Strategic Environmental Compliance and Performance Review

Preventing Contaminated Sites

Department of **Environment & Climate Change** NSW

The Strategic Environmental Compliance and Performance Review – Preventing Contaminated Sites was undertaken by the Compliance and Assurance Section, Department of Environment and Climate Change NSW (DECC).

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Executive Summary

The Strategic Environmental Compliance and Performance Review of the Department of Environment and Climate Change NSW (DECC) integrates compliance audit and licence reviews with ongoing regulatory activities. These reviews encourage improved environmental performance by combining assessing compliance with legislative requirements with research on best environmental management practices. Industry, licensees, state agencies, local government, the community and other stakeholders can provide input into various stages of the program.

DECC has completed a review focusing on preventing future contaminated sites. The object of this review is to increase the awareness of:

- activities and practices that have the potential to result in sites becoming contaminated
- best environmental management practices to reduce the likelihood of site contamination.

This report, *Strategic Environmental and Compliance Review – Preventing contaminated sites*, is a summary of the findings of the review.

The results of the audits show that industry could improve its compliance and environmental performance by ensuring that:

- chemicals are properly contained
- there are regular site inspections of the containment measures that are in place
- all waste products are properly stored, recycled or disposed of
- potential risks are identified and management plans are in place to handle those risks
- control equipment is installed where necessary.

A systematic and rigorous process of follow-up actions has been completed by DECC to ensure that issues identified at audited sites are being addressed.

In reaching its conclusions about best practice, DECC reviewed current environmental management standards and guidance material on how to prevent site contamination, such as those included in Australian Standards, codes of practice, and guidelines addressing environmental risk. In addition, DECC identified best environmental management practices from other jurisdictions, and operations that could further reduce the environmental risks that can result in a site becoming contaminated.

This report will be a valuable management tool that will help industries to improve environmental performance.

DECC is also undertaking a number of other initiatives aimed at preventing and mitigating site contamination. These include:

- developing the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2007. This Regulation contains requirements to minimise environmental impacts from underground storage systems.
- a campaign examining activities at galvanising works to prevent site contamination
- the development of an education package to provide guidance to industry on practices to manage environmental risks and assist in understanding their legal obligations
- the release of liquid waste fact sheets – *Protecting the environment and your business*; which provide important information to businesses about best management practices and how to manage liquid waste.

Introduction

Strategic Environmental Compliance and Performance Review

The Strategic Environmental Compliance and Performance Review of the Department of Environment and Climate Change NSW (DECC) integrates the compliance audit and licence review processes with ongoing regulatory activities. These reviews encourage improved environmental performance by combining the assessment of compliance with legislative requirements with research that has been carried out on industry best practice. Industry, licensees, state agencies, local government, the community and other stakeholders can provide input into various stages of the process through specific consultation phases.

The Strategic Environmental Compliance and Performance Review focuses on priority environmental issues. Previous reviews include the wood preservation industry and liquid chemical storage, handling and spill management practices.

This report focuses on preventing the contamination of sites. The objective of the review is to increase the awareness of:

- activities and practices that have the potential to result in sites becoming contaminated
- best environmental management practices to reduce the likelihood of site contamination.

DECC conducted compliance audits on a selection of premises licensed under the *Protection of the Environment Operations Act 1997* (POEO Act). In addition to assessing compliance with relevant licence conditions, the audits gathered information to identify and evaluate activities and practices that have the potential to cause site contamination.

The audits assessed the licensee's:

- level of environmental performance
- level of environmental sensitivity such as the proximity to sensitive receptors
- performance against best practice principles.

Information on activities and practices that have the potential to cause contamination of land was also gathered from previous audits conducted by DECC. These include industry sector audits on piggeries, coal mines, livestock processing, landfill facilities, extractive industries, asphalt works and drum reconditioning works, as well as the Strategic Environmental Compliance and Performance Reviews of the wood preservation industry and liquid chemical storage, handling and spill management practices.

This report is a summary of the audits' findings and also presents the findings of research on best environmental management practices, and provides industry with guidance on how to prevent site contamination. It also provides guidance to officers who regulate premises with activities that have the potential to contaminate land. The findings in this report can be applied to all types of activities that have the potential to cause site contamination.

