STORING AND HANDLING LIQUIDS:

ENVIRONMENTAL PROTECTION

PARTICIPANT'S MANUAL

our environment it's a living thing

Department of Environment & Climate Change NSW

STORING AND HANDLING LIQUIDS: ENVIRONMENTAL PROTECTION

A guide to managing environmental risks associated with the storage and handling of liquid substances

PARTICIPANT'S MANUAL

Department of **Environment & Climate Change** NSW

Disclaimer

The Department of Environment and Climate Change NSW has prepared this document as a guide only. It is not intended to be an exhaustive guide to preventing pollution nor does it constitute legal or regulatory advice. Businesses and individuals should seek their own legal and other expert advice concerning the storage and handling of liquid substances. The Department of Environment and Climate Change NSW accepts no responsibility for errors or omissions in this guide or for any loss or damage arising from the use of this guide.

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Summary

In NSW there are strict laws to prevent pollution.

If you are storing or using liquid substances you run the risk of causing pollution.

Environmental laws do not always dictate how you should prevent pollution – the laws simply state that pollution must not occur.

NSW laws define a 'pollution incident' as including situations that are likely to result in pollution, not just situations in which pollution is actually occurring.

This Guide outlines the principles for preventing pollution when storing and handling liquid substances.

Any liquid substance has the potential to cause harm to the environment – even seemingly safe substances like foods or drinks. You need to ensure that all liquids stored or used at your site are managed so that they do not enter the environment (unless permitted to do so by a licence, or by approval or agreement from the relevant authority). This includes water or quenchants generated during firefighting operations and means that hosing clean outdoor areas is likely to result in water pollution.

For many liquids there are additional requirements that govern storage and use, such as WorkCover NSW requirements or Australian Standards (see ***Overview*** section).

If you are prosecuted for certain environmental offences (for example tier 1 offences) arising out of a pollution incident, then you may be able to raise the defence of due diligence – that means, being able to show that you took all practical measures and managed your operations so as to prevent pollution. In any case, taking measures to implement the principles described in this Guide will enable you to demonstrate your efforts in practising good site management.

Good site planning and ongoing management are fundamental to pollution prevention

Businesses with robust pollution prevention strategies employ a range of measures.

Such measures include:

- Ensuring all personnel have a good understanding of the risks of pollution, the location of drainage infrastructure on site, the measures (both physical and procedural) in place to prevent pollution and what to do if pollution occurs.
- Having equipment and structures in place to prevent any spills or leaks from entering the stormwater system or otherwise escaping to the environment .
- Using site planning and management or water treatment infrastructure to ensure that rainwater that falls on the site does not carry pollutants away from the site.

A wide range of measures can be used to prevent pollution.

Often the most effective way to prevent pollution of the environment is to store all materials and to carry out all business activities inside buildings that are designed to ensure that any spilt liquids are contained inside the building area.

Polluting the environment can result in: legal proceedings, criminal conviction, heavy fines and legal fees, lost work time, clean up costs and damage to your public image. Not only that, spills and leaks of raw materials and products costs money.

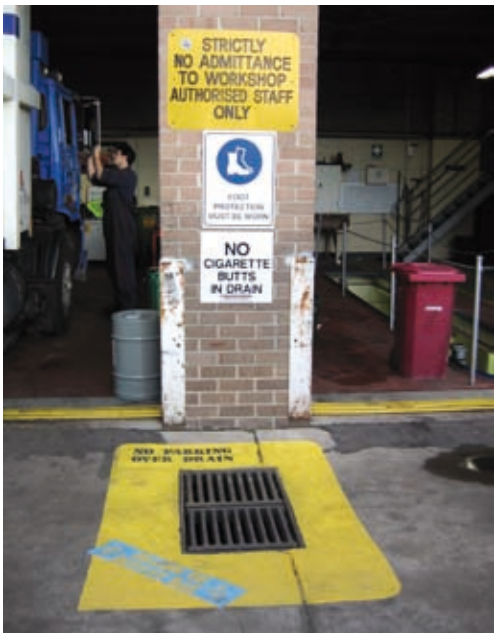
Preventing pollution is not only a legal obligation, it also makes good business sense.

Bad Practices

The photos on this page show examples of bad pollution prevention practices.

Good Practices

The photos on this page show examples of good pollution prevention practices.



Glossary

A number of terms are used in this Guide. Their definitions are provided here.

Bund – a raised, impermeable barrier forming the perimeter of a secondary containment area.

Dangerous goods – means the following (whether or not they are packaged for transport or under pressure):

(a) substances or articles defined under the *Australian Dangerous Goods Code* as:

(i) dangerous goods of Class 2, 3, 4, 5, 6.1, 8 or 9, or

(ii) goods too dangerous to be transported,

(b) C1 combustible liquids.

For a detailed definition, see the Road and Rail Transport (Dangerous Goods) Act 1997.

Department of Environment and Climate Change NSW – is a NSW government department, which employs staff to exercise the statutory powers and functions of the Environment Protection Authority,

First flush – the proportion of runoff produced during a rain event that is most capable of transporting pollutants from surfaces.

First flush system – a system of weirs, pumps, dams or tanks that is used to both collect and store the first flush from each rain event. The water collected is then stored, tested and either reused or disposed of.

Hazardous substance – a substance with the potential to cause harm to human health and/or the environment. Typical hazardous substances are toxic, corrosive, ignitable, explosive or chemically reactive.

Materials Safety Data Sheet – a document that summarises the relevant properties of a hazardous chemical or proprietary product. Often abbreviated to MSDS, it includes safety, health, storage, handling and emergency information.

Pollution Incident – an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise.

Primary container – the container that holds the liquid, either for storage, transfer or processing.

Risk assessment – the process of systematically identifying and quantifying the risks associated with a particular event occurring, including an assessment of the impact on that risk of potential control measures.

Secondary containment – any means used to contain liquids in the event that the primary container (liquid storage container) fails.

Sewerage system – The network of sewage collection, transportation and treatment facilities that ensures that domestic, commercial and industrial waste waters are treated prior to discharge to the environment.

Site containment – measures put in place to isolate the site from the receiving environment with the aim of preventing liquids from leaving the site. Also referred to as site isolation or shut off systems.

Stormwater – runoff generated by rainfall.

Stormwater system – the series of drains, pipes and channels designed to direct the runoff, generated by rain events, to waterways with the aim of prevent flooding. Stormwater is not treated to remove pollutants before it reaches the environment.

Toxic substance – a substance that can cause illness, death, disease, or birth defects. A toxic substance is also a hazardous substance.

Trade waste – waste water generated by non-residential premises, requiring the permission of the water authority for discharge to sewer.

Overview

Any liquid substance has the potential to cause environmental harm: fuels, oils, industrial chemicals, paints, solvents, pesticides, fertilisers, waste liquids, wash water, process liquids, even food ingredients (for example, liquid egg, milk, oils) or food products (for example, mayonnaise, sauces, juices, syrups).

If you produce, use or store any liquid substance then you need to consider the associated pollution risks and take action to reduce those risks.

The aim of this Guide is to help you to understand your legal obligations under New South Wales environment protection law and to provide you with guidance on how to meet those obligations. It outlines the minimum environmental protection requirements for the storage and handling of any liquid substance. The storage and handling of toxic and hazardous substances and dangerous goods may require more rigorous measures than those described here.

During 2004/2005 the Department of Environment and Climate Change NSW carried out an environmental compliance program focusing on liquid chemical storage, handling and spill management. The findings of the program indicated that there is a need to improve the way that liquid substances are stored and handled. This Guide has been produced as a result of those findings. For more information on the environmental compliance program or to obtain a copy of the reports contact Pollution Line on 131 555 or visit **www.environment.nsw.gov.au/licensing/envcomplchemicals.htm**

Who should read this guide?

This Guide is for anyone who uses, stores or produces liquid substances. It relates to bulk storage as well as smaller container or package storage of liquid substances.

Most business, industrial and government activities store and use liquid substances: fast food outlets using and storing cooking oil; office buildings using and storing cleaning products; mechanics storing new and used oils; council depots using and storing paints, pesticides, oil; farms using and storing fuel and agricultural chemicals; food manufacturers producing fruit juice; chemical manufacturers using and storing industrial chemicals.

How can safe liquids be harmful to the environment?

It is well understood that allowing toxic or hazardous chemicals into the environment can kill plants and animals in waterways, affect human health and persist in the environment for many years, but what about seemingly safe liquids like foods?

Food products and ingredients in liquid form (oil, egg, milk, juices, sauces, etc.) can also have a serious impact on waterways. They have a high carbon content which encourages the rapid growth of aquatic microorganisms that consume carbon. As these organisms process the carbon they also consume oxygen, resulting in a rapid depletion of life-giving oxygen in the water and the death of fish and other oxygen dependant organisms.

Food substances also add nutrients to waterways, as do plant fertilisers and some cleaning products. Nutrient build up can lead to algal growth also resulting in fish kills due to oxygen depletion.

Many substances, such as oils, also smother water plants, the water surface and shorelines.

Either way, the results are deadly to aquatic life, expensive to clean up and often very smelly.

Substances that are safe to humans can be damaging to the environment

Some substances are more dangerous than others, not just to the environment but also to human health and public safety.

This Guide describes the principles of liquid storage and handling for environmental protection purposes.

If you store toxic or hazardous liquids or dangerous goods, there are additional legal requirements and standards with which you need to comply (see *Further information*). This Guide does not duplicate the additional requirements for dangerous goods and toxic or hazardous substances.

Underground storage of liquids is not covered in this guide. For information on underground petroleum storage tanks contact the Department of Environment and Climate Change NSW on 131555 or **www.environment.gov.au** or email **upssreg@environment.nsw.gov.au**

Understanding your legal obligations

The *Protection of the Environment Operations Act 1997* sets requirements for protecting the environment from pollution. The *Contaminated Land Management Act 1997* regulates the investigation and clean up of land contamination. When using and storing liquid substances you should be aware of your obligations to:

- Ensure that water does not become polluted
- Prevent spills and leaks to the environment
- Minimise air pollution
- Dispose of wastes appropriately
- Report land contamination
- Notify the regulatory authority (local council or Department of Environment and Climate Change NSW) if material harm to the environment occurs or if contaminated land poses a significant risk of harm.

Both the Department of Environment and Climate Change NSW and your local council enforce environmental legislation. They are able to issues notices and fines and commence prosecutions where legislative requirements are breached. In addition, the Department of Environment and Climate Change NSW issues environment protection licences.

It is important to note that a lack of knowledge about environmental legal requirements is not a defence to an offence committed in breach of environmental laws. It is your responsibility to know your obligations. If you do end up in court, it is important to be able to demonstrate the measures you routinely have in place to prevent problems. More significantly, good site planning and management, including incident response planning, can help prevent problems in the first place.

More information on your legal requirements and how to comply with them is included throughout this Guide. In addition, Appendix 1 contains detailed legal information, including issues that are not specific to liquid substances (such as noise pollution).

Notes

How to use this Guide

Each section of this Guide provides information on how you can reduce pollution. More detailed information has been included in the Appendices.

Further information

- Your local council
- Department of Environment and Climate Change NSW 131555 or **www.environment.nsw.gov.au**
- WorkCover NSW 131 050 or **www.workcover.nsw.gov.au**
- Yellow Pages under Environmental or Pollution Control consultants and Dangerous Goods

TABLE 1: Regulation of Chemicals and Waste

Type of Substance	Further Information
Pesticides	Department of Environment and Climate Change NSW enforces proper use of pesticides (*Pesticides Act 1999* and *Pesticides Regulation 1995*). WorkCover NSW has occupational health and safety requirements for the use of pesticides and where they are classified as dangerous goods, regulates their storage and handling. Department of Primary Industries regulates the use of veterinary chemicals in NSW. The Australian Pesticides and Veterinary Medicines Authority (APVMA) is a federal government department responsible for the assessment and registration of pesticides and veterinary medicines and for their regulation up to and including the point of retail sale.
Dangerous Goods	Dangerous goods are regulated under the *Occupational Health and Safety Act 2000* and the *Occupational Health and Safety Regulation 2001*, while explosives and security sensitive dangerous substances are regulated by the *Explosives Act 2003* and the *Explosives Regulation 2005*. WorkCover NSW can provide further information. WorkCover NSW also has a range of publications relating to dangerous goods. In particular, for storage and handling purposes, the WorkCover NSW Code of Practice for the Storage and Handling of Dangerous Goods should be consulted, along with the relevant Australian Standards referenced in the Code of Practice. Department of Environment and Climate Change NSW regulates transport of dangerous goods on public roads (*Road and Rail Transport (Dangerous Goods) Act 1997*, which applies the *Australian Code for the Transport of Dangerous Goods by Road and Rail* to NSW).
Hazardous Substances	WorkCover NSW has a range of publications relating to the occupational health and safety implications of hazardous substances. There are a number of Australian Standards relating to hazardous substances (see below)
Trade Waste	The local water and sewage authority (for example Sydney Water, Hunter Water, local council) is responsible for regulating the discharge of trade waste to the sewer, see cl 55 of the *Protection of the Environment Operations (General) Regulation 1998*.
Underground petroleum storage systems	Department of Environment and Climate Change NSW – underground storage tanks are required to comply with the Australian Institute of Petroleum Code of Practice *The Design, Installation and Operation of Underground Petroleum Storage Systems CP4-2002*
Group A liquid wastes (as defined in Division 2 of Schedule 1 of the *Protection of the Environment Operations Act 1997*)	Department of Environment and Climate Change NSW – transport, tracking and disposal under the *Protection of the Environment Operations (Waste) Regulation 2005*.

