Liquid storage and handling guidelines

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ABOUT THIS GUIDE

The information in this publication is for general guidance only. It does not constitute legal or other professional advice, and should not be relied on as a statement of the law. Because it is intended only as a general guide, it may contain generalisations. You should obtain professional advice for your specific circumstances. EPA has made every reasonable effort to provide current and accurate information, but it does not make any guarantees regarding the accuracy, currency or completeness of that information.

DEFINITIONS

The following definitions are provided for the purposes of this guideline only

Bund: A raised, impermeable barrier forming the perimeter of a secondary containment system. It is commonly used in reference to the whole system.

Clean up: To restore the environment to a state as close as practicable to the state it was in immediately before the pollution event. Fully defined in the *Environment Protection Act 1970.*

Collection sump: A hollow or a depression on the floor into which liquids can drain off to and get collected.

Dangerous goods: Substances and items as defined in the *Australian Dangerous Goods Code* (part 1: section 1.2.1.2.4).

Environmental management system: The organisational structure, policies, practices, processes and procedures for implementing environmental management including systems for designating responsibility for and allocating resources to, environmental management.

Hazardous substances: Hazardous substances are substances that have the potential to harm human health. A substance is defined by the Occupational Health and Safety Regulations as hazardous if it meets the criteria for hazardous classification set out in Part 3 (Health Hazards) of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) (3rd, 4th or 5th revised edition), with some exceptions.

Incident means—

(a) an emergency; or

(b) an unintended event that, but for the intervention of a risk control measure or human intervention, is likely to result in an emergency.

Pollution: of water, atmosphere or land is to adversely change its physical, chemical or biological condition, by the discharge or deposit of any waste or pollutant, (as fully defined in the *Environment Protection Act 1970,* and referred to in Sections 39(1), 41 (1) and 45(1)).

Secondary containment: Establishing an additional line of defence to prevent loss of containment in the event of failure of the primary containment systems (such as bulk storage containers and drums).

Site: As is defined in State Environment Protection Policy (Prevention and Management of Contamination of Land), **'site'** means a parcel of land and other elements of the environment associated with the land.

EPA: Environment Protection Authority Victoria.

Undercover area: An area sufficiently constructed (example walls, roofs) so as to prevent ingress of water.

Used containers: A container that has been utilised to store something, which is empty and contains a residue.

OVERVIEW

Who should use this guide?

This guide is to help businesses with practical controls to ensure that their liquid substances are appropriately stored and handled to prevent spills.

If you store and/or handle liquids at your site, then this guide applies to you. Some examples of industries that should refer to this guide include (but are not limited to):

- fast food outlets using and storing cooking oil
- office buildings storing cleaning products
- mechanics storing new and used oils including fuel
- council depots using and storing paints, pesticides, oil and fuel
- farms using and storing fuel and agricultural chemicals
- food manufacturers producing fruit juice, milk etc.
- chemical manufacturers using and storing industrial chemicals
- service stations.

What is this guide about?

This guide outlines the principles for preventing harm to the environment and human health when storing and handling liquid substances. This guide refers to bulk storage as well as smaller containers or packaged storage of liquid substances, and to liquids that are considered 'raw materials', 'product' and those that are considered as 'waste'.

Each section of this guide provides information on proper storage and handling methods for liquids and how you can reduce and control risks to the environment and human health. For many liquids, such as acids, there are additional requirements that govern storage and use, such as WorkSafe publications or Australian Standards.

Why should I use this guide?

Taking steps to implement the principles described in this guide will enable you to demonstrate that you have taken practical measures to manage your operations, preventing real or potential harm to the environment and human health.

Liquids, both hazardous and seemingly harmless substances such as milk, have the potential to pollute the environment and harm human health. Even water of differing quality can cause damage when discharged into a water body (for example, too salty or too fresh for the receiving environment). The storage and handling of any liquid can lead to spills or leaks and the subsequent pollution of water and land. Some of the negative effects of this kind of pollution include (but are not limited to):

- damage to ecosystems and a loss of plant and animal life
- spread of disease-causing bacteria
- impacts to amenity as a result of odour or toxic vapours in the atmosphere
- the addition of some chemicals (nutrients) to waterbodies can lead to eutrophication (excessive growth of aquatic plant species and algae) which reduces the amount of oxygen that is dissolved in water negatively impacting other organisms (fish, birds, humans) (see figure 1)
- legal proceedings, criminal convictions, heavy fines and legal fees
- lost work time, cleanup costs and damage to your business reputation
- reduction of your operating efficiency, especially if it is a product or raw material that you are losing.

Figure 1: Liquids added into the environment due to leaks and spills can cause harm to the environment and human health.

If you produce, use or store <u>any</u> liquid substances then you need to consider the associated pollution risks and act to reduce those risks. You must:

- **Ensure that liquid substances 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).**
- **Ensure that any liquid leaving your site is properly transported and will be delivered to an appropriate receiving site, which also contains suitable risk mitigation mechanisms.**

Liquid storage and handling guidelines

Bad practices: The images on this page show bad practices related to storing and handling liquids that could lead to environmental pollution.

Liquid storage and handling guidelines

Good practices: The images on this page show good practices related to storing and handling liquids.

PREVENT

Managing your site

Risk management

Like any other business risk, you can assess and manage the risk of environmental pollution occurring at your site using a risk assessment approach. A risk assessment will help you to identify and quantify the risk of a pollution event occurring at your site and will also help you to target your efforts to design preventative controls to mitigate those risks. Risk is a combination of both the severity of an event (consequence) as well as the probability (likelihood) that it will occur.

RISK = CONSEQUENCE x LIKELIHOOD

The method for assessing and controlling risk has four steps (see Figure 2 and Table 1). This method is a continuous process which returns to step 1 after a control is put in place. Please refer to the EPA Guidance Document *Assessing and controlling risk: A guide for business* (EPA publication 1695) for further information.

Figure 2: Steps of the risk assessment process.

Table 1: Steps in controlling hazards and risks.

Step	Action	Description
1	**Identify hazards**	What hazards are present that might cause harm.
2	**Assess risks**	What is the level or severity of risk, based on likelihood and consequence.
3	**Implement controls**	What measures are suitable and available to the business to eliminate or reduce a risk.
4	**Check controls**	Review controls to ensure they are effective.

Table 2 gives you a template of a simple risk assessment with an example filled in. You can also refer to Table 3 to get an idea of some of the potential hazards in your worksite and include them into your risk assessment.

Routine inspection programs and maintenance of equipment and storage vessels will help to pick up on potential leaks before they occur.

Table 2: A sample template to complete a simple risk assessment at your site.
(**Note**: use the risk matrix of the EPA's *Assessing and Controlling Risk: A Guide for Business* (Pg. 7 – Figure 2) to calculate the **Risk Rating** or use your own matrix)

Identify hazards		**Assess risk**			**Implement controls**					**Check controls**	
Hazard	**Potential harm**	**Consequence** (Severe, Major, Moderate, Minor, Low)	**Likelihood** (Certain, Very Likely, Likely, Unlikely, Rare)	**Risk rating** (Consequence X Likelihood)	**Existing controls**	**What further controls are required**	**Action by** [Role Title]	**Due date**	**Date complete**	**Date of review**	**Effective/ Not effective**
Example: Forklift impact could rupture or topple cooking oil drums near loading dock, adjacent to stormwater drain	Cooking oil can drain into to the stormwater drain	Moderate (medium level of harm to human health and environment)	Likely (forklifts turn close to the storage area)	High	None	Investigate the possibility of relocating the cooking oil storage area	Site Manager	dd/mm/yy	dd/mm/yy	dd/mm/yy	

Site planning

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. 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 (Figure 4).

When planning your site, you should aim to:

- Set up storage locations for liquids in accordance with these guidelines and any other relevant legal requirements (for example WorkSafe and Australian Standards). It is always advisable to store liquids undercover.
- Review the processes carried out within your site and take steps to reduce the amount of stored hazardous or toxic liquids if possible.
- Engage a suitably qualified individual (for example a local water authority, or industry body) to design a bunding system suitable to your site. Construct the bunds according to the guidelines set out in this guidance (please refer to the section on secondary containment).
- Prevent spills or leaks from occurring by installing other suitable secondary containment infrastructure.
- Ensure that any spills or leaks that do occur on site cannot leave the site or escape to the environment (air, land, water, including groundwater) by installing site containment infrastructure and site isolation systems.
- Ensure that appropriate systems are in place to guarantee that only clean water leaves the uncovered outdoor work areas and enters the environment. Installing first flush systems, triple interceptor points or oil/water separator systems will assist in this regard.
- Divert uncontaminated stormwater away from liquid storage areas and any other areas where contaminants may accumulate.

Figure 3: Image of a triple interceptor system. This system will retain contaminants such as oil, grease, sand, silt etc. as water flows through the three tanks. This will prevent the pollutants from entering the stormwater system.

Bad practice: Liquid containers stored outside without secondary containment.

Good practice: Liquid containers stored undercover in a clearly designated secondary containment area.

Figure 4: Ensuring your liquids are stored in a place that is properly designated and contained is an essential part of good site planning.

Table 3: A series of questions that would help you identify the hazards on your site that requires planning and management to reduce risks.