Purpose of this report

This report provides practical advice and information on how to minimise the potential for soil or ground/surface water contamination from industrial activities. It also lists standards, industry codes and advice from regulators on how to minimise and/or prevent site contamination. In particular, the report:

- presents the findings of audit programs completed by DECC on practices that can result in site contamination

- provides guidance on how industry can improve its environmental performance by implementing best environmental management practices to mitigate and/or prevent site contamination
- provides information on future initiatives that will help industry improve its environmental performance.

This report has been prepared for the purpose described, and no responsibility is accepted for its use in any other context or for any other purpose.

The cost of contamination

The release of chemicals through leaks and spills can lead to the contamination of soils, surface and ground waters. Surface water and groundwater may mobilise pollutants from many different sources and may, therefore, contain a variety of contaminants. Water that becomes contaminated with pollutants from land sources can reach surface and coastal waters via runoff from rain. Polluted surface waters can filter down to groundwater and may seep slowly for long distances, and over time eventually emerge into rivers, springs or wetlands.

Contaminated water can also infiltrate land to an extent where the land itself becomes contaminated to a level that some form of remediation would be required. Soil can also be contaminated through direct discharges of pollutants, which in turn may result in water pollution if the contamination is mobilised.

Water, soil and land contamination have a direct impact on human health, ecological health and land uses. This contamination can also have significant financial impacts for industry and the community because of the high clean-up costs.

Even low rates of leaks and spills can translate to a significant quantity of lost product if leaks and spills go undetected for a long period of time. Once a leak has been identified, clean up of contaminated soils and ground water can be extremely costly, technically difficult and time consuming. Environmental consultants have previously indicated that typical remediation costs for small to medium (petroleum) service station sites with some soil contamination and no offsite migration of product or groundwater contamination, could be estimated in the range of $43,000 to $54,000 (DEC 2006). For more complex industrial sites with extensive soil and ground water contamination, and with sensitive receptors nearby, and/or offsite migration of contaminants, remediation costs may be much higher. In some cases this can be in the region of up to $800,000. Where contamination also affects surrounding properties, the owner or occupier of the premises causing the contamination may be liable for third-party damages.

Preventing leaks, monitoring and early detection minimises the potential for widespread contamination and avoids expensive clean-up operations for industry.

Key findings

The results of the audits and the review of research on best practice methods show that industry can improve its environmental performance and reduce the potential for contamination through:

- the proper containment of chemicals
- regular inspections of the containment measures that are in place
- the proper storage, recycling or disposal of waste products
- the identification of potential risks and ensuring that management plans are in place to handle those risks
- the installation of necessary control equipment.

Relevant legislation

Legislation administered by DECC

Protection of the Environment (Operations) Act 1997

Premises that undertake activities listed in Schedule 1 of the *Protection of the Environment (Operations) Act 1997* (POEO Act), and meet the activity threshold criteria, are licensed and regulated by DECC. Some activity types include coal mines, livestock intensive industries, waste facilities, petroleum works and sewerage treatment systems. For a full list of all the scheduled activities and the classifications under them, refer to Schedule 1 of the POEO Act. www.legislation.nsw.gov.au/fragview/inforce/act+156+1997+sch.1+0+N

Environment protection licences issued under the POEO Act set environmental performance requirements for industry. Licences may specify a required performance outcome or a specific environmental management practice.

Licence conditions take into account factors such as the surrounding environmental conditions, type of activity and the available technology. Pollution reduction programs and pollution studies are often attached to licences, requiring licensees to carry out work within a specified timeframe to enable them to comply with environmental requirements. Changes to environment protection licences are negotiated with the licensee.

The POEO Act also prohibits certain actions that may pose a risk to the environment, including the pollution of waters (section 120) and leaks and spills of substances (section 116). These restrictions apply to industries and activities whether or not they are licensed.

The POEO Act also establishes that DECC is the 'appropriate regulatory authority' for non-scheduled premises that are occupied by state and local government agencies. Premises not regulated by DECC are regulated by local government.