There are many Australian Standards relevant to liquid chemical storage – these standards require measures additional to those stated in the guide for environmental protection purposes. Some of these Standards are listed below. Note: Australian Standards are constantly updated and the user should ensure the one consulted is the most recent. Searches for relevant Standards and current editions may be conducted at www.saiglobal.com/

AS	Title
1940 (2004)	The storage and handling of flammable and combustible liquids
2507	The storage and handling of agricultural and veterinary chemicals
2714	The storage and handling of hazardous chemical materials—Class 5.2 substances (organic peroxides)
3833	The storage and handling of mixed classes of dangerous goods in packages and intermediate bulk containers
3780	The storage and handling of corrosive substances
3846	The handling and transport of dangerous cargoes in port areas
AS/NZS	**Title**
2243.10	Safety in laboratories – storage of chemicals
4081	The storage, handling and transport of liquid and liquefied
4452	The storage and handling of toxic substances
4681	The storage and handling of Class 9 (miscellaneous) dangerous goods and articles

Notes

1. Site Management

The storage and handling of any liquid could lead to spills or leaks to the environment resulting in the pollution of water and soil. In addition, the storage and handling of volatile liquids can lead to air pollution.

Environmental laws do not always dictate how you should prevent pollution – the laws simply state that pollution must not occur.

The way that you choose to plan and manage your site will impact upon the likelihood of pollution occurring.

In this Guide the term 'site' refers to both premises based activities and activities that are not based at a single location such as mobile activities (for example, painting, cleaning, gardening services, road works). The legal requirements and site management principles are the same whether liquid substances are being used or stored at a single location or as part of a mobile service, the main difference being that temporary rather than permanent structures will most likely be needed for mobile activities.

Whether you carry out your activity at one location or as a mobile service, you need to put in place measures to reduce the risk of pollution occurring.

What is water pollution?

The *Protection of the Environment Operations Act 1997* defines water pollution very broadly. 'Waters' can include creeks, rivers, oceans but also dry creek beds, dams, groundwater and stormwater channels. 'Pollution of waters' not only means placing any substance into 'waters' but also placing any substance in a position where it is likely to 'fall, descend, be washed, be blown or percolate into any waters'.

This means any liquid substances, even seemingly 'safe' substances such as foods, need to be stored in well contained areas so that any leaks or spills cannot make their way to waters (including street gutters). Having spill kits on hand and well trained staff are also important in reducing the chance of water pollution occurring.

Penalties for water pollution: On the spot fines of $1500 for corporations and $750 for individuals apply to water pollution. If taken to court, penalties can be up to $1 million for corporations and $250, 000 for individuals, with a maximum daily penalty of $120,000 for a corporation and $60,000 for an individual.

If it can be shown that a substance was allowed to 'leak, spill or otherwise escape' due to a willful act or negligence, then the penalties are much higher and can include imprisonment. See Appendix 1 for more information.

What is clean water?

You need to manage your site so that no substances leak or spill to the stormwater system and so that when it rains only clean water leaves your site. But what is clean water?

There is no hard and fast definition of clean water. If the water looks dirty or has an oily sheen then it is not clean water. However, even water that looks clean could carry contaminants that can harm the receiving environment.

The best way to ensure that the water is clean is to make sure that the outdoor areas of your facility are free from chemicals, soil, liquid substances or waste materials, there by preventing rainwater from becoming contaminated.

Some businesses find it useful to divide their outdoor areas into 'clean' and 'dirty' areas. Water from the 'dirty' areas would need to be stored and tested prior to reuse or disposal – a first flush system is one way of dealing with runoff from 'dirty' areas (see Appendix 2 for more information). It makes sense to minimise the size of any 'dirty' areas and to direct clean water around those areas. That way, if outdoor 'dirty' areas cannot be avoided, the amount of rain water that will require testing and specialised disposal can be minimised.

Rain water collects contaminants from the site and transports them to the environment via the stormwater system

Manage your risks

Polluting the environment can result in: legal proceedings, criminal convictions, heavy fines (see Appendix 1) and legal fees, lost work time, clean up costs and damage to your public image. Not only that, spills, leaks and air emissions reduce your operating efficiency, especially if it is a product or raw material that you are losing.

Like any other business risk, you can assess and manage the risk of environmental pollution occurring at your site using a risk assessment approach.

In this context, risk assessment is the process of systematically identifying and quantifying the risks of a pollution event occurring. Risk is a combination of both the severity of an event (hazard) as well as the probability (likelihood) that it will occur.

Risk = hazard x likelihood

The type of risk assessment tools used for occupational health and safety are equally applicable to environmental pollution risks. As with occupational health and safety, the most useful risk assessment results are generally obtained when a group of people work together to identify and assess the risks. This might include managers and staff that work in a particular area or who have similar roles, it might include people external to you organisation or people with special expertise in risk assessment.

It is often useful to start at the beginning of your process (for example delivery or raw materials area) and work through your facility, identifying any activities or areas of your site that could result in pollution.

For each area of your site or for each activity carried out, determine what sort of pollution incident could occur. For example, ask your self "what if that pipe broke, what if a forklift toppled those drums, what if that container was overfilled or that valve was left on. Would the spill or leak be contained on site or would it escape to the environment? What is the likelihood of that happening? How long would it be before it was noticed?"

Once you have developed a list of scenarios and the likelihood of each, you can determine the risk of pollution for each of the hazards you identified (you may want to use your existing risk rating system or qualitatively judge whether a risk is high, medium or low).

For each of the hazards identified, determine suitable control measures. Is it possible to eliminate the risk altogether? Could you reduce the risk by installing secondary containment to prevent any liquids leaving the area of the spill? Do you need to be able to better isolate the site from the stormwater system? Could staff be better trained? Could more spill kits be installed?

Will the control measure that you have chosen for each hazard reduce the risk ranking? Will risks that you deemed to be high become low or medium after you implement the control measure?

You can use the information in this Guide to prompt you on likely hazards and suitable control measures.

Once you have completed your risk assessment process, you may have a number of control measures that need to be implemented. These can be listed in an action plan format, identifying when they will be implemented and who is responsible for implementing each measure. This is an important step in site planning and is a way of showing that you are actively managing your site to reduce the risk of a pollution event. Once the measures are implemented regularly monitoring the controls will allow you to assess their effectiveness in minimising/preventing pollution.

It is important to note that risk assessments are not mandatory under environmental law. Risk assessments are a useful tool for helping you to target your efforts in preventing pollution.

Locate and mark clearly all stormwater drains and ensure liquids can't escape to them

Planning and managing your site

Sections 2, 3, 4 and 5 of this Guide provide information specific to the storage and handling of liquid substances, waste management and incident planning. However, a number of issues arise from the way that your site, as a whole, is set up and managed.

For this reason, it is important to look at the entire site when considering how best to reduce the chance of environmental pollution occurring from the storage and handling of liquid substances.

When managing your site you should aim to:

- prevent spills or leaks from occurring
- ensure that any spills or leaks that do occur cannot leave the site or escape to the environment (air, soil or water)
- ensure that outdoor areas are managed so that only clean water leaves the site and enters the environment – prevention is often better than treatment, good source control measures are often less costly and more effective than treatment
- divert uncontaminated stormwater away from liquid storage areas and any other areas where contaminants may accumulate.

Effective site management is based on good site planning. Sites where areas or zones are designated for particular activities or uses tend to reduce both the risk of pollution as well as the costs of preventing pollution. This is because appropriate pollution prevention measures are targeted at the areas that require them.

Table 2 contains a series of questions to help you identify the areas of your site planning and management that may pose a risk and require improvement.

It is important to check with your local council to find out if council permission is required for any site improvement works.

Table 2: Checklist for assessing potential risks: handling and storage of liquid substances

1. **Do you know where the inlets to the stormwater system are for your site?**	It is important to know where the rain water that washes over your site drains to as it will carry any contaminants from your site to the environment. There should be no stormwater inlets inside buildings or roofed areas.
2. **Do you carry out any activities out of doors, such as storage, delivery, dispatch or transfer of liquid products?**	Where it is safe to do so, storing and handling liquids indoors reduces the risks of pollution provided that the building area is able to contain any spills (*see Section 2: Storage*).
3. **Are all liquid storage containers/ tanks, piping, handling areas, delivery areas and process tanks located within secondary containment areas?**	Secondary containment areas contain spills and leaks to prevent liquid escapes to the environment – secondary containment design considerations are addressed in Appendix 2. Many water pollution and soil contamination events occur due to inadequate secondary containment of all components of the liquid storage and handling system.
4. **If your secondary containment areas are located outside and without roofing, do you have a system in place to store, test and dispose of the contaminated water that collects when it rains?**	Sometimes it is not possible to roof all outdoor liquid storage areas. In such cases measures are needed to allow for the testing and appropriate disposal of contaminated water (*see Appendix 2 for details*).
5. **If your site regularly accumulates pollutants in outdoor areas, what measure do you have to prevent these contaminants entering the environment?**	Rain water leaving your site must be clean. Prevention is easier than treatment, so if possible, eliminate or minimise the outdoor areas that are considered to be 'dirty' and ensure that rainwater from "clean" areas is diverted around the 'dirty' areas. You may need to install a first flush system to contain runoff from the first part of each rain event from 'dirty' outdoor areas – Appendix 2 contains information on first flush systems.
6. **If you store volatile liquids, are there measures in place to prevent the leaking of vapours during storage and handling?**	Measures to reduce the risks of air pollution occurring are addressed in Section 3: Handling.
7. **Are all personnel aware of what to do in the event of both small and large spills of liquids?**	Whenever it is safe to do so, spills should be prevented from leaving the site and cleaned up immediately – never hose liquid substances down the drain. All personnel need to know what to do in the event of environmental incidents and be aware of their duty to notify. Section 5: Incident Management and Spill Response contains information on incident planning, spill response and duty to notify.
8. **If there is a fire, where will the firefighting water go?**	Water and other substances used to control fires can be contaminated by the liquid substances used and stored on the site, leading to water pollution if the fire water is not contained. Site containment systems can be used to capture fire water (*see Appendix 2*)
9. **Is it someone's job to regularly inspect containers, labels, spill prevention sensors and equipment, secondary containment and to check for leaks and spills?**	Regular inspection and maintenance are important components of good site management. Appendix 3 contains an example of a checklist that could be used for this purpose.
10. **Is it possible to shut off the site from the stormwater system during a major incident?**	Site containment or isolation systems prevent liquids from entering the stormwater system during an incident, allowing time for the spill to be contained. The system can also be shut off at times of high risk such as delivery or dispatch (*see Appendix 2*)
11. **If you already have a system on site for treating water to remove contaminants, do you know how effectively it works?**	It is important to check that pollution control equipment is appropriate for the application and serviced regularly. This can be achieved by regularly monitoring outputs.

Demonstrating good site management

Do you do any of the following:

- Frequently check the site for leaks?
- Frequently check the integrity of containers and secondary containment infrastructure?
- Regularly maintain containment and secondary containment infrastructure?
- Train all personnel in incident response and spill management?
- Conduct environmental audits of your whole site?
- Check whether any changes to your activity (for example, increased production, new products) have increased your risk of pollution?
- Think about how you will improve the environmental performance of and the implementation of plans at your site over time?

Regular checking of the site, regular maintenance of equipment and having plans (that are properly implemented) for improvement are all part of good site operations. These are all important components of demonstrating that you are taking all care to prevent pollution – and that is something that is worth demonstrating to others.

Are you able to show that you do these things? It is useful to keep records of inspections, maintenance, audits and training as well as any written plans for improvement works or new control measures. If you are doing these things, you might as well be able to demonstrate it!

To take this one step further you may want to consider implementing an environmental management system. A well documented, systematic approach to improving your environmental performance is one of the best ways to both reduce the risk of environmental pollution occurring and of demonstrating your efforts towards good site management.

What is the difference between the stormwater and sewerage systems?

When it rains, our drainage systems are designed to carry the water away as quickly as possible to prevent flooding. These drainage systems are also referred to as the **stormwater system** and are characterised by drains, gutters, roadside depressions, pipes and channels. They carry the rain water straight to creeks, rivers, lakes and the ocean.

There may be inlets to the stormwater system on your site. Alternatively, rainwater from your site may flow to the street gutter to connect with the stormwater system. *Only clean water from your site can be allowed to enter the stormwater system, even when it rains.*

The **sewerage system** is a series of pipes and pumps that take waste water from toilets, sinks and industrial and commercial processes to a treatment plant. The treatment plant removes most pollutants before the water is discharged to the environment. Your local water authority may allow you to discharge your liquid wastes to the sewer and may require you to enter into a Trade Waste Agreement for the discharge (see Section 4: *Managing Waste* for more information).

Further information

- *Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organisations*, U.S. EPA, Office of Wastewater Management, November 1996, 156 pages, **www.epa.gov/OWM/pdfs/finalgu.pdf**
- Your local council
- Department of Environment and Climate Change NSW 131555 or **www.environment.nsw.gov.au**
- WorkCover NSW 131 050 or **www.workcover.nsw.gov.au**

2. Storage

When storing liquid substances on your site you will need to consider:

- where you are going to store liquid substances
- what measures you will have in place to prevent pollution
- whether there are additional requirements due to the nature of your stored substances. For example, the storage of flammable liquids should be in accordance with *AS1940-2004 The storage and handling of flammable and combustible liquids* (see *Overview* section).