Area	Question	Why is it important?
Containment	1. Do you carry out any activities such as storage, delivery, dispatch or transfer of liquid products outdoors?	Where it is safe to do so, storing and handling liquids indoors reduces the risks of pollution of stormwater provided that the building area can contain any spills (see the section on Managing liquid storage for more information).
	2. Are all liquid storage containers/tanks, piping, handling areas, delivery areas and process tanks located within secondary containment areas (bunded)?	Secondary containment areas contain spills and leaks to prevent liquid from escaping into the environment – design considerations are addressed under the section secondary containment of this guidance. Many water pollution and soil contamination events occur due to inadequate secondary containment of all components of the liquid storage and handling system.

Area	Question	Why is it important?
Containment	3. 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 practicable 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 the section on Reducing the risk of pollution through leaks and spills for more information on systems that can be used to contain sites, prevent stormwater pollution and a decision diagram (Figure 17) for managing liquids that accumulate in pollution prevention systems).
	4. If your site regularly accumulates pollutants in outdoor areas, what measures do you have to prevent these contaminants entering the environment?	Rain water leaving your site must be clean. Prevention is easier than treatment. Therefore, if possible, eliminate or minimise the outdoor areas that are considered to be 'dirty'. Ensure that rainwater from 'clean' areas is diverted around '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 (read the section on first flush systems for more information). Triple interceptors and oil water separator systems can also be used to prevent contaminants from leaving the site.
	5. What would happen if a container failed, was overfilled or was toppled over and the contents spilt?	Storing liquids within secondary containment areas (bunded) or in tanks with integral secondary containment prevents spills or leaks from spreading, leaving the site and causing pollution. Check the section secondary containment for information on design and operation considerations for secondary containment. The section on Incident management and spill response provides more information on how to manage spills.
Incident management	6. 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 should be provided with training that will inform them on the steps to take in the event of environmental incidents and be aware of their duty to notify. Section Incident management and spill response of this document contains information on incident planning, spill response and duty to notify.
	7. 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. This can lead to water pollution if the fire water is not contained. Section on Reducing the risk of pollution through leaks and spills (under Preventing and monitoring of spills) gives more information on response mechanisms that can be used to capture fire water.
	8. 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. Refer to the section on Reducing the risk of pollution through leaks and spills for more information.

Area	Question	Why is it important?
Monitoring and maintenance	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? Have they received adequate training for this?	Regular inspection and maintenance are important components of good site management. Table 5 and Table 6 of this document provide templates for a daily checklist and a monthly checklist respectively, that could be used for this purpose.
	10. If you already have a system onsite for treating water to remove contaminants, do you know how effectively it works and how often it is maintained?	It is important to check that pollution control equipment is appropriate for the application and serviced regularly. This can be achieved by regularly monitoring output quality prior to discharge.
	11. 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. Some of the leak detection methods that can be used for monitoring loss of content from underground storage tanks are automatic tank gauge (ATG) systems, statistical inventory reconciliation analysis (SIRA), interstitial monitoring and line leak detection. In addition to this, groundwater monitoring wells and tank pit observation bores can be used to help detect leaks, as a backup for loss monitoring. Please refer to the *Victorian underground petroleum storage systems: A guide to preventing and managing leaks and spills* (EPA publication 1670) for more information on managing spills and leaks from underground petroleum storage systems.
Storage	12. If you store volatile liquids, are there measures in place to prevent the leaking of vapours during storage and handling?	Storage of volatile liquids requires vapour recovery and air pollution control. In addition to this, you should also ensure that you follow the requirements stipulated within the Dangerous Goods (Storage and Handling) Regulations 2012 and Occupational Health and Safety Regulations 2017 for dangerous goods and hazardous substances respectively. Dangerous goods regulations include provision for prevention of ignition sources (reg. 43) and ventilation (reg. 44). Measures to reduce the risks of air pollution occurring are also addressed in Preventing and monitoring of spills segment of this guidance.

Area	Question	Why is it important?
Storage	13. Do you ensure that incompatible substances cannot come into contact with each other? (for example, do you ensure that acids are not stored near caustic liquids)?	Separation distances for particular chemicals are set out in Australian Standards and *Dangerous Goods (Storage and Handling) Regulations 2012* (Reg. 35) requires management of incompatible materials. It is important to ensure that incompatible chemicals will not come into contact during spills, leaks or fires.
	14. 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.
	15. How secure are your storage areas?	Pollution incidents can occur as a result of vandalism or unauthorised tampering. Indoor storage, the use of fences, locks and/or alarms may be necessary.
Stormwater	16. Do you know where the inlets to the stormwater system are for your site and where the stormwater pit flows to?	It is important to know where the rain water that washes over your site drains to as it will carry contaminants from your site to the environment. There should be no stormwater inlets inside secondary containment areas, buildings or roofed areas.

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 (including bunding)?
- Regularly maintain containment and secondary containment infrastructure (including bunding)?
- Train all personnel in incident response and spill management?
- Regularly inspect spill kits to ensure they are available and well stocked?
- 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?
- Review reports and maintain records?

Regular inspection of the site, maintenance of equipment and having plans 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. You may wish to develop an environmental action plan to ensure key site management issues are addressed by the appropriate personnel. Table 4 of this guidance provides an environmental action plan model that you can modify to suit your needs.

Are you able to show that you do these things?
You should maintain records of inspections, maintenance, audits and training as well as any written plans for improvement works or new control measures. Unless you maintain evidence to prove that adequate steps have been taken to manage the risks, regulators will not be able to assess your performance.

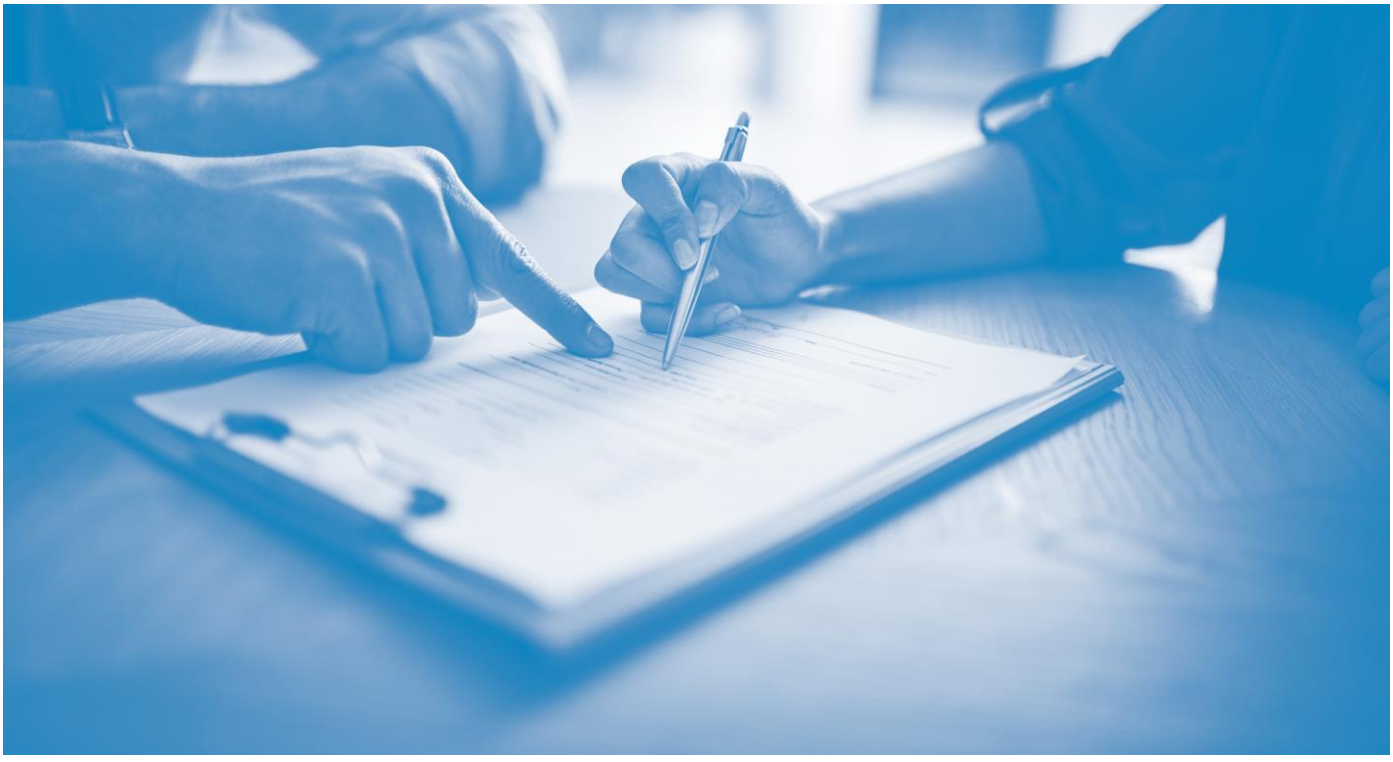


Table 4: Environmental action plan model
(Note: this is a model of a plan that can be used to mitigate issues other than those that are addressed through daily or weekly inspections. The actions and the dates that are included are provided for guidance and should be adjusted to suit your needs and can be addressed as a matter of priority).