Contaminated Land Management Act 1997

The *Contaminated Land Management Act 1997* (CLM Act) establishes a legal framework for investigating and (where appropriate) remediating land areas where contamination presents a 'significant risk of harm' to human health or other aspects of the environment. In broad terms the Act specifies who is responsible for investigating and remediating the contamination, gives DECC a range of duties and powers to ensure that contamination is addressed, and establishes a scheme to ensure that the public has appropriate information about the scheme. More information is available on the DECC website at www.environment.nsw.gov.au/clm/index.htm.

Local councils deal with other contamination under the planning and development framework, including State Environmental Planning Policy No 55 – Remediation of Land and the *Managing Land Contamination – Planning Guidelines*. The planning and development process determines what remediation is needed to make the land suitable for a different use.

Environmentally Hazardous Chemicals Act 1985

The *Environmentally Hazardous Chemicals Act 1985* (EHC Act) is the state's key chemicals management legislation. The EHC Act establishes DECC's goal for hazardous substances: to minimise the adverse impacts of chemicals and hazardous substances on the environment and public health. The EHC Act provides a flexible legal framework for regulating priority or high-risk chemicals throughout their entire lifecycles.

The main provisions of the EHC Act relate to:

- statutory chemical assessment
- the regulation and control of chemicals via chemical control orders, licences and regulations
- establishment of a statutory advisory group, the Hazardous Chemicals Advisory Committee.

Chemical Control Orders (CCOs) are the primary regulatory tools of the EHC Act for responding rapidly and flexibly to chemical problems. They are the key tools available to NSW if there is a

need to impose management restrictions on a specific chemical or class of chemicals. CCOs allow for the control of a chemical throughout its lifecycle, and can set requirements for a broad range of activities, including the manufacture, processing, distribution, use, sale, transportation, storage and disposal of chemicals and chemical wastes for industrial, commercial and household purposes. CCOs can also be used to require the phasing-out of a particular chemical. There are currently five CCOs in force in NSW, covering aluminium smelter wastes containing fluoride or cyanide; dioxin-contaminated waste materials; scheduled chemical wastes; organotin waste materials; and polychlorinated biphenyl wastes and materials.

Pesticides Act 1999

DECC is responsible for administering the *Pesticides Act 1999.* This Act controls the use of pesticides in NSW registered by the Australian Pesticides and Veterinary Medicines Authority (APVMA). The APVMA is responsible for the evaluation, registration and review of pesticides including the chemicals used in wood preservation. The labels or permits issued by the APVMA for each pesticide detail how the pesticide is to be used. The Pesticides Act includes the requirement that pesticides be used in accordance with the instructions on the label. The Pesticide Regulation 1995 includes requirements for wood preservation premises to keep records of pesticide/preservative use.

Road and Rail Transport (Dangerous Goods) Act 1997

DECC licences some transporters of dangerous goods, including some transporters who transport wood preservatives and solvents under the *Road and Rail Transport (Dangerous Goods) Act 1997* and regulations. The criteria for classifying goods as 'dangerous' are outlined in the Australian Dangerous Goods Code (FORS 1998).

Legislation administered by other agencies

Occupational Health and Safety Act 2000

WorkCover NSW primarily administers the *Occupational Health and Safety Act 2000*, including the Occupational Health and Safety (General) Regulation 2001, in relation to the keeping and handling of dangerous goods at premises dealing with liquid chemicals. More information can be found on the WorkCover website at:
www.workcover.nsw.gov.au/OHS/DangerousGoods/default.htm

Environmental Planning and Assessment Act 1979

All development proposals in NSW must be assessed to ensure that they comply with relevant planning controls and, according to the nature and scale, that they are environmentally and socially sustainable. State, regional and local plans and policies indicate the level of assessment required, and who is responsible for undertaking it, either the local council or the Minister for Planning (the Department of Planning assesses proposals for the Minister).

The development assessment system in NSW is set out in the *Environmental Planning and Assessment Act 1979*. The Act provides for public in decisions that will shape a community's future. The Department of Planning primarily administers the Act, including associated regulations regarding planning and development.

The activities of some industries that deal with liquid chemicals would be classified as 'potentially hazardous' or 'potentially offensive' under State Environmental Planning Policy No. 33: Hazardous and Offensive Development.

