canterbury's Pollution Prevention Guide (PPG) could help reduce their environmental impacts.

These visits were undertaken because Environment Canterbury, as the owner of these properties, is ultimately responsible for any adverse environmental impacts that might occur. The visit provided Environment Canterbury and the business with the opportunity to have an 'environmental health check'. Additionally, as an environmental management authority, Environment Canterbury has responsibility for providing industries with information and guidance on ways to reduce their environmental impacts.

The audits were performed in two stages, using two different methods. The first group of companies were audited in May and June of 2004 and the second group in November and December 2004. Both were surveyed 12 months after the initial audits to review their progress towards meeting the recommendations across a similar timeframe.

The audit of the first group involved taking the business through the questions in the PPG and developing recommendations from this. They had greater levels of contact with the auditor and received help implementing the generated actions. They were allocated more time and were supported through the whole process.

The second group were given an overview of the PPG and were shown which areas of the guide would be best for them to concentrate on. The auditor conducted a site assessment followed by the preparation of an action list for the business to implement within a set timeframe. This process was less hands-on than the first process. This two-stage approach was an attempt to see which process delivered the best outcomes and effectiveness from the resources required.

From Table 11.4 it appears that the second group of companies have made less progress with the recommendations. Although a slightly higher percentage of recommendations has been fully completed, the percentage of incomplete recommendations is also higher. This would indicate that the second method is slightly less effective in delivering outcomes. However, the second method required much less time on site and, overall, the difference in completion rate of recommendations is small.

Table 11.4 Number of completed recommendations after 12 months from the initial audit

	Overall	First audit group	Second audit group
Completed recommendations	63%	62%	64%
Partially completed recommendations	27%	35%	19%
Non-completed recommendations	10%	4%	17%

CASE STUDY 11.2

Spill response procedures

Companies have a range of hazardous substance management systems. The following examples illustrate two different approaches, and how these can affect the environment. Two companies each had a hazardous substance spill on site, which entered a waterway. One company employed systems to manage the spill. The other failed to undertake basic measures to prevent contamination of the surrounding environment.

Example one

Staff at the company advised Environment Canterbury's Pollution Hotline of a spill of cutting fluid (a water-soluble oil) that had occurred at the factory. When the discharge was discovered, staff assessed the situation and tried to mitigate the effects. A spill response procedure was found in the spill cleanup station and measures to slow the flow of the contaminant along the drain were put in place. Environment Canterbury was notified of the spill by a staff member less than an hour after the spill was discovered. An Environment Canterbury enforcement officer was on site within half an hour of the notification.

Initially, the contamination was able to be contained on-site. However, during the clean up some of the cutting fluid that had entered the stormwater drain discharged into an open section of drain that flowed through the site. Because the spill was of water-soluble oil that does not float on water, the clean-up procedures differed from those used in a normal oil spill. However, staff succeeded in containing much of the material discharged. As a result of the proactive action of the company, and because they had a spill procedure in place, the discharge of any significant concentration of contaminants out into the Heathcote River was avoided.

Example two

Environment Canterbury's Pollution Hotline was notified of a discharge of oil into a drain through a complaint from a member of the public. An enforcement officer arrived on-site and found a box drain running through the property with a substantial quantity of oil floating on the water.

The discharge of oil was most likely caused by a progressive build-up of contaminants from the cooling and stormwater system. It was also found that the storage of chemicals on site was substandard and some drums of hazardous substances were leaking. It appeared that no effort has been made to clean up the leak or prevent it from happening again. Hazardous substances on site had also been spilt during loading and had not been cleaned up.

The company had failed to undertake basic measures to prevent contamination of the surrounding environment. It was clear that this was not an isolated incident as the Christchurch City Council had dealt with discharges of hazardous substances from the same company before.

These examples show that when using hazardous substances, spills can occur. However, it is important to have the correct procedures in place to manage the spill quickly and correctly to prevent further environmental degradation.