Action or measure	Who is responsible?	When?
For example, set up inventory of relevant legislation, standards, codes of practice, and guidance.	[Role title]	[Enter month/date]
For example, provide ready access to all relevant Acts, regulations, Standards and Codes of Practice.	[Role title]	[Enter month/date]
For example, copies of licences, approvals and certificates at hand	[Role title]	[Enter month/date]
For example, write up standard workshop area daily and weekly checklists, taking into account equipment inspections, routine actions to prevent spills, etc.	[Role title]	[Enter month/date]
For example, train staff in environmental responsibility, in using the checklists (daily and weekly) and in reporting areas of concern to managers	[Role title]	[Enter month/date]
For example, develop a daily or per-shift system to make sure the daily/weekly checks have been completed and signed off.	[Role title]	[Enter month/date]
For example, check that all hazardous materials are stored in a bunded and covered storage area (secondary containment area).	[Role title]	[Enter month/date]
For example, check that hazardous liquid wastes are segregated and stored in correctly labelled containers.	[Role title]	[Enter month/date]
For example, set up an inventory of all chemicals and products used on-site.	[Role title]	[Enter month/date]
For example, make sure all containers are labelled, dated, properly sealed and closed.	[Role title]	[Enter month/date]
For example, check that all chemicals (including flammable, toxic and corrosive substances) are stored in accordance with the Dangerous Goods (Storage and Handling) Regulations 2012: Statutory Rule No: 132/2012.	[Role title]	[Enter month/date]
For example, organise the chemical storage area so that older chemicals are used first.	[Role title]	[Enter month/date]
For example, make sure material safety data sheets (MSDS) / safety data sheets (SDS) for all chemicals are up-to-date (less than five years old from the date that you are referencing the documents) and accessible at any time.	[Role title]	[Enter month/date]
For example, arrange for a recycler to collect recyclable chemicals or glues that are out-of-date or no longer used, or take them to a suitable receiver yourself.	[Role title]	[Enter month/date]
For example, provide taps/valves to chemical containers so that hand pouring is not required.	[Role title]	[Enter month/date]

For example, develop an emergency spill response procedure.	[Role title]	[Enter month/date]
For example, provide training to employees on general emergency spill response as well as training specific to the chemicals/substances stored or handled on site.	[Role title]	[Enter month/date]
For example, produce posters that briefly describe the steps to take in the event of an emergency.	[Role title]	[Enter month/date]
For example, display emergency procedure posters where they can be seen clearly within the workshop.	[Role title]	[Enter month/date]

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 and risk to human health from occurring and of demonstrating your efforts towards good site management.

Managing liquid storage

Primary containment

When storing liquid substances on your site you will to take the following into consideration.

Where you are going to store liquid substances?

You should AVOID:

- locations with a high risk of water pollution or land contamination, for example, in or on structures that are built over water (boat sheds, jetties, pontoons)
- bare ground or unsealed surfaces
- areas with no secondary containment
- areas adjacent to or over stormwater inlets, drains, creeks.

CHOOSE locations with a low risk of water pollution or soil contamination:

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

What measures do you need to take to ensure safety and prevent pollution through spills and leaks?

For example:

- properly and clearly labelling all containers containing liquid substances
- putting systems in place to ensure incompatible materials are not mixed during any incidents
- storing liquid substances in a dedicated, well-ventilated storage area
- not storing liquid substances in empty food and drink containers
- making sure lids are secured on containers
- purchasing smaller quantities and safer chemicals (for example, granular products instead of dusty powders, water-based products instead of solvent based, more dilute chemicals)
- minimising spills and splashes by using safe pouring or decanting techniques (for example, using **dry break coupling** which provides an automatic mechanism to seal off both the hose and the fixed pipe end when the hose is disconnected, in place of quick release and camlock coupling)
  Note: additional examples of safe decanting techniques are provided in Table 7 of this document.
- disposing of any liquid substances you don't use anymore (contact your local council, local landfill, chemical waste disposal company or EPA Victoria for advice)
- providing PPE such as gloves, face shields, safety glasses or respirators if necessary and making sure PPE is used, cleaned and maintained properly
- regular monitoring and maintenance of primary containment systems.

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: The storage and handling of flammable and combustible liquids.* Refer to the sections on requirements for dangerous goods and hazardous substances, licensing and legal obligations and relevant Australian Standards of this guidance for more information.

- WorkSafe has a range of publications relevant to the storage and use of hazardous substances and dangerous goods. In particular, the *WorkSafe Code of Practice for the Storage and Handling of Dangerous Goods* and the *WorkSafe document - A step by step guide for Managing chemicals in the workplace* will need to be considered.

Maintaining an inventory

- 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. Material safety data sheets(MSDS)/safety data sheets (SDS) should be available to all site personnel, referred to when dealing with spills and waste disposal and updated regularly.

Secondary containment (including bunding)

Figure 5: Image of an industry site that uses bunding around their tanks as secondary containment.

Description: Secondary containment refers to any means used to contain liquid leaks or spills if the primary container (liquid storage container) or transfer mechanism fails. Secondary containment areas prevent liquids from escaping to the environment. Secondary containment can include:

- **Bunds** – impermeable, raised barriers forming the perimeter of secondary containment areas (for example, walls, speed humps, guttering, curbing, flexible rubber barriers constructed with robust, impermeable, UV and chemical resistant material or lined with such material).
- **Encasement** – storage containers with built-in (integral) secondary containment (for example, encasing plastic pipes that carry liquid within a larger pipe which drains to a collection sump, placing drums inside larger, sealed plastic drums during transport by forklift).
- Grading of sealed surface areas to form a contained area, either as part of a building or an external structure.

Note: Regulation 41 of Dangerous Goods (Storage and Handling) Regulations 2012 prescribes spill containment.

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, including bunding, is widely applicable to liquid storage and handling situations. There are a 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 prevention and 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 ensure that the requirements of any relevant Australian Standards are met. Information on Australian Standards relevant to liquid storage and handling can be found under Other Considerations section of this guidance.

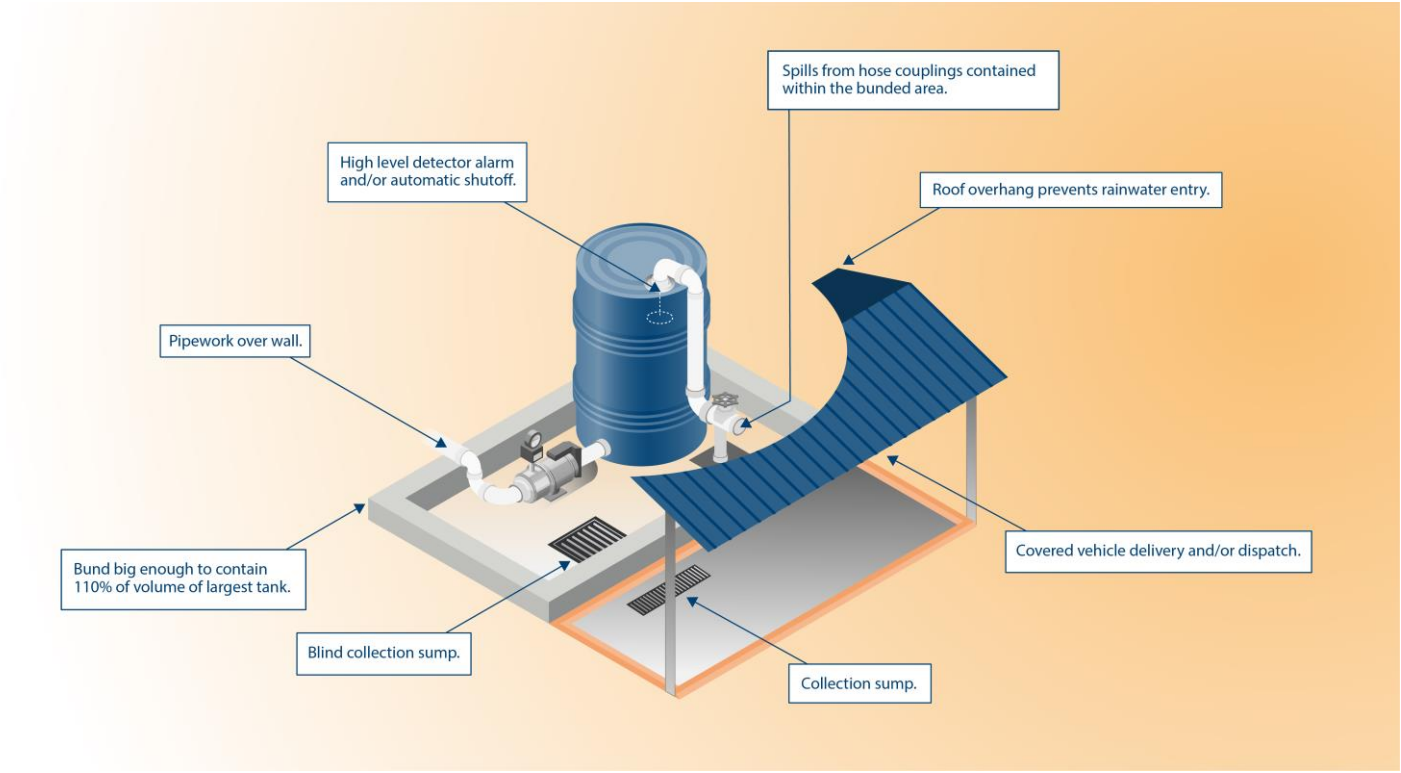


Figure 6: A schematic diagram showing the recommended design specifications for a bund around a tank.