'Potentially hazardous industries' are subject to a preliminary hazard analysis during the assessment process to determine their risk to people, property and the environment. Should such risk be within the criteria of acceptability and the proposal is approved, the approval may be subject to conditions that control the ongoing safety of the development and require potential hazards to be specifically addressed.

'Potentially offensive industries' would also need to meet the requirements for licensing by DECC. More information is available on the NSW Legislation website at www.legislation.nsw.gov.au/viewtop/inforce/epi+129+1992+first+0+N.

Targeting industry sector activities

DECC regulates all industrial activities licensed under the POEO Act through a range of regulatory actions, for example, conducting site inspections and reviewing annual returns. In addition, DECC has a rolling program of intensive compliance audits of industry sectors and their activities. Sectors and activities targeted for the Strategic Environmental Compliance and Performance Review are chosen through assessment of major environmental and community concerns, and DECC's corporate objectives and strategies.

The criteria considered include the likelihood of the activity causing environmental harm to human health and the environment, the nature of hazards associated with the chemicals used, the complexity of the activity, emissions and wastes produced from the activity, gaps in understanding the activity, environmental performance, location of the activity, community concern, the opportunity to make significant environmental gains in relation to the activity and the opportunities to integrate with other DECC programs.

The topic 'preventing contaminated sites' was chosen because:

- sites determined as a significant risk of harm under the CLM Act were found to occur at a large range of industry types such as fuel and metal industries, galvanisers, chemical manufacturers and processors, landfills and marinas
- the contamination of many existing sites could have been prevented by the implementation of better environmental management practices
- previous audits show poor compliance with chemical storage and handling practices
- sites that are at a risk of becoming contaminated include both those regulated by DECC and local councils.
- the program findings would be applicable to both DECC and council regulators.

Compliance audits

DECC undertook targeted audits on a selection of licensed premises, covering the industry types: metal plating and coating works, secondary non-ferrous production, hazardous, industrial or Group A waste generation and storage (bus depots) and wool scouring.

The audits were confined to activities related to the handling, movement, storage (including above ground and underground storage) and processing of chemicals and waste and incident management practices that have the potential to cause contamination.

The activities within the audit scope were assessed against the audit assessment criteria (i.e. the required performance standards) for the 24-hour period before the end of the inspection.

The audit criteria for the licensed premises were limited to audits that assessed compliance with the following two mandatory standard operating conditions, which appear on all environment protection licences:

O1.1 Licensed activities must be carried out in a competent manner. This includes:

- *the processing, handling, movement and storage of materials and substances used to carry out the activity*
- *the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.*

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- *must be maintained in a* proper and efficient condition
- *must be operated in a proper and efficient manner.*

Compliance was also assessed for other operating conditions that related to activities and practices that could lead to site contamination, such as the storing, handling and processing of substances.

In addition to the above audits, DECC conducted a review of the findings of previous audit campaigns to gather further information on activities and practices that have the potential to cause site contamination.

This included previous industry sector reports on piggeries, coal mines, livestock processing, landfills, extractive industries, asphalt works and drum or container reconditioning works, as well as previous targeted campaigns of the wood preservation industry and liquid chemical storage, handling and spill management practices under the Strategic Environmental Compliance and Performance Review.

Audit methodology

All compliance audits are undertaken in accordance with the procedures and protocols set out in DECC's Compliance Audit Handbook (copies are available from Environment Line 131 555 or at www.environment.nsw.gov.au/resources/cahandbook0613.pdf). When an audit is completed, the findings of the audit are put together and presented to the enterprise as an individual compliance audit report. Individual compliance audit reports are publicly available in DECC's Library, Level 14, 59–61 Goulburn Street, Sydney; phone (02) 9995 5302.

The audits were limited to reviewing the enterprise's compliance with legislation administered by DECC, or statutory instruments issued by DECC, for activities that have the potential to cause water and/or soil contamination. Audit findings were based on information from departmental files, information supplied by representatives of the enterprise, and observations made during site inspections.

The audit reports contain an action plan, which outlines any non-compliances and includes recommended actions and agreed timeframes in which the enterprise must comply. DECC staff then follow up on the audits to ensure that the enterprises are implementing the actions required of them. DECC has a systematic and rigorous monitoring program that tracks these follow-ups to ensure that the enterprise completes all actions.