NSW WorkCover Authority has a range of publications relevant to the storage and use of chemical substances. In particular, the WorkCover NSW Code of Practice for the Storage and Handling of Dangerous Goods and the requirements of occupational health and safety laws need to be considered. SEPP 33 and council DCP requirements may also need to be considered.

Locating liquid storages

You will need to consider a range of factors in deciding where to locate your liquid storages. Given the broad definition of water pollution, your choice should aim to reduce the risk of pollution occurring.

Locations with a high risk of water pollution or soil contamination (to be avoided):

- in or on structures that are built over water (boat sheds, jetties, pontoons)
- on bare ground or unsealed surfaces
- in areas with no secondary containment (see *Measures to prevent pollution below* and *Appendix 2*)
- adjacent to stormwater inlets, drains, creeks.

Locations with a low risk of water pollution or soil contamination:

- inside a building designed to serve as a secondary containment area so that spills cannot flow out
- on sealed surfaces with suitably designed and maintained secondary containment and covered roofing to exclude rain water.

If you need to store liquids outside with no roofing you need to establish measures for dealing with the rainwater that collects inside the secondary containment. Information on how to manage such waster is discussed in *Appendix 2*.

There is little chance of containing a spill from containers located next to stormwater drains. There is a high risk of environmental pollution.

You should also ensure that any spills cannot flow into the sewerage system. Some liquids can have damaging effects on sewage treatment plants, even non-toxic liquids such as foods. Contact your plumber or local water authority if you are unsure about the location of sewage inlets on your site.

Measures to prevent pollution

When storing liquids, whether in small volume containers or large volume tanks, you need to consider how you will prevent pollution during both normal operations and unexpected situations such as leaks, spills or fires.

Don't let this be you!

Typical causes of water pollution and soil contamination due to the storage of liquid substances:

- Rain water fills uncovered secondary containment areas, reducing the residual capacity so that when a leak occurs the containment area has insufficient capacity and the substance overflows.
- Rain water accumulates in an uncovered secondary containment area where it becomes polluted by the small amounts of liquid chemical that have spilt inside the area. When the water is pumped out to the surrounding ground it flows to a stormwater drain.
- A drainage tap is installed inside the bund wall to allow rainwater to drain out – the tap is left open after the water has been removed rendering the bund useless during a spill.
- Waste liquids are stored in drums in out of the way places on the site, the containers spill or degrade over time.
- Packaged liquid substances are stored outside of secondary containment areas, either permanently or temporarily, and spills are not able to be contained on site.

Table 3 lists a range of issues that should be considered when determining how to prevent pollution at your site.

An integral part of pollution prevention when storing liquids is secondary containment. Secondary containment refers to any means used to contain liquids in the event that the primary container (liquid storage container) fails or if spills occur.

The most common type of secondary containment is bunding, however, a wide range of measures can be used. Examples of the variety of options for secondary containment are pictured in this section. The design considerations for secondary containment are set out in Appendix 2.

Table 3: Issues to consider when storing liquids

1. **What would happen if a container failed, was overfilled or was toppled over and the contents spilt?**	Storing liquids within secondary containment areas or in tanks with integral secondary containment prevents spills or leaks from spreading, leaving the site and causing pollution. *Appendix 2* describes the design and operation considerations for secondary containment. *Section 5* provides information on *Incident Management and Spill Response*.
2. **What happens when it rains?**	Storing liquid chemicals within secondary containment areas that are either indoors or under cover reduces the chance of rainwater becoming contaminated. If it is not possible to cover secondary containment areas then a procedure needs to be put in place for storing, testing, reusing and/or disposing of the contaminated rain water.
3. **Would you know if a tank or container was leaking?**	It is not always possible to know if there is a leak in a large tank that has its base in contact with the ground or underground storages. Level sensors can be used to identify unaccounted for losses. The installation of down-gradient groundwater monitoring wells provides access to groundwater for regular testing.
4. **Do you ensure that incompatible substances cannot come into contact with each other?**	Separation distances for particular chemicals are set out in Australian Standards and required by dangerous goods regulations. It is important to ensure that incompatible chemicals will not come into contact during spills, leaks or fires.
5. **Are primary containers and secondary containment materials compatible with the chemicals being stored?**	It is important to ensure that the storage container and the secondary containment materials are impermeable to the substance being stored and will not react with the substance being stored.
6. **How secure are your storage areas?**	Pollution incidents can occur as a result of vandalism. Indoor storage, the use of fences and/or alarms may be necessary.
7. **Do you store volatile liquid substances?**	Storage of volatile liquids requires vapour recovery and air pollution control. This is addressed in *Section 4: Handling*.

Above: *The risk of water pollution or soil contamination from this storage area is high. Leaks from upper drums may not be contained and toppling is likely.*

Left: *Cabinets with built in secondary containment are useful for storing small containers.*

Below: *This secondary containment area is roofed, has a sunken concrete bund, appropriate signage and an electronic alarm system.*

Above: *Procedures need to be put in place to manage water that accumulates in unroofed secondary conainment areas*

Above: *Shielding can be installed where the secondary containment area is insufficient to contain leaks from the top half of the tank.*

Above: *Speed humps can be a useful form of secondary containment, especially over driveways.*

Left: Bund walls constructed from bricks or blocks need internal waterproofing. One leaky area renders the whole structure ineffective.

Left: *Secondary containment does not need to be a bund*

Above: *Roofs keep rainwater out of secondary containment areas but can restrict access. This portable roof keeps thge area dry but can be moved during delviery or despatch.*

Underground Storage of Liquids

When liquids are stored in underground systems of tanks and pipes it is important to put in place measures to both prevent and detect pollution.

Sound geotechnical and construction advice is imperative when planning and installing such systems.

Leaks from underground systems can lead to both water pollution and soil contamination and need to be detected as soon as they occur. This can be achieved through:

- use of level sensors to detect unexpected losses
- regularly conducting material balances to identify any losses
- installation of down gradient groundwater monitoring wells to test for product in groundwater
- regular integrity testing of the whole system (pipes and storages).

Underground petroleum systems are required to comply with the Australian Institute of Petroleum Code of Practice *The Design, Installation and Operation of Underground Petroleum Storage Systems CP4-2002*.

Maintenance

A frequently overlooked aspect of liquid storage is the need for frequent and regular inspection and maintenance. A number of environmental pollution incidents can be traced back to a lack of maintenance. Preventative maintenance schedules are integral to preventing pollution. The following should be inspected regularly and maintained as needed:

- Storage containers and tanks
- Container labels
- Secondary containment areas – liquid build up, rainwater
- Secondary containment structures – soundness

Why not keep records of inspections and maintenance works? These records are an important part of demonstrating your efforts in good site management, as discussed in *Section 1*. *Appendix 3* contains an example of the sort of inspection checklists that you could use on a daily and weekly basis.

Reducing air pollution from storage

The storage and handling of volatile liquids can lead to air pollution. The requirements for preventing air pollution from both storage and handling are addressed in *Section 3: Handling*.

Further information

- Your local council
- Department of Environment and Climate Change NSW 131555 or **www.environment.nsw.gov.au**
- WorkCover NSW 131 050 or **www.workcover.nsw.gov.au**

Spill response

When storing liquid substances it is important that:

- there is an incident response plan for the site which includes a spill prevention and response plan
- all personnel are appropriately trained and know how to respond to spills
- spill kits are readily available and always well stocked
- all spills, no matter how small, are cleaned up immediately
- an inventory of substances stored is readily available to emergency personnel
- a site plan including drainage diagrams, site shutoff valves and any pollution control or containment devices is available to emergency personnel
- materials safety data sheets are available
- all personnel are aware of the duty to notify material harm to the environment.

Incident management and spill response are dealt with in more detail in *Section 5*.

3. Handling

Delivery, dispatch, transfer and decanting of liquid substances are activities that each pose a risk of pollution if not managed well.

This section outlines measures for reducing the risk of pollution arising from the handling of liquid substances.

Some liquid chemicals have additional laws and standards that regulate their use to ensure public safety and safe and healthy occupational conditions, for example pesticides, hazardous substances and some liquid wastes (see *Overview* section at the front of t his Guide).

Above left: Hoses, pipes and taps can rupture or fail for a variety of reasons. This activity poses a high risk of water pollution because there is no method of secondary containment. Above right: Decanting smaller containers requires planning and management.

Reducing the risk of pollution

Handling liquids, whether by pipework, hoses and valves, decanting smaller containers or delivering drums on palettes requires planning and management to reduce the risk of pollution.

Table 4 lists the issues you need to consider in relation to the handling of liquid substances.

Table 4: Issues to consider to reduce the risk of pollution from handling liquid substances

1. **Where do delivery and dispatch / loading and unloading take place?**	All loading and unloading operations should be undertaken in designated areas. Such areas could: • be within secondary containment areas that provide vehicular access • have stormwater shut off valves that are closed during transfers • have spill kits on hand with all personnel trained in how to use them. The management of rainfall over the loading/unloading area needs to be considered. Is the area covered? If not how will rainwater that collects within the loading/unloading area be managed? Vehicles should be checked for leaks before they leave the contained area.
2. **How is overfilling prevented?**	Level indicators need to be easily seen from the unloading area. Electronic level indicators with alarms and automatic shut off may be required. If using nozzles for filling containers, fit a shut-off valve. If overfilling does occur, does the overflow spill into a secondary containment area?
3. **How are the risk of spills or leaks from transfer hoses, pipework and valves minimised?**	Locating all pipes, valves, hoses and process units within secondary containment areas or systems reduces the risk of leaks escaping. This is not always possible. Are all transfer connections regularly checked for tight fittings? Are the transfer hoses protected from vehicles driving over or striking the hose? Are hoses/pipes regularly inspected for leaks? Regular inspection, maintenance and replacement reduce the risk of pollution.
4. **What precautions are in place when decanting from smaller containers?**	Are taps with drip collectors fitted to drums? Are site personnel advised to use a decanting area when pouring? Locating a decanting and mixing area within secondary containment reduces the risk of pollution. Extra care needs to be taken with mobile sites. For smaller containers, decanting over a temporary bund or collection tray, is a simple method for containing accidental spills.

Reducing the risk of air pollution

There are a number of measures that can be put in place to ensure that air pollution from the storage and handling of liquid substances is minimised.

It is important to know which of the substances that you store, use or produce that could volatilise (or have a volatile component) during normal operating conditions. Some of these substances may generate an odour, others may be odourless. Keep an inventory of these substances and refer to the Materials Safety Data Sheet to ensure that they are handled appropriately.

Depending on the size and nature of your operation, you may need to consider:

- eliminating the use of volatile organic compounds from your process or substituting with a less volatile alternative.
- Installation of vapour recovery equipment or other measures for minimising losses of volatile components (such as the installation of after burners or carbon filters).
- The effectiveness of your ventilation and exhaust systems.
- The installation of a solvent recovery unit (Spent solvents should never be burnt or allowed to evaporate as a means of disposal. They need to be collected by a licensed hazardous waste disposal contractor) or recycled on site.
- Ensuring that small package containers are sealed and kept in a well ventilated storage area.
- Carrying out any spray painting activities are in well maintained spray booths.

The loss of raw materials or products through volatilisation costs you money. Minimising losses to air makes good business sense.

Don't let this be you!

Typical causes of pollution due to the handling of liquid substances:

- During delivery a storage container falls from the vehicle and, with no secondary or site containment, the spill enters drains.
- When it rains the water entering stormwater drains carries the leaks and spills that have accumulated on the outdoor areas that were deemed too small to clean up.
- Overnight a pipe fails and causes the contents of a tank to flow down a stormwater drain.
- Fuels or pesticides are decanted or paints mixed on the footpath or roadway, any spills escape straight to the stormwater system.
- When replacing a hose on a piece of equipment some liquid substance escapes onto a concrete surface and is hosed down the drain.

Air Pollution – what is required by law?

Under the *Protection of the Environment Operations Act 1997*, air pollution includes the emission of: odours, volatile compounds, visible plumes, smoke, un-burnt fuel or any other air impurity to the air.

The Act requires that materials be dealt with in a 'proper and efficient manner' and that plant is maintained in an efficient condition and operated in a 'proper and efficient manner'.

Where air pollution is the result of a failure to operate equipment and materials in a proper and efficient manner then an offence has been committed. For example, this could include: leaving the lids off drums containing solvents; failing to clean up a spill of an odourous liquid.

In addition, the *Protection of the Environment Operations (Clean Air) Regulation 2002*, contains, amongst other requirements, specific measures that are required to control air emissions from the storage and transfer of large volumes (>8kL) of certain volatile organic liquids.

Maintenance

As discussed in *Section 2*, a frequently overlooked aspect of liquid handling is the need for frequent and regular inspection and maintenance. The following should be inspected and tested regularly and replaced or maintained as needed:

- pipes, hoses, valves
- secondary containment areas
- secondary containment structures or systems
- air pollution control equipment
- storage containers for any volatile liquids.