Volume of secondary containment

The effective volume of your secondary containment needs to be:

- Facilities with large tanks where liquids are transferred into large containers for storage (bulk storage facilities) require a minimum of 100 per cent of the volume of the largest container for bulk storage. If two or more tanks are operated as a single unit, then the capacity of all such tanks should be considered when calculating the volume. A minimum additional volume of 10 per cent of the second largest tank is suggested. There is an additional suggested minimum of 10 per cent for free board to contain rainwater and firewater. You should also refer to Australian Standard publication *AS1940: The storage and handling of flammable and combustible liquids* when calculating the volume, if it is applicable to you based on the material that is stored at your site.
- Or 25 per cent 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 per cent).

- For tank vehicle loading – the capacity of a bunded area should at least be equal to the greater of:
  - 100 per cent of the largest compartment of any tank vehicle using the filling facility, or 9000L, whichever is less or;
  - The maximum quantity capable of being discharged from the two filling points having the greatest flow during a period of two minutes.
- The larger the volume of the secondary containment area relative to the primary storage 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 containers that are stored within a secondary containment area will take up some space. Therefore, the **available volume** of the secondary containment area (that is the volume that is available to contain any spills or leaks from the containers) will be less than the **calculated volume** (volume calculated using the dimensions of the secondary containment area) due to the **collective volume** taken up by all of the containers stored within that area.

Calculated volume (volume calculated using the dimensions of the secondary containment area)	**-**	**Collective volume taken up by containers that are stored within that area.**	**=**	**Available volume**

- The possibility of stacked containers toppling outside the secondary containment area leading to pollution events and OH&S issues. A wider area may be required to ensure suitable distances between containers and the perimeter, or to store items without stacking.

Half height rule

Tanks and drums should be separated from the inner edge of the bund crest by a distance of half the height of the tanks or stack of drums on flat grounds. This rule may be waived where adequate restraint is provided to prevent drums from falling outside the bund, such as a cyclone wire fence or a wall.

- 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 the secondary containment area size is limited, 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 secondary containment area is not undercover 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). This information can be obtained from the Bureau of Metrology.

- 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. Refer to *Metropolitan Fire Brigade (MFB) Fire Safety Guideline GL 12 – Considerations for fire water run off at dangerous goods site* for more information.

- Construction materials should be appropriate to the contents of the containers held within the secondary containment area. For example, chlorinated solvents can seep through concrete and require a steel barrier. Please see the following section on considerations for material selection for more information.

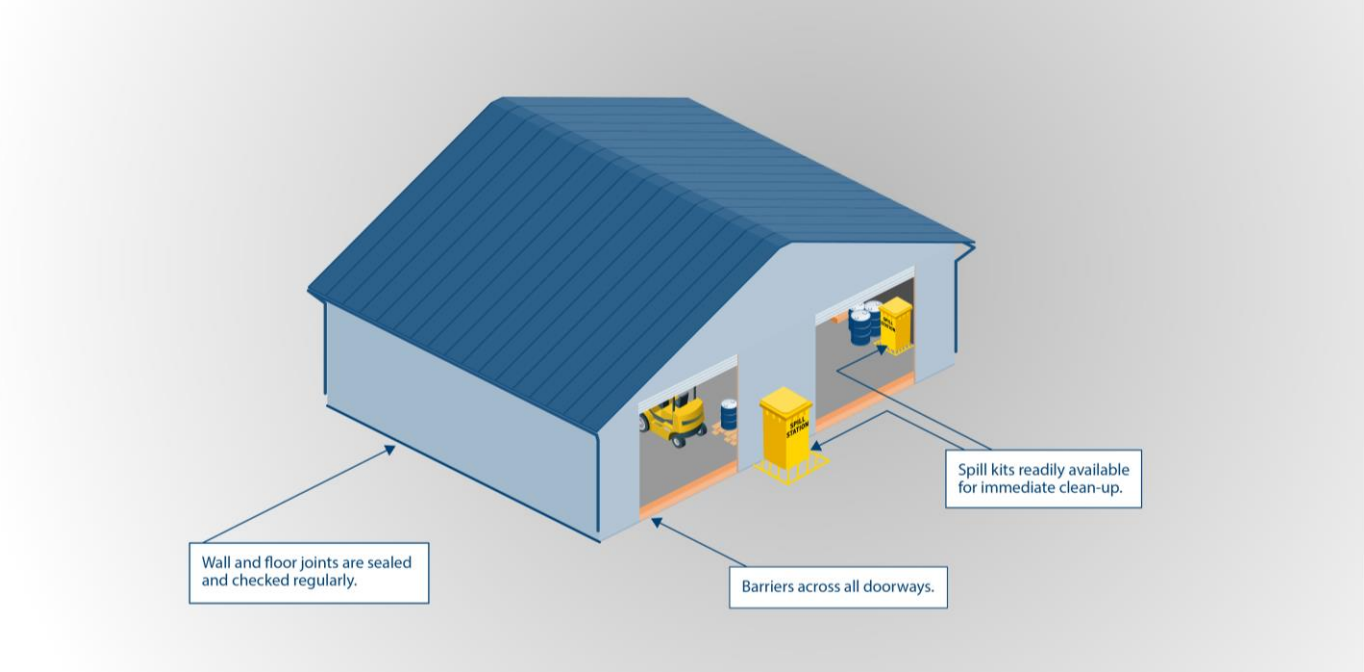


Figure 7: Storage and handling of liquid substances should take place only within buildings

Considerations for material selection

- Bund walls constructed from bricks or blocks need internal waterproofing. One leaky area will render the whole structure ineffective.

- The floor of the secondary containment area should be impervious to the substance being stored. For example, impermeable concrete mix or concrete with a suitable impermeable coating.

- Special care should be taken to ensure there is no possibility of liquid escaping between the floor of the contained area and the vertical barrier such as through joints for example.

- 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 humps, flexible barriers or small raised metal barriers) and there is a method for 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 land and water contamination. Effectively lined earth bunds with sound geotechnical design may be appropriate. Temporary earthen bunds should only be constructed where the clay or soils have very low permeability and are capable of holding spilt liquids and where there is a soil remediation plan in place to deal with contamination.

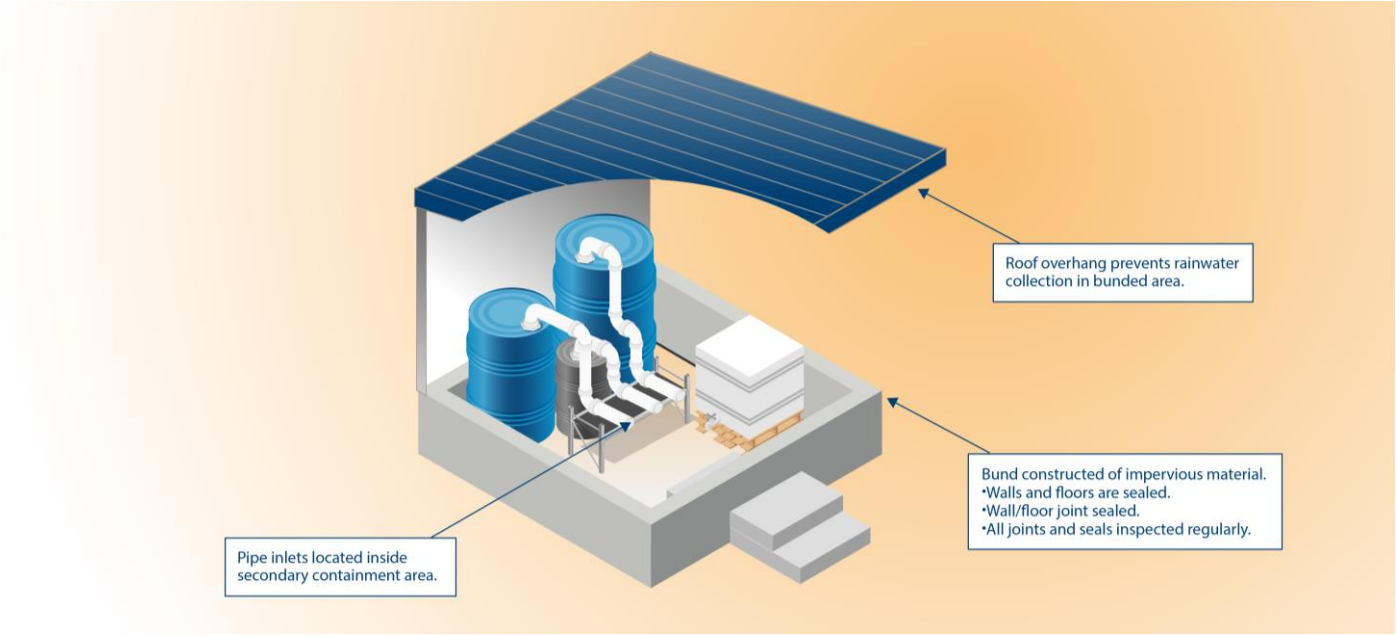


Figure 8: Effective volume of bunded area is 110 per cent of the volume of the largest container

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. Please refer to Figure 16 for more information on managing liquids that accumulate in pollution prevention systems, including secondary containment.