For the targeted audit program the risks associated with the non-compliances identified were assessed and colour-coded according to their environmental significance.

Non-compliances were assessed against two criteria: the likelihood of environmental harm occurring and the level of environmental impact. The likelihood of environmental harm was determined by assessing:

- past environmental performance
- current environmental performance
- potential contributing factors.

The level of environmental impact by the non-compliant activity was assessed by considering factors such as the quantity and toxicity of the material and the sensitivity of the receiving environment.

After these assessments were made, information about the activity was transferred into a risk analysis matrix shown (see Table 1).

Table 1: Risk analysis matrix

	Likelihood of environmental harm occurring because of non-compliance			
		Certain	*Likely*	*Less likely*
Level of environmental impact	***High***	**Code red**	**Code red**	**Code orange**
	Moderate	**Code red**	**Code orange**	**Code yellow**
	Low	**Code orange**	**Code yellow**	**Code yellow**

A non-compliance assessed as a 'code red' suggests that the non-compliance is of considerable environmental significance and therefore must be dealt with as a matter of priority. A non-compliance assessed as a 'code orange' suggests moderate environmental significance and a 'code yellow' suggests that the non-compliance could receive a lower priority but must still be addressed.

Risk analysis of issues identified

The issues identified during the targeted audit program were categorised using the risk analysis process referred to above. The percentages of issues found in each category during the audit process are shown in Table 2.

Table 2: Percentage of issues found in each category at the audited premises

Colour code of issue	Code red (high risk)	Code orange	Code yellow	Total
Percentage of issues	0%	28%	72%	100%

Findings of compliance audits

This section of the report summarises the activities and issues that were identified during the audit phase, and through previous industry audits, that have the potential to result in site contamination.

Handling and movement of chemicals and waste

The handling and movement of chemicals and waste includes the transfer (delivery and dispatch) and transport of materials within the premises. Poorly designed, installed or maintained delivery and dispatch areas, pipework, or areas where materials are transported within the premises could allow chemicals and waste to contaminate soil and groundwater, or drain or be flushed to waters, causing surface water pollution.

Any leaks and spills that occur during handling and movement of chemicals and waste, or from both above ground and underground storage tanks that are either not provided with appropriate secondary containment or have no measures in place to detect leaks, have an increased potential to contaminate soil and groundwater and can either drain or be flushed to waters, causing surface water pollution.

Examples of handling and movement of chemicals and waste not being conducted in a competent manner and/or equipment associated with the handling and movement of chemicals and waste not being operated in a proper and efficient manner are described below.

Inadequate containment measures

- Waste water containment systems were not capturing leaks effectively, resulting in discharge of waste water over unsealed areas.
- Overflows of solid and liquid waste from treatment ponds resulted in discharges to adjacent areas.

Lack of leak detection measures for underground transfer of liquid waste and chemicals

- Measures were not in place to detect leaks in underground concrete and steel pipes, sumps and tanks.

Storage of chemicals and waste

Any leaks and spills of solid or liquid materials from intermediate bulk containers, 200-litre drums and plastic containers that are not properly handled or stored with appropriate secondary containment have the potential to contaminate soil and groundwater, and either drain or be flushed to waters, causing surface water pollution.

Examples of inadequate storage facilities for chemicals and waste that would not effectively contain spills and leaks include:

- a lack of secondary containment for chemical and waste storage areas
- bulk tanks and drums of cleaning solvents, engine coolant and transmission oil and used engine parts being stored within the workshop area in close proximity to an outside stormwater drain with inadequate secondary containment
- waste batteries being stored without secondary containment measures in place
- drums of degreaser and transmission oil being stored on mobile temporary bunds insufficient in size to contain 100% of the volume of the containers and any trajectory leaks not able to be fully contained within the bund
- drums containing waste solvents being stored on bunded pallets in the open with no means of excluding rainwater where overflows discharge directly to the stormwater system
- overhead bulk liquid waste storage tanks located in close proximity to the surrounding bund walls where trajectory leaks would not be contained within the bunded area
- drums containing unknown chemicals, used cooking oil, waste oil, batteries, disused pumps and filters contaminated with oil being stored in open areas draining to stormwater with no secondary containment.