Why not keep records of inspections and maintenance works? These records are an important part of demonstrating your efforts in good site management, as discussed in *Section 1*. *Appendix 3* contains an example of the sort of inspection checklists that you could use on a daily and weekly basis.

Further information

- Your local council
- Department of Environment and Climate Change 131555 or **www.environment.nsw.gov.au**
- WorkCover NSW 131 050 or **www.workcover.nsw.gov.au**
- Yellow Pages under Environmental or Pollution Control consultants, Dangerous Goods.

Notes

4. Managing Waste

Typical wastes generated at sites that store and handle liquids include:

- used containers and packaging
- liquid wastes
- contaminated water
- used absorbent materials from spill clean up.

It is important that rainwater is not allowed to come in contact with any stored wastes.

Storing wastes on your site

While it may be necessary to store waste whilst waiting for reuse or collection, the accumulation of waste over time should be generally avoided. Part of your site management planning (*Section 1: Site Management*) can include a waste management plan which identifies ways in which wastage can be reduced, managed during storage and removed from site for recycling or disposal. A waste management plan should include an inventory of all wastes on site and a timetable for disposal ensuring that waste does not accumulate over time.

When storing wastes:

- clearly label wastes that may be suitable for reuse or recovery or that are being stored for collection by a particular service to ensure wastes are correctly sorted
- ensure wastes cannot be blown or washed away
- store wastes within secondary containment areas
- place lids or covers on waste containers or store under roofing
- don't store incompatible wastes together.

You could also consider the precautions listed in *Section 2: Handling*, to reduce the chance of wastes spilling during collection or transfer.

Avoid and reduce

As with any kind of waste, it is preferable to avoid creating these wastes in the first place. Is there a different way of doing the same task that means less waste is produced? Could you return empty containers to your supplier? Putting roofs over outdoor secondary containment areas will reduce the amount of contaminated water produced.

Reuse

Is it possible to reuse any of your wastes on site? You would need to ensure that it is safe to do so and consider the occupational health and safety implications. Reusing wastes onsite can have significant costs savings.

Recycle

Can you arrange for a recycling business to collect your wastes? If your neighbouring business have similar recyclable wastes it may be more viable for a recycling business to come to you area to collect waste/ resource. For some wastes the recycler may either pay you for the waste or not charge you for the collection.

Disposing of wastes

It is important that each type of waste that you create is disposed of appropriately. In NSW there is a system for classifying wastes in order to

Inapprpriate waste storage can lead to pollution

determine where they can be disposed of and how much regulation needs to apply to their transport and disposal.

Liquid wastes

Contaminated water can sometimes be disposed of to the sewerage system under a Trade Waste Agreement with your local water and sewage authority (for example, Sydney Water, Hunter Water, your local council). Your local authority will usually assess your waste to determine if it can be disposed of to the sewer. The waste may require pre-treatment before it can be accepted to the sewer.

Some chemical wastes, such as solvents and oils, may be able to be collected for recycling. Other liquid wastes may need to be collected for disposal at a licensed waste disposal facility.

Solid wastes

Check with your waste collection service provider to find out which of your solid wastes can go in the normal solid waste disposal bins. Some solid wastes may need to be disposed of by a waste collection service that is licensed to collect wastes that are classified as hazardous or industrial.

Avoiding waste generation

Spent solvents example

Disposing of used solvents can be a significant business cost. It is illegal to allow spent solvents to evaporate, they must be collected by a licensed hazardous waste disposal service.

The installation of a solvent recycling unit means there is no longer any need to dispose of hazardous liquid wastes. Many businesses report payback periods of around 12 months. An added benefit is that less fresh solvent needs to be purchased, so the costs of both waste disposal and raw materials are reduced.

Appendix 4 contains more information on how you can cut business costs and improve your environmental performance.

Waste tracking

Some liquid and solid wastes are subject to waste tracking requirements. This means that you will need a licensed transporter to take the waste to a licensed disposal facility and meet the requirements of the waste tracking system.

To find out if your waste is subject to the waste tracking system go to **www.environment.nse.gov.au/waste/wastetracking1htm.** Some common examples of wastes that must be tracked are listed on the following page.

What is 'appropriate' disposal of waste?

It is illegal to take waste to a place that cannot lawfully be used to dispose of that waste. The law says that both the generator/owner and the transporter of the waste can be found guilty of this offence. In addition, if the illegal disposal also results in spills or leaks to the environment, further penalties apply (*see Appendix 1*).

It is also an offence to pollute land or cause or permit land pollution, subject to certain exceptions. The land pollution offence focuses on the potential of a substance to cause harm.

How do your know which wastes should go where?

The Department of Environment and Climate Change NSW guideline: *Environmental guidelines: Assessment, classification & management of liquid & non-liquid* wastes provides a method for determining how each type of waste can be disposed of. This guideline is available at: **www.environment.nsw.gov.au/waste/envguidlns/index.htm**

If you are unsure you can contact:

- Department of Environment and Climate Change NSW
- Your local council
- Waste disposal facilities
- Waste disposal contractors

It is advisable to keep all of your waste collection and disposal receipts to show where your wastes have gone.

Some common examples of wastes that must be tracked

Photo-processing Industry	• process bath solutions • colour developer • waste bleach/fix/bleach-fix waste • other silver-containing waste
Printing Industry	• spent cleaning solvent • plate-making waste (acids and alkalis) • fountain solutions • spent photo-processing chemicals • waste inks
Automotive Repair Industry	•waste oil • transmission fluid • engine oil • batteries • oil and fuel filters (unless crushed and drained free of oil) • solvent cleaners • aqueous cleaners • paint waste • clarifier sludges
Metal Finishing and Electroplating Industry	• cleaning fluids (solvents, alkalis, acids) • abrasives • rinse water • spent process solutions • filter cakes and sludges • spent salt bath • waste water treatment sludge • paint waste
Metal Casting and Metal Fabrication Industry	• spent solvents • abrasives • spent foundry sand • refractory materials • slag • spent quenchants • paint waste
Service Stations	• oily water • waste oil • contaminated soil
Educational and Research Institutions	• various laboratory chemicals • acids and bases • solvents • specimens and samples
Clinics and Surgeries	• clinical waste that has the potential to cause injury, infection or offence • sharps • radioactive substances • pharmaceuticals and poisons • chemicals
Farming Industry	• pesticides • herbicides • insecticides • empty pesticide, herbicide or insecticide containers (unless triple rinsed) • cattle or sheep dip site soil or sludge • waste oil
Dry Cleaning Industry	• spent solvents (perchloroethylene, trichloroethane)

See Schedule 1 of the Protection of the Environment Operations (Waste) Regulation 2005 for a comprehensive list.

Further information

- Your local council
- Department of Environment and Climate Change NSW 131555 or **www.environment.nsw.gov.au** – Liquid Waste Fact Sheets, Waste Tracking Requirements
- Yellow Pages under Waste Disposal Contractors, Environmental or Pollution Control consultants

5. Incident management and spill response

Incidents range from emergencies (which are generally require an urgent response and may involve the emergency services) to small scale spills and leaks which can be dealt with by on-site personnel. Inadequate and inappropriate incident management, such as untrained staff flushing spills or leaks down stormwater drains, can cause serious pollution incidents.

Each site is different, and the issues and responses required will vary accordingly. The degree of incident planning that you need to undertake at your site will depend on the types of liquids that you store and the quantities. Your Incident Management Plan might be a lengthy document or it might fit onto one sheet of paper.

Incident Management Plans

An Incident Management Plan outlines the procedures for dealing with any event outside of the normal operating modes of a business (for example, spill of liquids or fire). It is important to plan for incidents to ensure that any incidents that do occur are managed safely and in a manner that minimises harm to site personnel, the environment and the business. All premises should have an Incident Management Plan. The size and complexity of the plan will depend upon the size and nature of the operation.

Where necessary due to the size of likely incidents, incident management plans should be prepared in consultation with relevant emergency services and regulatory authorities. Information from the Materials Safety Data Sheets for the substances stored on site should be used in formulating your plan.

The plan should include:

- procedures for dealing with, for example, the following types of issues as appropriate:
  - fires
  - explosions
  - management of spills
  - fire water management
  - reaction of incompatible substances.
- nomination of positions who are responsible for implementing and reviewing the plan
- contact details of responsible personnel
- a diagram of the site which notes the location of, for example:
  - site access ways for emergency services
  - all chemical storage areas
  - emergency response equipment (fire extinguishers, spill kits etc)
  - stormwater infrastructure, for example drain inlets, pipework, drain outlets, isolation valves
  - an updated inventory of all dangerous goods and hazardous substances and their locations onsite.
  - contact details for Emergency Services, for example, local fire brigade, local port authority and regulatory authorities for example Department of Environment and Climate Change NSW, local council.

Incident management plans should be regularly reviewed and updated.

Locations of spill response equipment should be clearly marked and staff trained in use.

Training

Incident management training should be provided to all relevant employees regarding procedures pertaining to:

– the Incident Management Plan and how to respond to an incident

– small scale incident management, including for example

- incident prevention procedures for liquid chemical delivery, dispatch, on-site transport and storage (location and use of drain covers, general chemical handling procedures etc);
- spill cleanup (location and use of spill kits etc)
- regular practice drills in using the procedures for responding to a major incident that would require attendance by emergency services or regulatory agencies.

The training material should be reviewed regularly and updated as necessary and refresher training should be provided on a regular basis.

Response infrastructure and equipment

Infrastructure may include, site containment systems, isolation valves on drains, retention pits.

Equipment should be provided to allow appropriate management of possible incidents on a site. The equipment should be in accessible locations. Response equipment may include:

- fire extinguishers
- spill kits containing absorbent material appropriate to the type of substance being used on site
- an appropriate number of recovery drums/containers compatible with the substances which may be put in them
- neutralisers for any acids, caustic soda
- equipment to block stormwater inlet drains, booms
- portable pumps, retention tanks
- safety equipment for the people involved

Make sure you sweep up spills with absorbent material and place in waste. Do NOT hose the liquid down the drain.

Spill kits should be checked regularly to ensure they contain sufficient materials and are not being used to store wastes.

Response equipment could be kept on a pallet for quick transport to the site of the spill or other incident.

Equipment should be maintained and replaced as necessary.

Incident Response

The response for serious incidents will involve the evacuation of the site according to the occupational health and safety requirements for your site. However, the following are general principles for managing a spill of a liquid substance that does not pose a threat to safety:

- Attend to the spill immediately, **no matter how small**
- If it is safe to do so, stop the spill at its source
- Contact the NSW Fire Brigade immediately on 000 if the spill involves a hazardous substance (such as a flammable or toxic substance) or if you suspect that the spill will escape to the environment
- If the spill is not contained, use spill control and adsorbent materials over the entire spill area to contain the spill if it is safe to do so
- Ensure that any adsorbent materials and other equipment used to clean up spills are disposed of appropriately (see *Section 4: Managing Waste*)
- While spills should not be hosed away, any water used for cleaning up and decontaminating spills needs to be treated as contaminated waste water (*see Appendix 2*)
- Where possible, spills should be covered during rainfall to the extent that it does not compromise clean-up activities
- Record all incidents of spills and ensure that they are reported to management
- Investigate the cause of each spill and ensure that precautionary action is implemented to reduce the risk of a similar incident occurring.

Review of the Incident Management Plan

The Incident Management Plan should be regularly reviewed to ensure that it is up-to-date and remains relevant.

In particular, an up-to-date inventory listing all the liquid substances stored, in particular dangerous goods and hazardous substances, and their locations onsite should be kept on the site. Materials Safety Data Sheets should be available to all site personnel, referred to when dealing with spills and waste disposal and updated regularly. Check their location and condition.

All site personnel should identify any potential areas or practices which may result in incidents not being managed appropriately. For example:

- all containers containing liquid substances should be clearly labeled
- systems should be in place to ensure incompatible materials are not mixed during any incidents
- spill recovery drums and tanks should be located within secondary containment areas.

Systems should be in place:

- for recording any incidents which occur and their causes
- to trigger actions to prevent further similar incidents.

Duty to notify

You must report incidents which harm the environment

If something happens which harms the environment, or threatens or even potentially threatens the environment, you have a duty to notify your regulator – either the Department of Environment and Climate Change NSW or your local council (see *Appendix 1*).

You must contact the regulator as soon as you can after you become aware of the incident.

This duty to notify pollution extends to employees and employers, occupiers, consultants and agents. For more information contact the Department of Environment and Climate Change NSW on 131 555.

Spill management is simple

Further information

- NSW Fire Brigade
- Your local council
- Department of Environment and Climate Change NSW 131555 or **www.environment.nsw.gov.au**
- WorkCover NSW 131 050 or **www.workcover.nsw.gov.au**
- Yellow Pages under Environmental or Pollution Control consultants, Dangerous Goods.

Appendix 1: NSW Environmental Legislation

In NSW there are a number of laws relating to environmental protection. The information contained in this Appendix summarises legal aspects of the prevention and control of pollution relevant to premises that store and handle liquid substances.

The *Protection of the Environment Operations Act 1997* (POEO Act) contains offences relating to water, air and noise pollution, disposal of waste and land pollution. It allows both the Department of Environment and Climate Change NSW and local councils to prevent and deal with pollution incidents.

Note: The Department of Environment and Climate Change NSW exercises certain statutory functions and powers in the name of the Environment Protection Authority.

Who enforces environmental law?