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 angled overhang to prevent rain water entering the area.

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 engineered to a standard that is capable of withstanding the loads applied.
- Ensure that secondary containment structures do not reduce access for emergency services.
- If the container fails causing a spill, ensure it will not cause floating or toppling of other containers.
- There should be no taps, bolts or other holes through the wall of the secondary containment system. 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. Consideration must also be given to the sealant used, and whether it will be impermeable to the liquids being contained.
- A drainage pipe renders the secondary containment ineffective and there is a risk of tap valves being 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, alarms 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.
- Where two or more liquids (different types) are stored on site, they should be stored such that separate bunded areas are provided where possible for each liquid to maximise collection and re-use of uncontaminated spilled liquid.
- Minimum separation distances for storage vessels containing chemicals belonging to different classes of dangerous goods, should be in accordance with *WorkSafe Code of Practice for the Storage and Handling of Dangerous Goods* and should be strictly adhered to (note: the segregation chart is located in Appendix 3 of the document).

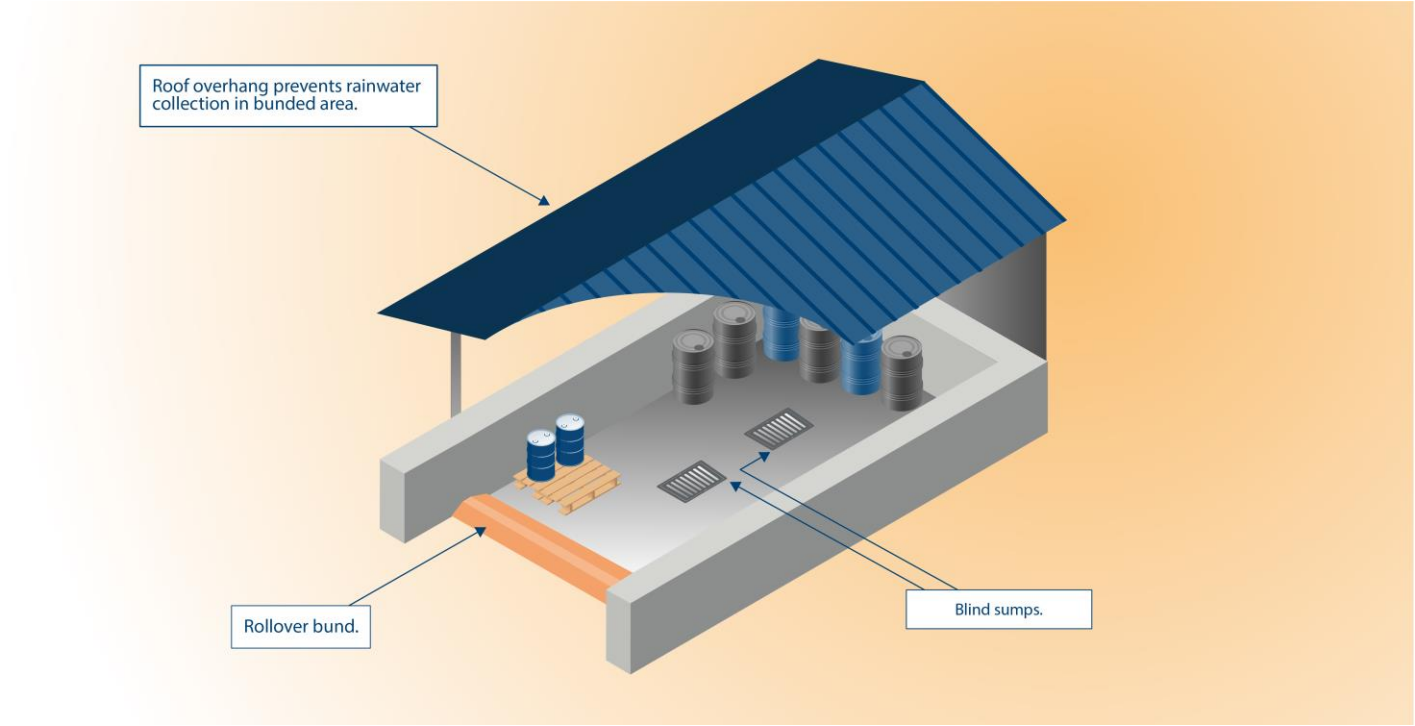


Figure 9: Effective capacity is 25 per cent of the total storage volume or 110 per cent volume of the largest container (whichever is the greatest).

To optimise the effectiveness of the secondary containment system, it needs to be inspected regularly and maintained. 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 is regularly inspected – including labels and signs and for smaller containers whether the lids have been secured.
- The condition of all secondary containment structures and equipment are regularly inspected, 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 regularly checked to ensure they are in working condition.
- Accumulation of rainwater or spilt materials inside secondary containment areas or systems. Use the *Decision diagram for managing liquids that accumulate in pollution prevention systems* (Figure 16) to manage the liquids (rainwater or split material) that gets accumulated inside secondary containment areas or systems.
- Reconsider if you still need to store a liquid on site. Perhaps it can be disposed of rather than presenting an ongoing risk.

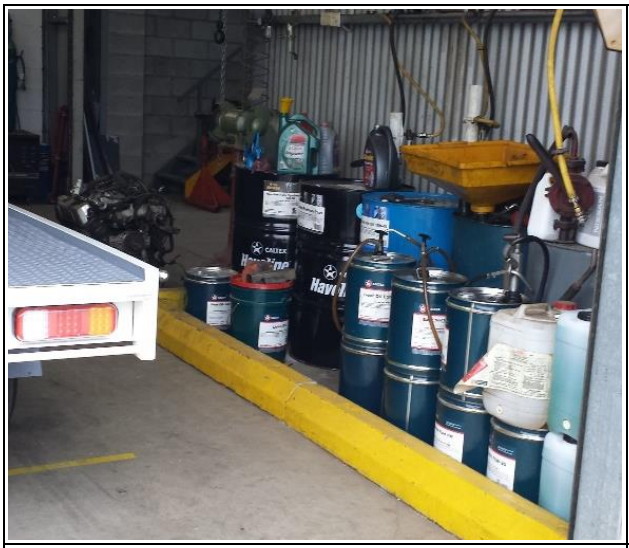
	
Bunded chemical storage area.	Bulk chemical storage area with pump drip tray.
	
Small liquid containers on a drip tray.	Using a bunded drum dispensing trolley to move a liquid drum.

Figure 10: Some examples of secondary containment methods photographed from industry sites.

Requirements for dangerous goods and hazardous substances

Liquids that are identified as dangerous goods and/or hazardous substances are controlled by the *Dangerous Goods Act 1985* and Dangerous Goods (Storage and Handling) Regulations 2012. Please refer to the following WorkSafe documents for more detailed information on liquids that fall under these categories.

Chemicals management in the workplace; A step by step guide for (2002)
Code of practice for the storage and handling of dangerous goods (2013)
Code of practice for hazardous substance (2000)
Safe Handling of Industrial Waste – A Practical Guide For Workplaces (2018)
Your health and safety guide to Hazardous substances (2008)
Hazardous Chemicals – Farm Safety Series (2003)
Safe Manual Handling of Chemicals is the Automotive Industry (2006)

Note: these documents may be subject to change.

Preventing spills and ongoing monitoring

Monitoring and maintenance

Figure 11: Regular maintenance can reduce the risk of pollution by preventing spills and leaks before they happen.

A frequently overlooked aspect of liquid storage and handling is the need for frequent and regular inspection and maintenance. Some of the areas that should be inspected and tested regularly and replaced or maintained as needed include (but are not limited to):

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

Two examples of checklists that you can use on a daily basis (Table 5) and a weekly basis (Table 6) to monitor and maintain your premises have been provided with this guidance. **The suggested frequencies are only a guide and should be varied to suit your needs.**

EPA may ask for evidence to prove that regular maintenance and system checks were carried out at your premises. Keeping copies of completed checklists is a good way to demonstrate your good site management practices.

Table 5: Daily checklist example

(Note: these templates are only a guide. You can modify them to suit your work site)

Action	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 full or close to becoming full 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: ……..
Comments:……
……
……
……
……
Signature: …… Date:……..

Table 6: Weekly checklist example

(Note: these templates are only a guide. You can modify them to suit your work site)

Action	Tick
Daily checklists completed for each day.	
Check that all spill cleanup 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, and appropriate to the risks.	
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: ……..
Comments:……
……
……
……
……
Signature: ……Date: ……..

Spill prevention

Figure 12: An intermediate bulk container (IBC) on a spill pallet with a dispensing unit attached. The spill pallet reduces the risk of leaks or spills from the IBC while the dispensing unit directs any potential spills during decanting into the sump.