Examples of inadequate maintenance of tanks and secondary containment facilities include:

- bulk tanks containing waste oil and chemicals that are not properly or efficiently maintained may compromise the structural integrity of the tanks
- cracks within the bunded containment area serving the chemical storage facility may result in any spills and leaks potentially contaminating soils and groundwater
- storage of solid waste sludge from ponds, and off cuts from wool processing activities on different areas of land or in pits, where the permeability of the soil or details of the type of linings used was not available
- build up of precipitate within the containment area, in this case for caustic soda bath tanks, resulting in a reduction in the residual capacity of the containment area to hold spills and leaks.

Examples of the lack of leak detection measures for underground storage of chemicals and wastes include:

- measures not in place to detect whether leaks had occurred or were occurring in underground storage tanks containing wastewater, oil and diesel
- infrequent and irregular inspections of plant and equipment and lack of maintenance of tanks.

Processing of chemicals

There were no issues associated with the processing of chemicals at any of the sites audited.

Stormwater management

Poor stormwater management practices can cause contamination of areas that were previously uncontaminated and increase the risk of soil contamination and contaminated discharges to stormwater.

Examples of poor stormwater management practices observed during the audits were:

- the inappropriate use of a 'first flush' system to contain spills and leaks that may occur on a site, and no effective secondary containment measures in place to contain leaks or spills generated from the storage of waste batteries, waste metals and drums containing sludge and plastics
- the potential for oil spills that occur in the transfer area to flow into other areas of a site increasing the potential for surface water and soil contamination
- measures not in place to exclude rainwater from entering oil transfer, oil treatment, and storage areas, resulting in large quantities of oily water requiring treatment prior to discharge
- the use of pumps that require manual operation, resulting in reduced bund capacity if significant wet weather events occur outside of normal working hours.

Incident management

Incidents which have the potential to cause pollution of waters and/or soil contamination from the storage and handling of wastes and chemicals may include leaks and spills, fire, or explosions. The scale of the incidents range from limited events (e.g. small-scale spills and leaks which can be dealt with by on-site personnel using spill management procedures and spill kits) to significant events (e.g. emergencies which are generally large-scale, requiring an urgent response, and may involve the emergency services).

The scale and complexity of incident management planning required at a premises is proportional to a number of factors, including the size of the facility, its location, the nature of chemicals and operations on the site, and the number of staff. Inadequate and inappropriate incident management, such as untrained or poorly trained staff flushing spills or leaks down stormwater drains, can cause serious pollution incidents.

An example of inadequate incident management procedures that were encountered in premises during the audits include: no procedures in place to deal with any type of emergency such as spills or fires; no emergency management response plans; and no training of staff in incident management.

Emergency response plans

Inadequate emergency response plans result in uncertainty and a lack of systems and procedures to deal with emergencies and the potential for chemicals and wastes to pollute surface water, groundwater and to cause soil contamination.

An example of this was an Emergency Response Plan that did not document the procedures to deal with all the different types of incidents that may occur and there were no procedures in place to deal with larger incidents such as explosions and fires.

Best Environmental Management Practice

Guidance material, including standards, codes of practice and guidelines dealing with issues relating to the prevention of site contamination, has been developed by both industry and regulators in Australia (for a more detailed list see the Reference Section of this report). DECC has reviewed these and other examples from overseas and identified a number of documents in particular, that companies should understand and apply.

AS 1940:1993 *Australian standard for the storage and handling of flammable and combustible liquids* provides industry with best practice requirements and recommendations for storing and handling flammable and combustible liquids. This standard was updated in 2004 as AS 1940:2004 to incorporate new information on control philosophies and innovative designs that had been developed since the last edition.

The chemical industry has prepared a number of codes of practice including the Australian Institute of Petroleum codes of practice (AIP 1993, 1994, 2003a, 2003b), the Plastics and Chemicals Industries Association responsible care codes of practice (PACIA 2000, 2002a, 2002b) and *The industry code of practice for the safe transport, handling and storage of packaged agricultural chemicals and veterinary chemicals* (Agsafe 2002) are all useful codes.