The 'appropriate regulatory authority' is responsible for enforcing the POEO Act. The Act divides this responsibility generally between DECC and local councils. It is important to know who the appropriate regulatory authority is for your premises or activity, as you are required to report pollution (see *Duty to Notify*) to the appropriate regulatory authority.

DECC is the appropriate regulatory authority for all state and local government activities as well as any premises or activities that are required to have (or have for the purposes of regulating water pollution) an Environment Protection Licence (see *Do you need a licence?*).

Local councils are the appropriate regulatory authority for most other premises and activities. This means that most small to medium sized non-government premises and activities, as well as residential premises are regulated by the local council for that area.

What powers does the appropriate regulatory authority have?

Both the Department of Environment and Climate Change and local councils have powers under the POEO Act. These powers include the ability to: issue Clean-up Notices; issue Prevention Notices; and commence prosecutions where environmental laws have not been complied with. In addition, the Department of Environment and Climate Change NSW issues Environmental Protection Licences.

Regulatory authorities also have the power to appoint authorised officers, who then have the power to enter and inspect premises. Enforcement officers from ARAs and other agencies have the power to issue on the spot fines.

DECC regularly undertakes compliance activities, including unannounced audits, for the premises that it regulates. Many local councils now have environmental assessment programs which involve local council officers inspecting premises to assess environmental compliance.

Do you need a licence?

Premises and activities that are above the thresholds listed in Schedule 1 of the POEO Act are required to hold an Environment Protection Licence. Small and medium-sized operations generally do not require an Environment Protection Licence. A licence is mainly required by larger industries and industries that have been identified as having the potential to seriously affect the environment – these are listed in Schedule 1.

Licences contain conditions which may include: requirements for monitoring; mandatory environmental audit programs; pollution studies; reduction programs or financial assurances. Licences also have general conditions requiring that all activities are carried out in a competent manner – in relation to the storage of liquid substances, this means having measures in place, such as secondary containment and spill management, that will prevent pollution.

It is an offence not to have a licence if one is required.

Businesses that do not require a licence are still required to comply with environmental laws.

To find out if you require a licence:

- call the DECC Environment Line: phone 131 555, or
- refer to Guide to Licensing which can be downloaded from the DECC website: search using key words 'licensing guide' on **www.environment.nsw.gov.au** or
- check Schedule 1 of the *POEO Act*.

Duty to notify

If an incident occurs at your premises or as a result of your activities that results in 'material harm' to the environment you are required to notify the appropriate regulatory authority – the Department of Environment and Climate Change NSW or your local council. You must report the incident as soon as you can after you become aware of it. This duty to notify extends to employees, consultants and agents, who have a duty to notify their employer or the occupier. The employer or occupier in turn has a duty to notify the ARA

'Material harm' includes both actual or potential harm to the health or safety of humans or to the ecosystem that is not trivial. However, you are not required to report pollution incidents which only involve the emission of an odour. If you are unsure if an incident would result in 'material harm' to the environment, you may wish to contact your appropriate regulatory authority as a precaution.

For more information call the Department of Environment and Climate Change NSW Environment Line: phone 131 555.

Offences under the POEO Act

The POEO Act and its associated regulations establish a number of offences: from wilful disposal of wastes to the environment, to throwing litter from a car window. Table A1.1 provides a summary of the offences and fines that are most relevant to typical business operations, however, it is not a comprehensive list of offences. You should seek legal advice in relation to specific offences.

Notes

Table A1.1: Some offences under the POEO Act

Brief description of offence	On-the-spot fines
Section 120: Water pollution	
Water pollution is very broadly defined under the POEO Act. It involves placing any matter in waters or where it could be blown, washed or percolate into waters. Waters includes the ocean, lakes, rivers, creeks, artificial water channels, even street gutters.	$750 for an individual, $1500 for a corporation
Sections 124 to 126: Air pollution	
Air pollution includes emitting odours, volatile compounds, visible plumes, smoke, un-burnt fuel or any other air impuities to the air. It is an offence to cause air pollution as the result of: not operating plant and equipment or undertaking maintenance work in a proper and efficient manner; not maintaining plant and equipment in an efficient condition; and not dealing with materials in a proper and efficient manner.	$750 for an individual, $1500 for a corporation
Sections 139, 140: Noise Pollution	
It is an offence to cause noise pollution as the result of not maintaining plant and equipment in an efficient condition operating plant and equipment in a proper and efficient manner or failing to deal with materials in a proper and efficient manner.	$200 for an individual, $400 for a corporation
Section 142A: Land Pollution	
It is an offence to pollute land. Land pollution includes placing in or on or otherwise introducing into or onto the land (whether through act or omission) any substance that could degrade the land and cause actual or potential harm to the health of humans, animlas or ecosystems. There are exemptions that relate to lawful fertiliser and pesticide usage and certain other agricultural purposes.	$750 for an individual, $1500 for a corporation
Section 143: Unlawful transport and disposal of waste	
If waste is transported to a place that cannot lawfully be used to dispose of that waste then both the person who transported the waste and the owner of the waste are guilty or an offence.	$750 for an individual, $1500 for a corporation or
Section 144: Use of land as a waste facility	
It is an offence to permit land that you either own or occupy to be unlawfully used as a waste facility.	$1500 for an individual and $5000 for a corporation if the wastes were asbestos or hazardous waste or any waste greater than 1 cubic metre or 2 tonnes
Section 167: Control Equipment	
Any control equipment (used to control or warn of pollution) must be maintained in an efficient condition and operated in a proper and efficient manner.	$750 for an individual, $1500 for a corporation

When prosecuted in court, the maximum penalties for the offences in Table A1.1 are $250,000 for individuals (plus $60,000 per day for continuing offences) and $1,000,000 for corporations (plus $120,000 per day for continuing offences).

The offences in Table A1.1 are strict liability offences –that means that you can still be found guilty, even if you did not intend to cause the pollution including where the pollution was the result of an accident or vandalism.

That is why you need to take all practicable steps to make sure that unforeseen events do not result in breaches of the legislation. For example, in the case of water pollution, care needs to be taken to ensure that spills or leaks do not result in contaminated water entering the stormwater system. This means determining whether your liquids storage or handling poses a risk of pollution and taking measures to reduce that risk: storing liquids within a covered, secondary containment area, having spill kits on hand and making sure staff know how to use them. Under no circumstances should you hose a spill down the drain, this could be considered to be a willful or negligent act of pollution which carries heavier penalties (see Table A1.2). (Maybe insert a description of what Tier 1 offences are eg. Tier 1 offences are the most serious offences under the *POEO Act*.

Table A1.2: Tier 1 offences under POEO Act

Brief description of offence	Penalties
Section 115: Disposal of waste to harm the environment If a person wilfully or negligently disposes of waste in a manner that harms or is likely to harm the environment then both the person and the owner of the waste are guilty of an offence. **Section 116: Leaks, spillages and other escapes** If a person wilfully or negligently causes any substance to leak, spill or otherwise escape in a manner that harms or is likely to harm the environment then both the person and the owner of the substance are guilty of an offence. **Section 117: Emission of ozone depleting substances** If a person wilfully or negligently causes any controlled substance within the meaning of the *Ozone Protection Act 1989* to be emitted into the atmosphere in contravention of the regulations under that Act and in a manner that harms or is likely to harm the environment then that person and the owner of the substance are guilty of an offence. **Defence:** For the above offences, it is a defence if the person can establish: a) the offence occurred due to causes over which the person had no control, and b) the person took reasonable precautions and exercised due diligence to prevent the offence from occurring.	Maximum penalty for individuals: $1,000,000 or 7 years' imprisonment, or both, for an offence that is committed wilfully or $500,000 or 4 years' imprisonment, or both, for an offence that is committed negligently. Maximum penalty for corporations: $5,000,000 for an offence that is committed wilfully or $2,000,000 for an offence that is committed negligently

Notices under the POEO Act

The POEO Act gives both local councils and the Department of Environment and Climate Change NSW the power to issue notices requiring action to be taken.

Clean-up Notices

A Clean-up notice can be issued when a pollution incident has occurred or is occurring. It is important to note that the POEO Act defines 'pollution incident' as including circumstances where pollution is ***likely*** to occur, but has not yet occurred. Clean-up notices may direct an occupier of a premises or person reasonably suspected of causing the pollution to take clean-up action as specified in the Notice and can be given verbally.

Prevention Notices

Prevention notices can be issued if an activity has been or is being carried out in an environmentally unsatisfactory manner (as defined in the POEO Act). Prevention notices can specify the actions that are required to be undertaken which could include: installing pollution control equipment; undertaking monitoring; changing the way that activities are carried out and a range of other measures. Prevention notices can be appealed in the Land and Environment Court.

For both clean-up and prevention notices an administration fee (currently $320) is payable for the issuing of the notice. Failing to comply with the provisions of either notice can result in an on-the-spot fine of $750 for an individual or $1500 for a corporation. If prosecuted in court, the maximum penalties for failing to comply with a notice are $250,000 for individuals (plus $60,000 per day for continuing offences) and $1,000,000 for corporations (plus $120,000 per day for continuing offences).

Noise control notices

Noise control notices can be issued to prohibit an activity, or the use of equipment, from emitting noise above a specified noise level. An administrative fee of $320 applies to the issuing of the Notice. Failure to comply with the notice can result in on the spot fines of $200 for individuals and $400 for corporations. If prosecuted in court, the offence of failing to comply with the notice has a maximum penalty of $30,000 for an individual (plus $600 a day for continuing offences) and $60,000 for a corporation (plus $6,000 a day for continuing offences).

Noise abatement orders

Any person who feels that they are experiencing 'offensive' noise within their own premises (home or business) can apply to the Local Court to have a noise abatement order directed to the respondent to abate or prevent recurrence of the offensive noise. 'Offensive' noise means that by reason of its level, nature, character, quality or the time at which it is made, or any other circumstance, the noise is harmful or interferes unreasonably with the comfort of people who are outside your premises.

Contaminated Land

The *Contaminated Land Management Act 1997* allows the Department of Environment and Climate Change NSW to require the investigation and remediation of land that is considered to pose a significant risk of harm to human health or the environment. There is also a requirement under the Act to notify the Department of Environment and Climate Change NSW of any land that is known to pose a significant risk of harm. The duty to notify contamination is the responsibility of both the owner of the property and the person whose activities have caused the contamination.

For more information:

- call the DECC Environment Line: phone 131 555
- refer to Guidelines on the Significant Risk of Harm from Contaminated Land and the Duty to Report (1999). You can find these guidelines on the DECC website: search using key words 'contaminated land guidelines' on **www.environment.nsw.gov.au.**
- contact a contaminated land specialist.

Trade waste agreements

Before disposing of liquid wastes to the sewer you need to contact your local water authority to see if you need a trade waste agreement or permit. Your local water authority is the organisation that provides your water and sewerage services and may be your local council, Sydney Water or Hunter Water.

For information about trade waste in the Sydney area you can go to: Sydney Water Trade wastewater section: **www.sydneywater.com.au/OurSystemsAndOperations/Tradewaste/**

Dangerous Goods

If your business stores dangerous goods on-site you may need to notify WorkCover NSW. Dangerous goods include flammable, toxic or corrosive substances, such as solvents. They should be stored in containers displaying the relevant diamond-shaped label.

New laws were introduced on 1 September 2005 to ensure the safe handling and storage of dangerous goods. The changes replaced previous licensing requirements with a requirement for occupiers to notify WorkCover NSW of dangerous goods stored and handled. All businesses currently keeping or using dangerous goods should check the new legislation and the WorkCover NSW Code of Practice for the Storage and Handling of Dangerous Goods to find out how they are affected by the changes. These changes include mandatory registers of dangerous goods, risk assessments and other requirements irrespective of the type and quantity of dangerous goods. Above specified thresholds, other requirements apply, including outer warning placards, notification to WorkCover, keeping of manifests and emergency plans which must be submitted to NSWFB.

Further information

- WorkCover NSW: phone:13 10 50; **www.workcover.nsw.gov.au**
- WorkCover's Code Of Practice provides practical guidance on the safe storage and handling of substances and articles classified as dangerous goods. You can find this online at: **www.workcover.nsw.gov.au/Publications/LawAndPolicy/CodesofPractice/cop_storage_handling_dangerous_goods.htm**

Notes

Appendix 2: Technical Considerations

This Guide refers to a variety of measures for reducing the risk of pollution due to the storage and use of liquids. This Appendix contains further information on the following pollution prevention measures, including design and operational considerations:

A Secondary containment

B Site containment

C First flush systems

D Managing contaminated water or other substances collected by first flush systems or in secondary or site containment systems.

2A Secondary Containment

Description: Secondary containment refers to any means used to contain liquids in the event that the primary container (liquid storage container) or transfer mechanism fails or liquids otherwise leaks or spills. Secondary containment can include:

- bunds – raised, impermeable barriers forming the perimeter of secondary containment areas (for example, walls, speed humps, guttering, curbing, flexible rubber barriers)
- encasement, for example storage containers with integral secondary containment (or see examples below)
- grading of sealed surface areas to form a contained area, either as part of a building or an external structure.

For example, a form of secondary containment that could be used to protect plastic pipes would be to encase the pipes in a larger pipe which drains to a collection sump. That way, if the pipework fails, the contents will be collected in the sump. Similarly, an example of secondary containment would be to place drums inside larger, sealed plastic drums during transport by forklift.