Delivery, dispatch, transfer and decanting of liquid substances are activities that each pose a risk of causing pollution through leaks and spills, 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, health and safety occupational conditions. For example, pesticides, hazardous substances and some liquid wastes. Please refer to the section on Requirements for dangerous goods and hazardous substances for more information on dangerous goods and hazardous substances.

Reducing the risk of pollution through leaks and spills

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 through leaks and spills. Table 7 below lists some of the issues you need to consider in relation to the handling of liquid substances.

Table 7: Issues to consider to reduce the risk of pollution from handling liquid substances

Issue	Factors to consider
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 collect 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 risks 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. Therefore, conduct regular inspections, maintenance and replacements to reduce the risk of pollution: 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?
4. What precautions are in place when decanting from smaller containers?	Some of the precautions that can be taken to reduce the risk of pollution when decanting from smaller containers are: • fitting drip collectors to drums with taps • advising staff to use a decanting area when pouring • locating a decanting and mixing area within secondary containment. • extra care needs to be taken with mobile sites. For smaller containers used on mobile sites, decanting over a temporary bund or collection tray, is a simple method for containing accident spills.

First flush systems

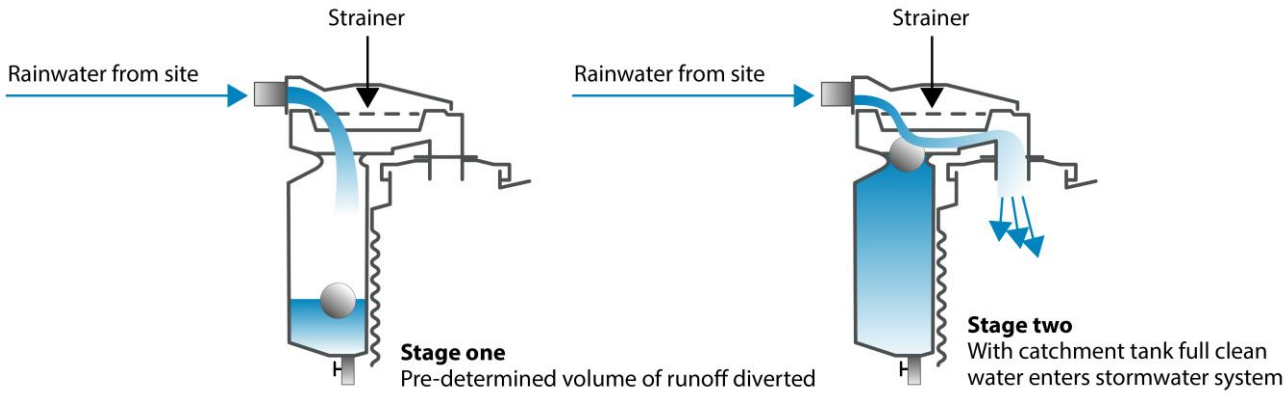


Figure 13: First flush systems prevent rain runoff containing contaminants from entering the stormwater system

Description: First flush systems are used to prevent pollutants that have accumulated on outdoor surfaces from entering the stormwater system during rain events. Examples for areas that can benefit from using a first flush system are motor vehicle courtyards, any exposed surfaces at a chemical manufacturing plant, exposed surfaces at a dye works etc. These systems work on the principle that most 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 water from the first flush for each rain event into storage, 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, using work management practices, including regular cleaning, 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 and desludging) whilst smaller sites may need to use above or below ground storage tanks (requiring more regular emptying by an appropriate liquid waste remover).

Storage size will depend on:

- The amount of runoff that needs to be collected – Refer to *Table 8: Suggested volume for the first flush collection pit* for some guidance on the amounts that need to be collected. 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 dams with clean water bypass 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.

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) through an appropriate liquid waste remover.
- The accumulation of solid matter at the base of the first flush collection area will reduce the capacity of the system over time. A regular cleaning and maintenance schedule needs to be implemented to ensure effective operation of the system as well as additional cleaning following rain events.
- Any pumps, valves, switches, alarms or sensors that are part of the system require regular checking to ensure the system is operational.

Table 8: Suggested volume for the first flush collection pit

Catchment surface	Pollutants	Examples of areas	Rainfall level to be contained	Volume of storage required based on catchment area
Sealed (impervious) surfaces (e.g. concrete, bitumen etc.)	Substances that are easily mobilised such as: (a) soluble materials (e.g. inks and dyes); (b) fine materials (e.g. dusts, silts, plastic and wood particles)	Exposed surfaces at a dye works; any concrete surfaces where plastic or wood particles may accumulate	10mm	10 L/m^2
	Substances that are more difficult to mobilise or are hazardous such as: (a) oil and grease (b) metal particles (c) hazardous substances	Motor vehicle courtyards; any exposed surfaces at a chemical manufacturer; any waste collection areas	15 mm	15 L/m^2
Unsealed surfaces (e.g. gravel or shale etc.)	All types of pollutants (pollutants that are either easy or difficult to mobilise)	Any unsealed yard areas	20 mm	20 L/m^2

Containing spills and leaks within worksite (site containment)

Description: Site containment or isolation (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, fire, or at times of high risk of spills (such as delivery or dispatch) provides additional time to contain, clean up, or manage pollutants from the site. 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 to build up in enclosed areas or prevent emergency vehicle access. A description of the site containment systems should be included in the site emergency plan and made available to emergency services.

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 – you should prevent spilt liquids from entering 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. Instead use sensors or switches to automatically trigger the system, or manually close it off at certain times such as during transfer of drums, or 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 and use of the site. Options include the surface area of the site or diversion to collection pits, tanks or dams.

In addition to the above, attention should be paid to specific WorkSafe and *Metropolitan Fire Brigade (MFB) guidelines* (GL- 12 regarding firewater containment) that stipulate legislative requirements relating to sites that contain dangerous goods and hazardous substance as well as major hazard facility (MHF) sites.

Operational considerations: Site containment systems need regular maintenance, especially those that are triggered by a certain event (for example, spill, rain event, 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. Staff should also be provided relevant training and standard operating procedures (SOPs).
- When liquids are collected there needs to be a procedure in place for determining recovery or disposal options.
- Spill kits and equipment needed to contain a spill (example, absorbent socks), should be checked regularly and maintained.

Figure 14: Rollover bunds can be a useful form of containment that can prevent liquids from leaving the work area.

Figure 15: Site isolation systems can be used to cut off a site from the stormwater system during an incident such as a spill or fire at times of high risk.

Managing contaminated water or other substances collected by 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.

The *Decision diagram for managing liquids that accumulate in pollution prevention systems (*Figure 16) 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 these 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 (i.e. liquids used for quenching or rapid cooling) 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. It is advisable to contact EPA, or an authorised waste expert to seek disposal options.

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.

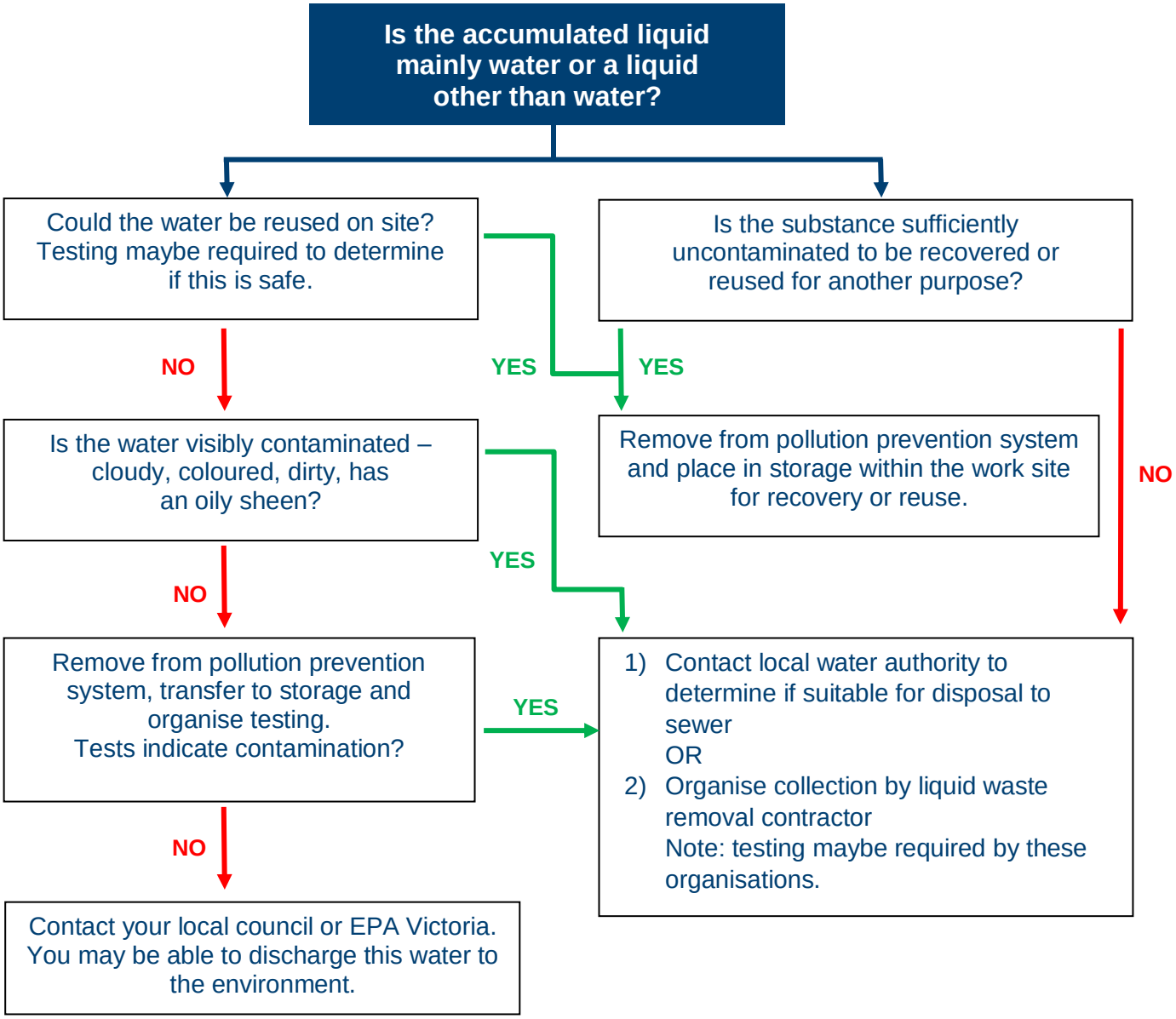


Figure 16: Decision diagram for managing liquids that accumulate in pollution control systems (secondary containment, first flush, site containment, site isolation)