In NSW, DECC, WorkCover, other government organisations and industry have also produced numerous guidelines to help organisations deal with issues of site contamination (see Reference Section of this report). WorkCover has developed a series of guidelines covering the storage and handling of dangerous goods and the management of spills.

Environmental management practices and codes from overseas were also reviewed for this report. Most best environmental management practices referred to were similar to those in NSW.

Practices to reduce the risk of contamination

The following best environmental management practices have been extracted from the research of the standards, codes of practice and guidelines.

Above ground storage of chemicals

- The material that tanks and containment systems are made of should be compatible with the chemicals that are to be stored in them.
- Bulk tanks should be located in a compound that has a containment system that provides sufficient containment for 100% of net capacity of the largest tank in the compound and holds the input from a 1-in-20-year 24-hour storm, or the output of any firewater for 20 minutes, whichever is greater.
- Floors of bulk storage facilities should be designed to withstand the hydrostatic pressure exerted when tanks are full.
- Containment systems should provide an impervious barrier to prevent spills from discharging outside the containment system.
- Any pipes connected to the storage tanks should be located over the containment system. If a pipe passes through a wall, the joint should be sealed to prevent leakage.
- All fixed tanks should be provided with a suitable overflow system that discharges to an area within the bund wall or to a collection or holding point.
- Any valve used for draining a storage compound should be located outside the bund wall. The valve should have clear open and closed positions and be compatible with the liquid contained. The valve should normally be closed except during drainage.

- All chemical storage tanks that contain dangerous goods must be located away from the containment walls so any lateral spill from the tank would be contained inside the containment walls or hit a suitable splatter shield.
- All storage tanks should be fitted with level indicators. Where the level inside the tank is not continuously visible to the person filling the tank, a high-level alarm should be fitted to prevent overflow.
- Where possible, all chemical storage areas should be roofed. If this is not possible, any water collected in the storage area should be monitored for quality before appropriate discharge.
- All uncontaminated surface stormwater should be diverted from chemical storage areas.
- All tanks and storage compounds should be inspected and maintained regularly, and the integrity of tanks should be tested at least every 5 years.
- Chemicals in bulk storage should be properly labelled and have material safety data sheets available in the work area.
- All storage areas should be secured against unauthorised entry.
- All new storage areas located near environmentally sensitive areas should have groundwater monitoring wells.

Packaged material storage

- Drums and other containers should be stored (stacked) in such a manner and in a location that would prevent the contents to spill outside the containment structure if the drums and other containers are ruptured or toppled.
- Stored chemicals and waste materials should be confined to designated areas.

Waste and empty container storage

- Areas for storing scheduled liquid chemical wastes should be secured, roofed and walled, have impermeable floors and be adequately ventilated.
- All containers storing waste liquids should be sealed (i.e. Lids sealed and bungs secured).
- Empty containers should be washed, rinsed or chemically treated and sealed before storage or disposal.
- Labels of containers should be retained until the containers are washed and rinsed.
- Containers not for reuse should be rendered safe and be punctured or crushed.
- Accurate records of all wastes stored should be kept to ensure early disposal.
- Employees should be trained in appropriate waste control and disposal procedures.

Handling, transfer and transport of chemicals

- Personnel trained in preventing the risk of spills or leaks should be present during loading and unloading operations.
- All uncontaminated surface stormwater should be diverted away from the chemical handling areas.
- Where possible, loading and unloading areas should be roofed and provided with rollover bunds and collection sumps.
- All vehicles should be inspected for leaks before and after loading and unloading operations.
- Hoses, couplings and other equipment should be regularly inspected for failures or leaks.
- All vehicle loading and unloading operations should be undertaken in a containment area with adequate spill containment capacity.
- Transfer points outside a bund should be provided with suitable spill containment.