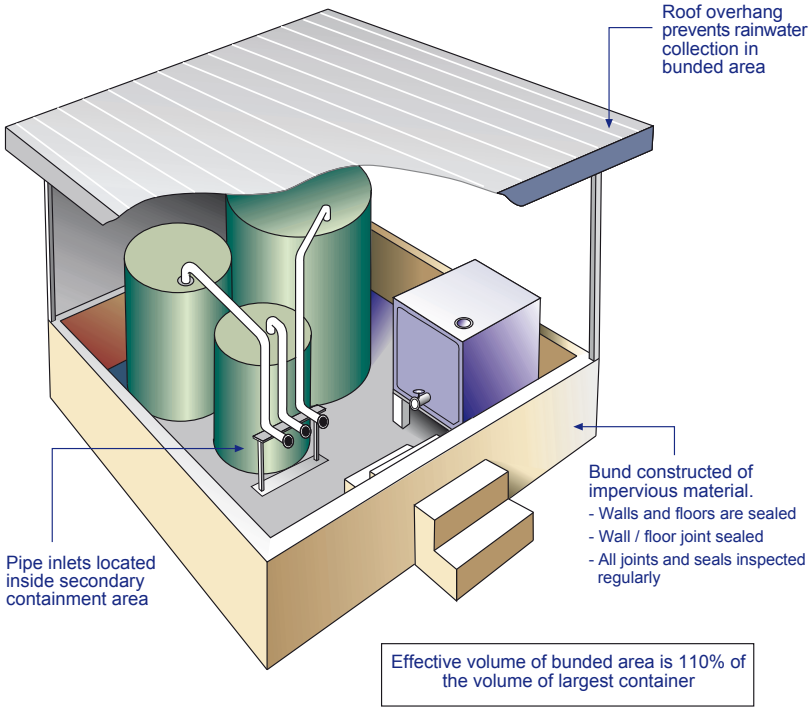
Secondary containment areas prevent liquids from escaping to the environment. An area is not a secondary containment area if there are any drains within it that lead to the stormwater system or out of the secondary containment area.

Application: Secondary containment is widely applicable to liquid storage and handling situations. There are an unlimited number of secondary containment methods. For example, secondary containment can be:

- permanent or temporary, fixed or mobile
- prefabricated or built on site
- used for storage of small containers or bulk tank storage
- indoors, outdoors or formed by the structure of a building.

Secondary containment is only one part of effective site management for spill and leak prevention. Appropriate design and maintenance of secondary containment areas as well as the ongoing provision of training and equipment for spill response are essential.

Design considerations: These design considerations are considered the minimum for environmental protection purposes. There are a number of Australian Standards that have additional requirements for the bunding of storage compounds for particular types of substances. You should also ensure that the requirements of any relevant Australian Standards are met.



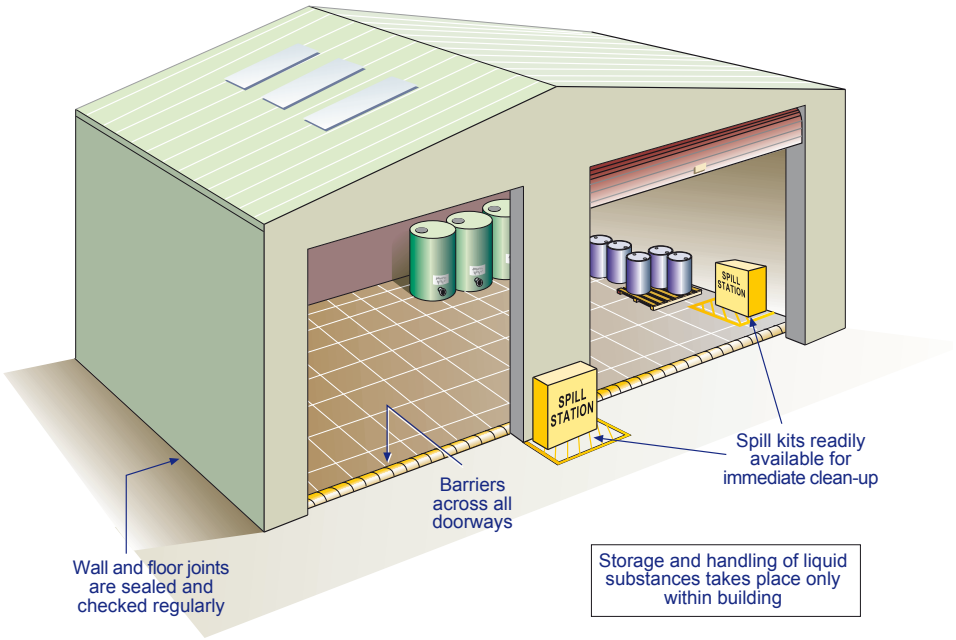
Volume of secondary containment

The effective volume of your secondary containment needs to be:

- A minimum of 100% of the volume of the largest container stored, for bulk storage facilities (that is, facilities where liquids are transferred into large containers for storage) plus enough free board to contain rainwater and firewater if rainwater or firewater are able to enter the area (the suggested minimum for free board is 10%).
- Or 25% of total volume of the stored product for facilities storing small containers (for example drums), plus enough free board to contain rainwater and firewater if rainwater or firewater are able to enter the area (the suggested minimum for free board is 10%).
- The larger the volume, the lower the risk. Some businesses find that to accommodate future expansion it is more economic to design considerably larger secondary containment areas than those described above.

In sizing a secondary containment area the following should also be considered:

- The reduction in effective volume due to the cumulative volume of all the containers stored.
- The possibility of stacked containers toppling outside the secondary containment area – a wider area may be required to ensure suitable distances between containers and the perimeter or to store items without stacking.
- Whether there is enough space between the perimeter and bulk storage tanks so that leaks at height will not project outside the secondary containment area (shielding of the tank may be necessary in some cases).
- If size is constrained, the effective containment volume can be increased by installing a sump or collection pit to which all liquids within the secondary containment area will drain for collection.
- If the area is not under cover then additional volume will be required to deal with estimated rainfall in the event that a leak or spill occurs during a rain event or before rainwater has been removed from the secondary containment area. In sizing the volume required by rain a 1 in 20 year 24 hour storm event could be used or 95th percentile 5-day rainfall depth (mm) [table 6.3A *managing stormwater – vol 1- soils & construction*, landcom nsw government, parramatta, landcom, 2004, 4th edition]
- Whether there is any likelihood that more than one container could fail at a time – if tanks are hydraulically connected then the combined volume of the tanks should be used to size the secondary



containment area. Similarly for package storage, if one container toppling over could cause others to fail then the size of the secondary containment area should be increased.

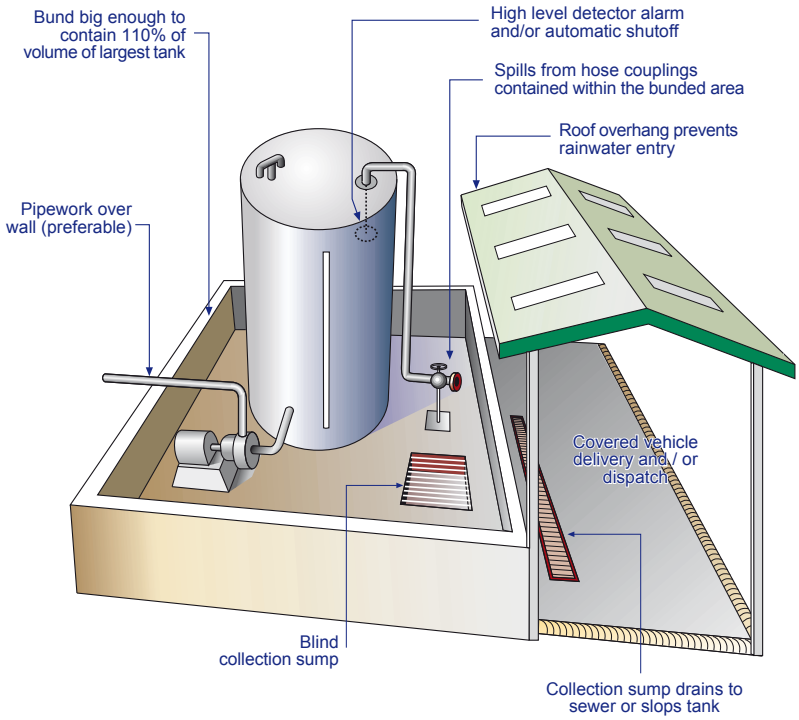
- If the secondary containment area forms part of your fire water collection system then additional volume will be required for fire water. This is typically based on the volume of water likely to be generated (for example, from a sprinkler system) during a 20 minute period.
- Construction materials
- Secondary containment structures can be made of any material that is impervious to the liquid being stored. For example, chlorinated solvents can seep through concrete and require a steel barrier.

Considerations for material selection:

- bund walls constructed from bricks or blocks need internal waterproofing. One leaky area renders the whole structure ineffective.
- The floor of the secondary containment area should be impervious to the substance being stored, usually concrete or concrete with a suitable coating.
- Special care should be taken to ensure that there is no possibility of liquid escaping between the floor of the contained area and the vertical barrier.
- If a building is being used as a secondary containment area it is necessary to ensure that the wall to floor join is well sealed, that doorways or other openings have a suitable barrier (for example, speed hump, flexible barriers or small raised metal barriers) and that there is a means of collecting spilt liquids.
- consideration should also be given to whether the secondary containment area is capable of operating during a fire, for example, plastic bunds may become inoperable.
- A secondary containment area made from unlined earth does not satisfy the need for an impermeable barrier and can lead to soil and water contamination. Effectively lined earth bunds with sounds geotechnical design may be appropriate. Temporary earthen bunds should only be constructed where the soils are capable of holding spilt liquids and where there is a soil remediation plan in place to deal with contaminated soil.

Roofs

Roofing reduces the risk of water pollution because it excludes rainwater from the secondary containment area or system. Water that accumulates inside the secondary containment area needs to be tested for contaminants before disposal and may need to be disposed of as liquid waste or treated onsite prior to disposal.



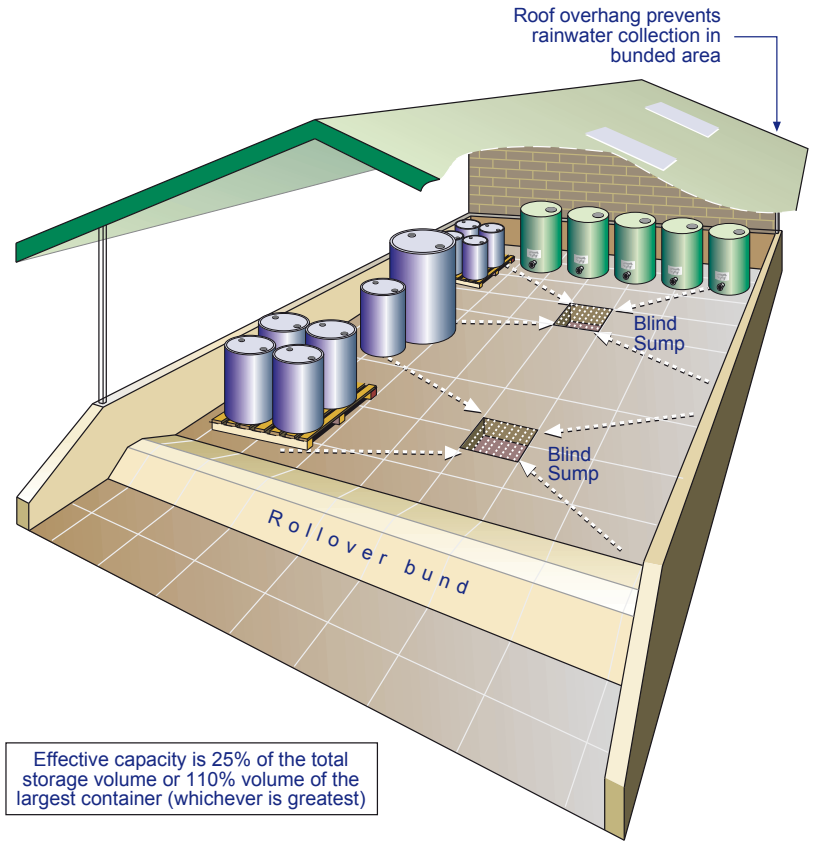
Rain water inside a secondary containment area reduces the effective volume of the containment and needs to be removed immediately. This can often mean that you will need somewhere to store this potentially contaminated water while it is being tested prior to disposal.

For these reasons, it is preferable to roof secondary containment areas that are located outside to prevent rainwater entering and accumulating. Roofs should be sufficiently larger than the secondary containment area so that there is enough overhang to prevent rain entering. An overhang of 12° from vertical is generally sufficient for this purpose, however, site specific conditions may require additional overhang.

It is not always possible to roof secondary containment areas for safety reasons or due to the size of the storage containers. In such situations, measures need to be put in place for the testing, storage and disposal of contaminated water that accumulates in the secondary containment areas.