Don't let this be you!

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

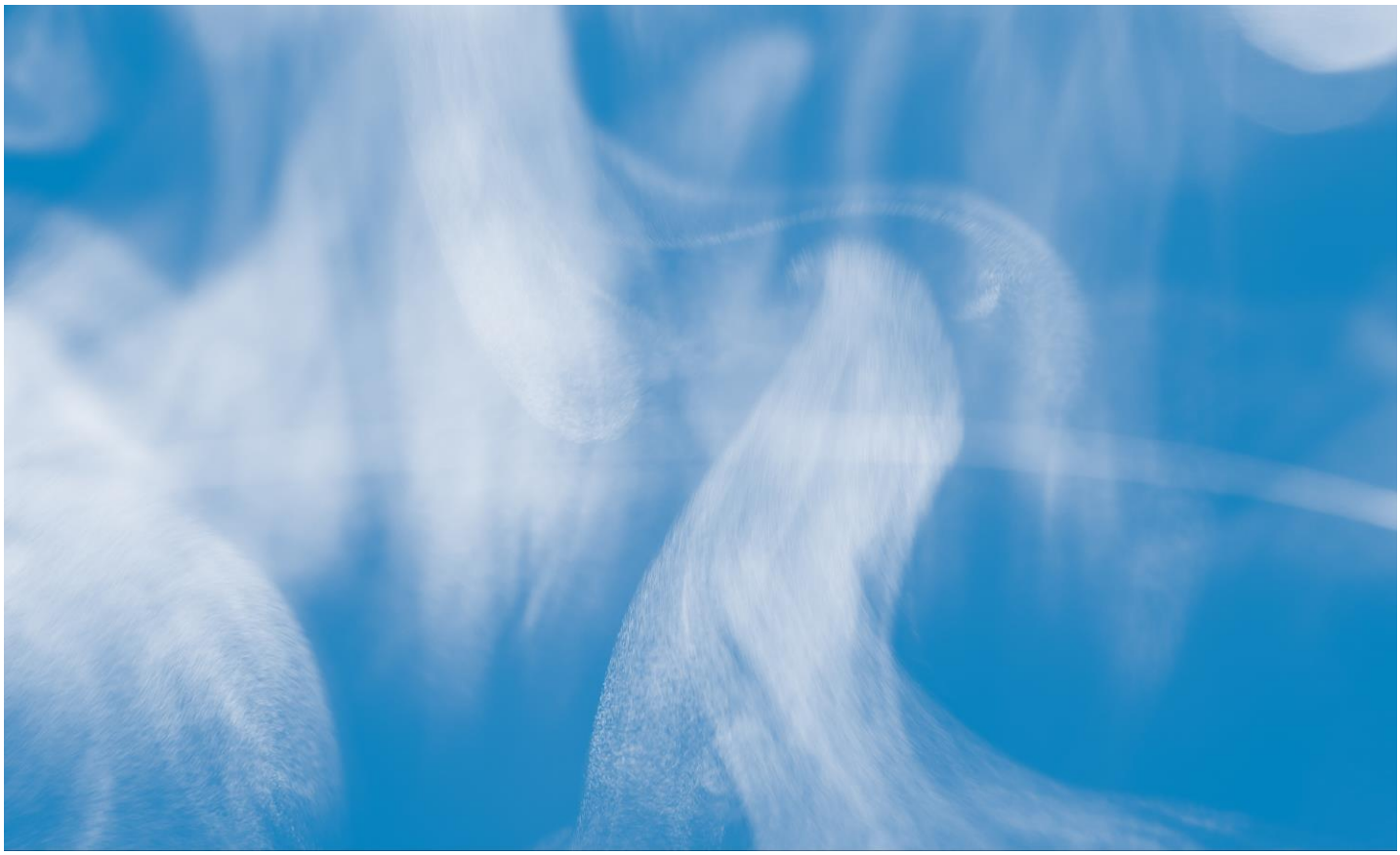
- During delivery, a storage container falls from the vehicle and, with no secondary or site containment, the spill enters drains.
- When it rains, the water entering stormwater drains carries leaks and spills that have accumulated on the outdoor areas that were deemed too small to clean up.
- Overnight 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.

Reducing the risk of pollution through vaporisation of stored liquids

Vaporisation of volatile liquids can cause air pollution and there are several measures that can be put in place to minimise air pollution from storage and handling of liquid substances.
It is important to know which of the substances that you store, use or produce could volatilise (or have a volatile component) during normal operating or weather conditions. Some of these substances may generate an odour which will help you detect a leak through vaporisation. However, there could be others that are odourless. Keep an inventory of these substances and refer to the material safety data sheet (MSDS)/ safety data sheet (SDS) 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.
- Installing vapour recovery equipment or other measures for minimising losses of volatile components (such as the installation of after burners or carbon filters).
- The effectiveness and maintenance of your ventilation and exhaust systems.
- Installing 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 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.



Staff training

Figure 17: Providing adequate and relevant training to your staff will help them to be more aware of the risks of pollution and how to prevent it.

It pays to train your staff. Providing adequate training to staff will inform and remind them of the procedures that are in place to reduce the negative impacts to human health and environment due to spills of liquid substances.
If dangerous goods or hazardous substances are handled at your site, employees should be provided with information, instruction and training on hazards and risks associated with the handling and storage of these substances that they use or may be exposed to. In addition to this, other persons on site (contractors, maintenance workers, administrative staff and visitors) should also be made aware of the associated risks and trained on precautions to be taken. This information can be a part of their induction process.
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:
  - incident prevention procedures for liquid chemical delivery, dispatch, onsite 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.

When developing a training material for your site, you should:

- Identify who needs to be provided with information, instruction and training. You should have at least one trained person onsite at all operating times. It may be necessary to train more than one person to cover leave, or illness.
- Decide what information, instruction and training is to be provided, when and how it is to be done and keep a record of training provided.
- Decide who will prepare and provide information, instruction and training.
- Provide information, instruction and training, and keep relevant records (including lists of staff that have been trained and when).
- Review any information, instruction and training provided to see how effective and useful it is. Check with your industry group or other similar companies to understand what might be relevant and available to you.
- Update the training material as necessary and provide refresher training on a regular basis. A template (table 9) has been provided with this guidance that will allow you to record the training sessions of your staff members.

Table 9: Template for staff training

Date	Training module	Attendees	Attendee signatures	Comments/issues

RESPOND

Incident management and spill response

An ‘incident’ can range from an emergency (which generally require an urgent response and may involve emergency services) to small scale spills and leaks which can be dealt with by on-site personnel. Not every incident is an emergency. However, inadequate and inappropriate incident management, such as untrained staff flushing spills or leaks down stormwater drains can cause serious harm to the environment and human health.

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.

Incident management plans and spill response

An incident management plan outlines the procedures for dealing with any event outside of the normal operating conditions of a business (for example, liquid spills or fire) and might be a lengthy document or it might fit into one sheet of paper. It is important to plan for incidents to ensure that any incidents that occur are managed safely 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 material safety data sheet (MSDS)/ safety data sheet(SDS) for the substances stored on site should be used in formulating your plan.

The plan should include:
– procedures for dealing with the following types of issues as appropriate:
- fires (including bush fires)
- explosions
- flooding, high wind events
- management of spills
- fire water management
- reaction of incompatible substances

– nominated positions 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 (for example, fire extinguishers, and spill kits)
- 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 EPA, local council).

in addition to an incident management plan, systems should be in place for recording any incidents which occur and their causes and to trigger actions to prevent further similar incidents.