Other design considerations

- Elements of secondary containment areas that are load bearing need to be capable of withstanding the loads applied.
- Ensure that secondary containment structures do not reduce access for emergency services.
- In the event that a container fails within a secondary containment area, measures should be put in place to ensure that the buoyant force of the spilt liquid should does not cause toppling of other containers (for example, tightly fitting lids on smaller containers and bolting down of tanks).
- Secondary containment systems based on encasement principles should be designed so that rainwater cannot enter the system.
- There should be no taps, bolts or other holes through the wall of the secondary containment. Pipes should go over the bund wall. Signs should not be installed on the bund with bolts through the wall. If a pipe must pass through the containment wall the joint should be sealed to prevent leaks and checked regularly.
- There should be no drainage pipes or taps installed in the bund wall. A drainage pipe renders the secondary containment ineffective and tap valves are invariable left open. Accumulated liquids are best removed by pumping from a collection sump inside the secondary containment area. The base should be graded so that all liquids drain to the collection sump.



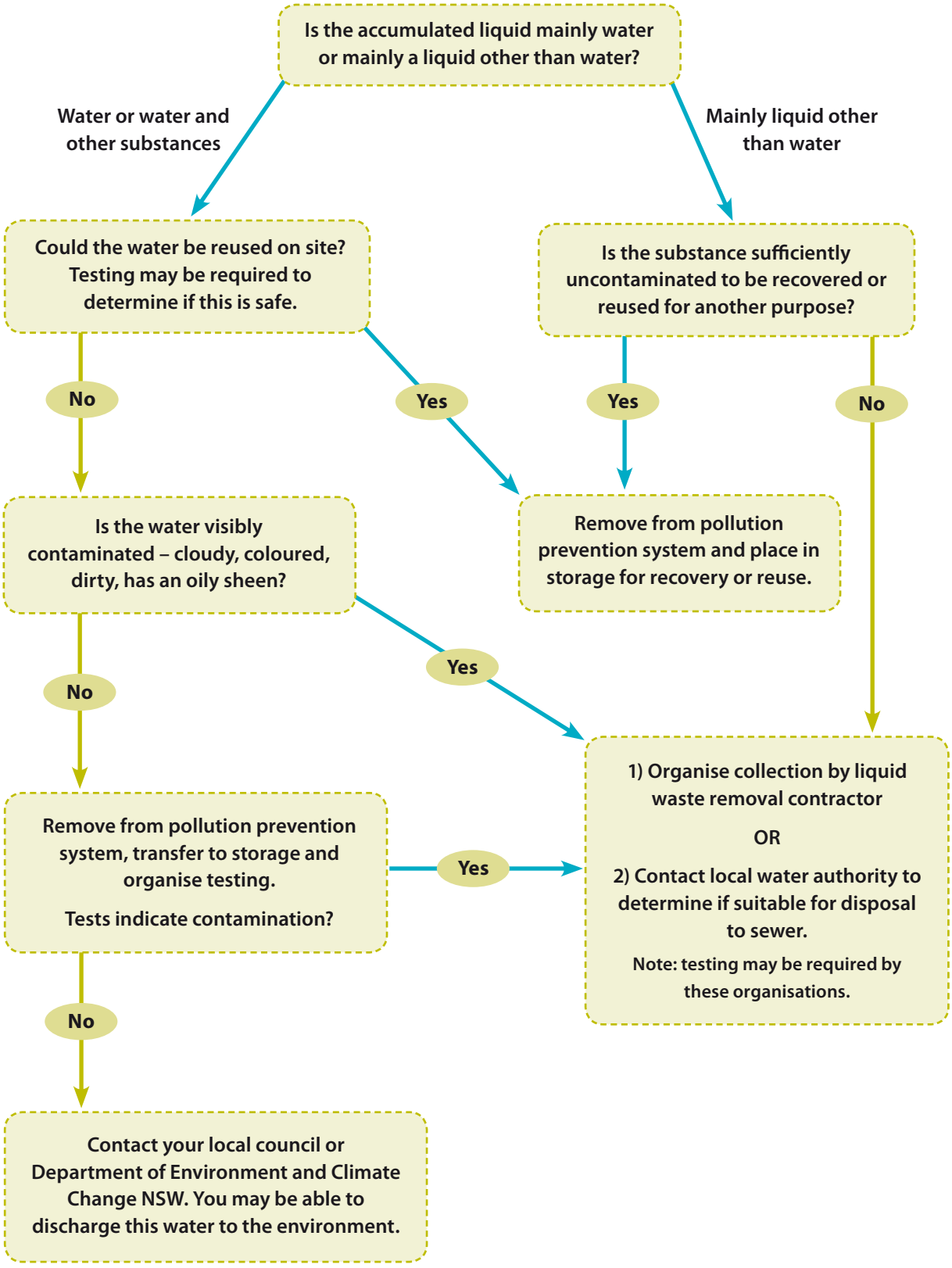
- Sensors and pumps are useful for systems which are not frequently inspected, particularly for encasement style secondary containment systems that drain to a sump.
- For tanks with integral secondary containment or hoses or pipes that are encased, the design needs to provide a means of checking the condition of the primary container.

Operational considerations

To optimise the effectiveness of the secondary containment system there needs to be a regular inspection and maintenance regime in place. The following issues should be considered:

- Appropriate use of secondary containment areas – are site personnel using the secondary containment areas or leaving/using liquid containers outside those areas? Are other materials being stored within the secondary containment area that do not need to be there and that reduce the effective volume?
- The condition of all primary containers – including labels and signs and for smaller containers whether the lids have been secured.
- The condition of all secondary containment structures and equipment, including: bund walls and floor, sealants, damage to or cracks in casing, any new installations (such as piping or signs) that compromise the integrity of the secondary containment area.
- Pumps, switches, sensors and alarms are in working condition.
- Accumulation of rainwater or spilt materials inside secondary containment areas or systems.

Decision diagram for managing liquids that accumulate in pollution prevention systems



2B First flush systems

Description: First flush systems are used to prevent pollutants that have accumulated on outdoor surfaces from entering the stormwater system during rain events. These systems work on the principle that the majority of contaminants will be mobilised by the rain water and transported to the stormwater system during the initial stages of any rain event – the first flush. The system diverts to storage all of the water from the first flush for each rain event, allowing for the testing, treatment and disposal of the contaminated water.

Applications: Prevention is better than treatment. Before installing a first flush system consider whether there are other means of ensuring that the stormwater leaving the site is uncontaminated. While a first flush system is likely to improve the quality of rain water leaving a site, it will not guarantee that all water leaving the site will be free from contamination. Carrying out all work indoors or under roofing and within secondary containment areas and using work management practices to prevent contaminants from accumulating on outdoor surfaces would reduce the need for a first flush system.

Design considerations: While site specific factors will determine the system design, the following should be taken into consideration.

Sizing the storage: The amount of space available for housing the first flush system will determine the type of design used – large sites can afford to use an open dam type construction (which require less regular emptying) whilst smaller sites may need to use above or below ground storage tanks (requiring more regular emptying). Storage size will depend on:

- The amount of runoff that needs to be collected – Table 2.1 gives some guidance, however, you may need site specific tests to determine the mobilisation rates for contaminants for your site.
- Overall site management – use grades and barriers to ensure that runoff from clean areas does not enter the catchment of the first flush system, unnecessarily increasing the amount of water captured and needing treatment.

Input control: There are a range of design options that will allow only the first flush to be captured. These include gravity based systems such as inlet weirs with clean water by pass channel and electronic systems (for example a pump and float switch combination). Effective input control is important for the correct operation of the first flush system.

Table 2.1: Suggested Volume for First Flush Collection Pit

Catchment Surface	Pollutants	Examples of Areas	Rainfall level to be contained	Volume of storage required[1]
Sealed (impervious) Surfaces eg. concrete, bitumen etc.	Substances that are easily mobilised such as: (a) Soluble materials (eg inks and dyes); (b) fine materials (eg dusts, silts, plastic and wood particles)	Exposed surfaces at a dye works; any concrete surfaces where plastic or wood particles may accumulate	10 mm	10 l/m2
	Substances that are more difficult to mobilise or are hazardous such as: (a) oil & grease; (b) metal particles (c) hazardous substances.	Motor vehicle courtyards; any exposed surfaces at a chemical manufacturers; any waste collection areas	15 mm	15 l/ m2
Unsealed Surfaces eg. gravel or shale etc.	All types of pollutants ie. Pollutants that are either easy or difficult to mobilise	Any unsealed yard areas	20 mm	20 l/ m2

[1] *In litres per square metre of catchment area to be treated (1000 litres equals one cubic metre)*

Operational considerations: First flush systems are ineffective if the water from the previous flush prevents storage of water from the next rain event. The following issues need to be addressed in operating a first flush system:

- A procedure is needed for the removal of water from the first flush system storage area after each rain event. This procedure should include methods for determining where the water will be either stored, reused or disposed of (testing may be required) and for arranging for the emptying of the first flush system when required.
- The accumulation of solid matter at the base of the first flush collection area will reduce the capacity of the system over time. A procedure is needed to determine when these solids require removal and how that will be carried out.
- Any pumps, valves, switches or sensors that are part of the system require regular checking to ensure the system is operational.

2C Site containment

Description: Site containment, isolation or shut off systems are measures that can be put in place to prevent liquids from leaving the site. Typically this involves preventing liquids from entering the stormwater system via drains on site and/or by flowing down driveways or paths to the street drain and gutter system.

Applications: The ability to isolate a site from the stormwater system during a spill or fire or at times of high risk of spills (such as delivery or dispatch) provides additional time to contain and clean up spilt liquids. These systems are widely applicable to operations involving the storage and use of liquid substances and can be achieved in a number of ways. Safety advice should be sought before installing site containment systems if flammable liquids are used on site, to ensure that the system does not allow vapour build up in enclosed areas.

Design considerations: Site specific issues will determine the extent and type of system used. The following should be considered when designing a system:

- the area of the site to which the system will apply – the whole site, indoor areas, outdoor areas, liquid storage area, delivery and dispatch area.
- The location of points where spilt liquids could escape from the site – stormwater drain inlets, sewer inlets, down driveways and paths or across ground to enter the street gutter and drain system. These are the points that will need to be isolated – shut off valves in stormwater drains, speed humps over driveways, even manual methods such as personnel blocking drains with appropriate materials or installing booms during a spill.
- When and how the system will be triggered – systems that apply to outdoor, uncovered areas cannot be closed at all times as rainwater would flood the site. The system could be triggered automatically by a system of sensors or switches, it could be closed off manually at certain times such as during transfer of drums or implemented by site personnel as part of spill containment procedures.
- Where collected liquids will accumulate – this will depend on the size of any likely spill (determined by the quantities of liquids stored and used) or if the system is for fire water collection it will depend on the size of the site. Options include the surface area of the site or diversion to collection pits, tanks or dams.

Operational considerations:. Site containment systems need regular maintenance, especially those that are triggered by a certain event (spill, or high risk activity).

Systems that rely on sensors, alarms and pumps should be checked regularly.

Systems that rely on site personnel to close off drains and/or install pollution booms should be checked by regular drills.

When liquids are collected there needs to be a procedure in place for determining recovery or disposal options.

2D Managing contaminated water or other substances collected by first flush systems or in secondary or site containment systems

Pollution prevention structures and systems such as first flush systems and secondary or site containment systems are less effective (even ineffective) unless the liquids that accumulate are removed. Liquids need to be removed as soon as possible to ensure that the system will operate as designed.

This flow diagram provides a framework to assist in the development of site procedures for the management of liquids removed from pollution prevention systems.

The types of liquids to which this procedures could be applied include:

- rainwater that accumulates in outdoor, uncovered secondary containment areas
- rainwater collected by a first flush system
- fire water or quenchants collected by secondary or site containment systems
- spilt or leaked substances collected by secondary or site containment systems.

The types of liquids and other substances stored and used on the site will determine the sorts of tests required, the way the liquid can be handled or stored and the final reuse, recovery or disposal option.

Testing and storage of contaminated water or other liquids can be time consuming, space intensive and costly. Other site planning and management measures may assist in reducing the volume of liquids that require management.

Appendix 3: Site Checklists

The following are examples of the sorts of checklists that you could use on a regular basis to ensure that the site management is going as planned. The suggested frequencies are a guide only and should be varied to suit your needs. Keeping copies of completed checklists is a good way to demonstrate your good site management practices.

Daily Checklist	Tick
Ensure that all taps, valves that should be closed are closed.	
Check secondary containment areas for leaks, spills or rainwater. Arrange removal if required.	
Check package containers for leaks, ensure all lids are on properly, that containers are stable.	
Check that waste storage area is not overfull and that wastes have been stored correctly.	
Check all floor areas for spills and drips and clean up. Report any leaks to manager.	

Carried out by:

Sign: Date:

Weekly Checklist	Tick
Daily checklists completed for each day.	
Check that all spill clean up kits have enough materials and are complete. Rectify if not complete.	
Visually inspect storage tanks and containers for leaks or visible signs of weakness.	
Walk around outside of premises during normal operation and check for odours. Report odours to manager.	
Test automatic alarms, shut off systems, pumps and level detectors to ensure proper function.	
Check that all signage on the site is intact.	
Check labels on all storage containers. Replace if necessary.	
Visually inspect hoses, pipework, valves and taps. Report any wear and tear to manager.	
Change posters relating to environmental issues so that staff do not become used to and ignore the same message.	