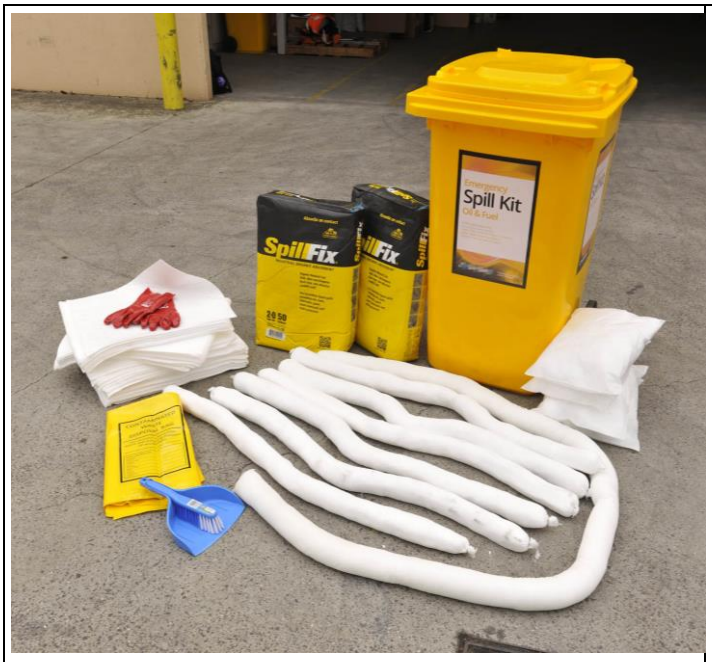


Figure 18: Ensure that spills kits appropriate for the type of substance stored on site are available as necessary

Figure 19: All spills should be attended to as soon as they happen

Incident management plans should be regularly reviewed to ensure that they are up-to-date and remain relevant.

Spill response infrastructure and equipment

Spill response 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/bases
- equipment to block stormwater inlet
- drains, booms
- portable pumps, retention tanks
- safety equipment for the people involved.

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 should 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:

- If it is safe to do so, stop the spill at its source.
- Contact the emergency services 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 absorbent materials over the entire spill area to contain the spill if it is safe to do so.
- Ensure that any absorbent materials and other equipment used to clean up spills are disposed of appropriately (see Managing the waste generated on site section of this guidance).
- Any water used for cleaning up and decontaminating spills needs to be treated as contaminated waste water (see Managing contaminated water or other substances collected by first flush systems or in secondary or site containment systems section).
- Where possible, spills should be covered during rainfall so that it does not compromise cleanup 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.
- Never wash away a spill into stormwater system.

Attend to the spill immediately, no matter how small.

RESPOND IMMEDIATELY TO SPILLS

Stop the spill

Contain the spill

Report the spill

Clean up the spill

You should report incidents which could harm the environment.

For more information contact EPA Victoria on 1300 372 842 (1300 EPA VIC) or email contact@epa.vic.gov.au. If the incident occurs outside of business hours you will still be able to contact EPA.

Emergency response contact information

Police, Fire, Ambulance:	000
EPA Victoria:	1300 372 842
WorkSafe Victoria:	13 32 60
Local council phone:	_____
Nearest hospital phone:	_____

OTHER CONSIDERATIONS

Managing the waste generated on site

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

- used containers and packaging
- liquid wastes
- contaminated water
- used absorbent materials from spill cleanup
- contaminated soil where sites are improperly managed.

Storing waste generated on your site

It may be necessary to store waste while waiting for reuse or collection. The accumulation of waste over time should be avoided. Part of your site management plan can include a waste management plan which identifies ways in which waste 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 suitable 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 and store under roofing if possible
- don't store incompatible wastes together.

Note: to achieve the best environmental outcome, EPA prohibits the disposal of large containers (containers with a capacity over 200L) contaminated with prescribed industrial waste (PIW). These containers must be cleaned to allow them to be reused or recycled. Please refer to *Industrial Waste Resource Guidelines – Classification for Reuse (Large Containers (>200L) Contaminated with PIW)* (EPA publication IWRG422) for more information.

Figure 20: Identify ways in which waste that is generated on site can be reduced, managed during storage and removed from site for recycling or disposal in order to prevent harmful effects to the environment.

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 waste on site? First ensure that it is safe to do so, and consider the occupational health and safety implications. You may also need to obtain permission from EPA to reuse your waste. Reusing wastes onsite can have significant costs savings.

Recycle

Can you arrange for a recycling business to collect your wastes? If your neighbouring businesses have similar recyclable wastes it may be more viable for a recycling business to come to your area to collect waste/resources from each site. For some wastes the recycler may either pay you for the waste or not charge you for the collection.
Note: some of the waste that is generated on site could be classified as PIW. Please refer to *Prescribed Industrial Waste Database* on the EPA website to access information on licensed waste handlers.

Disposing of wastes

It is important that each type of waste that you create is disposed of appropriately. For more information on legislative requirements related to waste disposal please refer to epa.vic.gov.au/your-environment/waste. Also, please refer to *Industrial Waste Resource Guidelines – Solid industrial waste hazard categorisation and management* (EPA publication IWRG631) for more details on waste categorisation.

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. 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 collected for recycling. While one litre of oil can contaminate one million litres of water, it can also be a valuable resource when recovered and reused. You can search for liquid waste treatment facilities that are licensed by the EPA at epa.vic.gov.au/business-and-industry/forms/prescribed-industrial-waste-database. Furthermore, additional information on liquid waste classification and their reuse can be found by visiting the EPA webpage on prescribed industrial waste classifications (epa.vic.gov.au/business-and-industry/guidelines/waste-guidance/prescribed-industrial-waste-classifications).

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 categorized as hazardous or industrial. Please refer to the epa.vic.gov.au/business-and-industry/forms/prescribed-industrial-waste-database for more information.

Waste tracking: All liquid waste, and some solid wastes (such as PIW), 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. Some common examples of wastes that require to be tracked can be found in Table 10: Some examples of wastes that need to be tracked.

Notifiable chemicals: Some wastes have very specific management controls that must be employed, for example some forms of arsenic, tin, chlorine, and polychlorinated biphenyls (PCBs).

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 and receiver of the waste can be found guilty of this offence. Significant penalties apply.

In addition, if the illegal disposal also results in spills or leaks to the environment, further penalties apply.
It is also an offence to pollute land or cause or permit pollution of the land, subject to certain exceptions. The pollution of the land offence, section 45 of the *Environment Protection Act 1970*, focuses on the potential of a substance to cause harm.

How do you know which wastes should go where?

EPA provides information on determining how you can dispose of each type of waste. Please visit epa.vic.gov.au/your-environment/waste for more information.

If you are unsure you can contact:

- EPA Victoria
- your local council
- waste disposal facilities
- waste disposal contractors.

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

Table 10: Some examples of wastes that need to be tracked.
(For a comprehensive list please visit epa.vic.gov.au/your-environment/waste)

Industry	Examples of liquid waste and wastes contaminated by liquids
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 • pumped contaminated groundwater • oil contaminated products
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)

Licensing, legal obligations and other relevant EPA guidelines

This guidance is intended to replace the *Bunding* guideline (EPA publication 347.1)
Environment Protection Act 1970
Environment Protection (Scheduled Premises) Regulations 2017
Environment Protection (Industrial Waste Resource) Regulations 2009
Interim Waste Management Policy (IWMP) for Resource Recovery Facilities
EPA notification protocol for reporting high priority sewer spills (EPA publication 1603)
Industrial Waste Resource Guidelines – Large containers (>200 L) contaminated with PIW – Classification for reuse (EPA publication IWRG422)
Industrial Waste Resource Guidelines – Solid industrial waste hazard categorisation and management (EPA publication IWRG631)

See also EPA's webpage on waste epa.vic.gov.au/your-environment/waste.

Part 7 of the *Emergency Management Manual Victoria (Emergency Management Agency Roles)* identifies control agencies and key support agencies for response. Response planners should use it as a guide to agencies that need to be included in response plans.

It is also important to be aware of the *Dangerous Goods Act 1985* and the following OH&S documents from WorkSafe
Chemicals management in the workplace; A step by step guide for (2002)
Code of practice for the storage and handling of dangerous goods (2013)
Code of practice for hazardous substance (2000)
Safe Handling of Industrial Waste – A Practical Guide For Workplaces (2018)
Your health and safety guide to Hazardous substances (2008)
Hazardous Chemicals – Farm Safety Series (2003)
Safe Manual Handling of Chemicals is the Automotive Industry (2006)

Note: these documents may be subject to change.

Relevant Australian Standards (AS)

HB 76	Dangerous goods – Initial emergency response guide
AS1216	Class labels for dangerous goods
AS1894	The storage and handling of non-flammable and combustible liquids
AS1940	The storage and handling of flammable and combustible liquids
AS2507	The storage and handling of agricultural and veterinary chemicals
AS2714	The storage and handling of organic peroxides
AS3780	The storage and handling of corrosive substances
AS3833	The storage and handling of mixed classes of dangerous goods, in packages and intermediate bulk containers
AS4326	The storage and handling of oxidizing agents
AS/NZS 2022	Anhydrous ammonia – Storage and handling
AS/NZS 2927	The storage and handling of liquefied chlorine gas
AS/NZS 4081	The storage and handling of liquid and liquefied polyfunctional isocyanates
AS/NZS 4452	The storage and handling of toxic substances
AS/NZS 4681	The storage and handling of Class 9 (miscellaneous) dangerous goods and articles

Note: these standards may be subject to change.