Carried out by:

Sign: Date:

You may wish to develop an **Environmental Action Plan** to ensure key site management issues are addressed by the appropriate personnel. A model is attached with suggestions:

Environmental issue	Action or measure	Who is responsible?	When?
1. Compliance			
	Set up inventory of relevant legislation.	Manager	January
	Provide ready access to all relevant Acts, Regulations, Standards and Codes of Practice.	Manager	January
	Copies of licences, approvals and certificates at hand.	Manager	January
	Write up standard workshop area checklists, daily and weekly, taking into account inspecting of equipment, routine actions to prevent spills etc.	Manager (with staff help)	February
	Train staff in the issues of environmental responsibility, in using the checklists (daily and weekly) and in reporting areas of concern to managers.	Designated workshop staff	February
	Develop a daily or per-shift system to make sure the daily/weekly checks have been completed and signed off.	Manager (with staff help)	March
2.Hazardous materials			
Use, store and dispose of hazardous materials safely.	Check that all hazardous materials are stored in a bunded and covered storage area.	Workshop manager	February
	Check that hazardous liquid wastes are segregated and stored in correctly labelled containers.	Designated staff	February and weekly
	Set up an inventory of all chemicals and products used on-site.	Workshop manager	March
	Make sure all containers are labelled, dated, properly sealed and closed.	Designated staff	February and weekly
	Check that all chemicals (including flammable, toxic and corrosive substances) are stored in accordance with the *Occupational Health and Safety (Dangerous Goods Amendment) Regulation 2005*.	Workshop manager and staff	March
	Organise the chemical storage area so that older chemicals are used first.	Workshop staff	March
	Make sure MSDS for all chemicals are up-to-date and accessible at any time.	Manager	February
	Arrange for a recycler to collect recyclable chemicals or glues that are out-of-date or no longer used.	Workshop manager	March
	Fit taps to chemical containers so that hand pouring is not required.	Designated staff	February
	Develop an emergency spill response procedure.	Manager and workshop manager	February
	Provide training to employees on emergency spill response.	Workshop manager and staff	March
	Produce posters that briefly describe the steps to take in the event of an emergency.	Workshop manager	April
	Display emergency procedure posters where they can be seen clearly within the workshop.	Designated staff	April

Appendix 4: Reducing operating costs

Cleaner Production – improve operating efficiency and increase profits

Good managers understand that a profitable business is an efficient business.

Efficiency in running a business includes reducing the use of resources (chemical input, raw materials, water and energy) and lowering the volume and toxicity of waste and other emissions. This efficiency is often referred to as 'LEAN manufacturing' or 'Cleaner Production'. It involves finding ways to reduce costs and environmental impacts along the entire production or service delivery process, from the supply of raw materials, to operations and distribution.

Implementing Cleaner Production is 'easy' for managers who know their business and are prepared to have a close, systematic look at inefficiencies. It is an opportunity to profit from:

- reducing the use of energy, water and raw materials
- avoiding waste and reusing and recycling materials
- minimising waste volumes and reducing waste toxicity to lower the cost of treatment and disposal
- implementing process changes to increase production and reduce spoilage
- reducing the use of hazardous and dangerous materials to minimise dangerous goods storage and environmental and OH&S liability risks, and
- providing a safe, clean and pleasant work environment that leads to increased staff productivity.

Where do I start?

Plan and organise

Dozens of Cleaner Production success stories prove that a team approach is best. With management support, establish a Cleaner Production team including staff from different areas of the business. Appoint a 'champion' or team leader and consider inviting suppliers or customers to join the team on occasions.

Assess and measure

The Cleaner Production team needs to assess the processes, material flows and costs within the business, and identify any internal barriers that may be preventing the implementation of more efficient practices.

The team should start by collecting baseline data on resource use, waste and process information—what gets measured gets considered! The team should also complete an initial business and processes assessment, which could include brainstorming sessions, a facility 'walk-through' or a more formal audit. It's also wise to involve an outside person with technical expertise who can provide a 'fresh pair of eyes' and ideas from other companies.

Identify opportunities

The Cleaner Production assessment will almost certainly identify immediate opportunities for cost savings, and these should be implemented as quickly as possible. These 'small wins' will help to maintain the team's enthusiasm. Other ideas may need further research and assessment and may take longer to implement.

The team should record ideas and options and prepare a simple Cleaner Production plan outlining opportunities, issues requiring further investigation, priorities, timeframes and staff responsibility for actions. As a starting point, the team could use the template environmental action plan in the 'Useful tools' section of this guide, and adapt it to suit your business.

Reward and revisit

The work of the Cleaner Production team should be acknowledged and the team should be encouraged to continue to look for new ideas. Consider 'refreshing' the group by alternating leaders and inviting new team members. Remember, efficiency is a continuous process and the Cleaner Production plan should be regularly revisited.

What if my business is too small for a cleaner production team?

Simply follow this suggested process on your own or with one or two workmates. Companies with as few as three employees have used Cleaner Production ideas successfully and saved resources and money.

CASE STUDY – Cleaner Production at Focus Press

Focus Press is a lithographic printing company based in Sydney, NSW. The company's printing capabilities include large and small format sheetfed printing, digital printing, CTP pre-press and full finishing facilities.

In 2002 Focus Press applied for funding under the NSW Government's Industry Partnership Program to put in place an EMS. The company's aim was to integrate environmental issues into its printing processes and operating systems.

With a consultant's help, Focus carried out an assessment to investigate environmental risks, research best practice and identify areas for potential environmental improvement.

The company collected benchmarking data on waste generation, electricity usage, water usage and discharge of effluent to sewer and put in place systems for recording and monitoring improvements.

Through this process the company was able to achieve the following gains:

- The quantity of alcohol used is at least 60% lower.
- Waste sent to landfill has reduced from 9 m^3 to 3 m^3 a week (saving $3,000 per year).
- Water consumption has dropped by over 62.5%, with further gains to come.
- By changing to soy-based inks, ink usage has reduced by 30%.
- Usage of paper and other raw materials in setting up and running print jobs has reduced by up to 58%.
- Quantities of hazardous substances used have been reduced.
- Energy usage is significantly lower.

Annual savings: over $65,000

Costs: Waste sorting and extraction system $40,000; 3-year payback period.

Developer filtration system $7,500; 12-month payback period.

For full details of this case study visit: **www.environment.nsw.gov.au/resources/focus.pdf**

Further information

- DECC Environment Line: phone 131 555
  or see **www.environment.nsw.gov.au/cleaner_production/ippcasestudies.htm**
- ecoBiz toolbox: search using key word 'ecoBiz' on
  www.epa.qld.gov.au/environmental_management/sustainability/ecobiz_queensland/
- Department of Environment and Water Resources at:
  www.environment.gov.au/settlements/industry/corporate/eecp/industry.html
- Sydney Water, water saving ideas: **www.sydneywater.com.au**

Appendix 5: Legal Definitions

Clean-up action, in relation to a pollution incident, includes:

(a) action to prevent, minimise, remove, disperse, destroy or mitigate any pollution resulting or likely to result from the incident, and

(b) ascertaining the nature and extent of the pollution incident and of the actual or likely resulting pollution, and

(c) preparing and carrying out a remedial plan of action.

It also includes (without limitation) action to remove or store waste that has been disposed of on land unlawfully.

Pollution incident means an incident or set of circumstances during or as a consequence of which there is or is likely to be a leak, spill or other escape or deposit of a substance, as a result of which pollution has occurred, is occurring or is likely to occur. It includes an incident or set of circumstances in which a substance has been placed or disposed of on premises, but it does not include an incident or set of circumstances involving only the emission of any noise.

Environmentally unsatisfactory manner – an activity is carried on in an environmentally unsatisfactory manner if:

(a) it is carried on in contravention of, or in a manner that is likely to lead to a contravention of, this Act, the regulations or a condition attached to an environment protection licence (including a condition of a surrender of a licence) or an exemption given under this Act or the regulations, or

(b) it causes, or is likely to cause, a pollution incident, or

(c) it is not carried on by such practicable means as may be necessary to prevent, control or minimise pollution, the emission of any noise or the generation of waste, or

(d) it is not carried on in accordance with good environmental practice.

Actions that can be required by a prevention notice:
The appropriate regulatory authority may, by notice in writing, do either or both of the following:

(a) direct the occupier of the premises

(b) direct the person carrying on the activity (whether or not at premises)

to take such action, as is specified in the notice and within such period (if any) as is specified in the notice, to ensure that the activity is carried on in future in an environmentally satisfactory manner.

Examples of preventative actions:

The action to be taken may (without limitation) include any of the following:

(a) installing, repairing, altering, replacing, maintaining or operating control equipment or other plant

(b) modifying, or carrying out any work on, plant

(c) ceasing to use plant or altering the way plant is used

(d) ceasing to carry on or not commencing to carry on an activity

(e) carrying on an activity in a particular manner

(f) carrying on an activity only during particular times

(g) monitoring, sampling or analysing any pollution or otherwise ascertaining the nature and extent of pollution or the risk of pollution

(h) action with respect to the transportation, collection, reception, re-use, recovery, recycling, processing, storage or disposal of any waste or other substance

(i) preparing and carrying out a plan of action to control, prevent or minimise pollution or waste

(j) reviewing the carrying out of an activity.

water pollution or **pollution of waters** means:

(a) placing in or on, or otherwise introducing into or onto, waters (whether through an act or omission) any matter, whether solid, liquid or gaseous, so that the physical, chemical or biological condition of the waters is changed, or

(b) placing in or on, or otherwise introducing into or onto, the waters (whether through an act or omission) any refuse, litter, debris or other matter, whether solid or liquid or gaseous, so that the change in the condition of the waters or the refuse, litter, debris or other matter, either alone or together with any other refuse, litter, debris or matter present in the waters makes, or is likely to make, the waters unclean, noxious, poisonous or impure, detrimental to the health, safety, welfare or property of persons, undrinkable for farm animals, poisonous or harmful to aquatic life, animals, birds or fish in or around the waters or unsuitable for use in irrigation, or obstructs or interferes with, or is likely to obstruct or interfere with persons in the exercise or enjoyment of any right in relation to the waters, or

(c) placing in or on, or otherwise introducing into or onto, the waters (whether through an act or omission) any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with any standard prescribed in respect of that matter,

and, without affecting the generality of the foregoing, includes:

(d) placing any matter (whether solid, liquid or gaseous) in a position where:

(i) it falls, descends, is washed, is blown or percolates, or

(ii) it is likely to fall, descend, be washed, be blown or percolate,

into any waters, onto the dry bed of any waters, or into any drain, channel or gutter used or designed to receive or pass rainwater, floodwater or any water that is not polluted, or

(e) placing any such matter on the dry bed of any waters, or in any drain, channel or gutter used or designed to receive or pass rainwater, floodwater or any water that is not polluted,

if the matter would, had it been placed in any waters, have polluted or have been likely to pollute those waters.

waters means the whole or any part of:

(a) any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea), or

(b) any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water.

STORING AND HANDLING LIQUIDS:
ENVIRONMENTAL PROTECTION
SITE ACTION PLAN

Date: Name:

Description of facility / area within the facility to which this plan applies:

Sketch of facility or area within the facility showing:

- liquid storages (above ground, below ground, bulk and package storage)
- pipes, hoses, valves
- liquid delivery / despatch areas
- stormwater drainage inlets and indicate direction of surface flow/grade
- sewer inlets
- existing pollution prevention measures (containment measures, spill kit locations, shut off valves, alarms, fencing etc.)
- existing treatment equipment.

Area/activity Identify an area, process or activity that could result in pollution.	**Possible outcome** What could happen? Consider both normal operations and accidents/ vandalism. Ask 'what if...'	**How likely is that?** Very likely Possible Unlikely	**Hazard** How easily could you prevent the substance leaving the site?
Example: Cooking oil storage area near loading dock adjacent to stormwater drain	Forklift impact could rupture or topple drums	Possible – Forklifts turn close to the storage area	Minimal chance of containing spill as stormwater drain adjacent

Assess the risk Risk = hazard x likelihood *See back page for an example of risk rankings*	**Action/Control measure** How could this risk be controlled? What measures could be put in place to reduce the risk of this occurring? Repeat the risk assessment process for each possible solution and choose one that produces a 'low risk' ranking.	**Responsibility** Who would be responsible for implementing and/ approving this action?	**Priority/timeframe** Based on the risk ranking, assign a priority to this action. You can use 1, 2, 3 or short/ medium/long term etc.
High risk	Relocate cooking oil storage drums to indoor area, away from traffic zones and within secondary containment structure.	Site Manager	1

Using the highest priority control measures that you identified on the previous page, list three actions that you will undertake when you return to work that will be a first step towards putting those measures in place (for example, discuss with manager, seek a quote, contact environmental consultant).

Three things that you will do when you return to work:

1.

By date:

2.

By date:

3.

By date:

Example of a risk ranking system:

It is suggested that you use the risk ranking system with which you are most familiar. If you do not have such a system, then you can use the example below. Remember that this risk assessment process is a tool towards prioritising better site management, risk assessments are not a requirement under environmental legislation and do not confer legal protection.

	Likelihood		
Hazard	**Very likely**	**Possible**	**Unlikely**
Substance will leave the site, not possible to contain it (eg via stormwater drain, through the soil)	High Risk	High Risk	Medium Risk
Substance may be contained if noticed in time	High Risk	Medium Risk	Low Risk
Substance can be prevented from leaving the site	Medium Risk	Low Risk	Low Risk