- Vehicles should move between storage areas in a manner that prevents the tracking of contamination from one area to another.
- All connections used during the transfer of liquid between vehicles and storage tanks should have tight fittings.
- All transfer points should be suitably anchored and protected from impact by vehicles or swinging loads.
- All transfer hoses should be protected from vehicles driving over the hose or striking its connection.
- All nozzles and valves used during the transfer of liquid between tankers and storage tanks should be fitted with shut-off valves to prevent overflow.
- Transfer pumps should be provided with emergency shutdown devices.
- Hoses should be purged before uncoupling.
- Overfill protection devices should be regularly inspected.
- Stormwater from containment areas should be tested before discharge to minimise discharge of pollutants.

Spill and incident management practices

- Spills should be cleaned up immediately, and waste must be disposed of in accordance with DECC requirements to mitigate any discharge to soil or waters.
- Contaminated water and other waste (spill materials) from the clean up of spills must be collected and disposed of in accordance with DECC requirements.
- Water used for cleaning up and decontaminating spills should not be allowed to enter stormwater drains or watercourses.
- Records of the location of all tanks and associated pipe-work should be maintained to assist incident management.
- All premises should ensure that details of the appropriate emergency services to be contacted during an emergency are developed and maintained.
- Employees should be trained in emergency response procedures, including spill clean-up procedures.

Limited incidents

Limited incidents are considered to be small-scale spills and leaks which can be dealt with by on-site personnel using spill management procedures and spill kits.

- Spill response plans should be developed, implemented, reviewed and updated as required.
- Spill response training and drills should be conducted regularly or as appropriate.
- Adequate supplies of spill response equipment should be maintained in accessible locations.
- Spread of the spill should be contained, and all spilled liquids should be recovered immediately. The spilled liquid and other clean-up waste should be properly disposed of.
- Spills should be covered and protected from stormwater runoff during rainfall to the extent that it does not compromise clean-up activities.

Significant incidents

Significant incidents are considered to be emergencies which are generally large-scale, require an urgent response, and may involve the emergency services.

- Emergency management plans to deal with significant incidents should be developed, implemented, reviewed and updated as required.

- In designing the premises, sufficient space between bund walls, storage areas and other structures should be provided to allow access during emergencies.
- Response equipment should be provided to allow emergencies to be dealt with immediately.
- Emergency drills using the emergency response plan should be undertaken at least annually.
- Responsible individuals should be designated to oversee and enforce control.
- All premises should have adequate measures to contain contaminated firewater on-site.
- Facilities that have bulk oil storage on-site should have a spill prevention control and countermeasures plan; the plan should contain: operating procedures that prevent oil spills; control measures to prevent a spill from reaching waters; and countermeasures to contain, clean up and mitigate the effects of an oil spill that reaches waters.
- Material such as sandbags or tarpaulins should be available to block any stormwater drain outlets from the site.

Underground storage tanks

Leaking underground storage tanks are a significant source of groundwater and soil contamination. Appropriate prevention and mitigation measures can provide a high level of confidence that releases will be prevented or detected within sufficient time for a response to be implemented.

DECC is finalising the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2007 to control and regulate the storage of petroleum products (including waste oils) in underground petroleum storage systems in NSW. The proposed regulation focuses on a preventative approach to minimise the risk of soil and groundwater contamination. A phased adoption of performance standards is proposed, that is consistent with the Code of Practice (CP4-2002) for *The Design, Installation and Operation of Underground Petroleum Storage Systems* (AIP 2002). The measures stated in the Regulation and code of practice are designed specifically for petroleum products however they can be applied to the underground storage of any liquid chemical. The requirements of the code of practice are summarised below.

Installation of new tanks

- New or replacement tanks should be double-skinned and be equipped with basement style bunds.
- Regular inspection during the installation of new underground storage systems should be undertaken.
- Protection devices such as an automatic flow shut-off or a high level alarm to prevent over filling of tanks should be installed.
- All tanks should be fitted with leak detection systems and/or an alarm.

Fill points and associated pipe work

- Each fill point should be accessible from the vehicle unloading and loading position to avoid spillage.
- All underground pipe-work should be protected from surface loading (such as heavy traffic areas).
- Adequate closure requirements including appropriate chemical decanting methods, the disconnection of lines and capping, removal of product saturated soils and necessary site assessment for contamination.

Ongoing monitoring

- Pressure, precision tightness and equipment integrity tests should be conducted regularly.
- Regular inventory control or stock reconciliations should be conducted on all underground storage systems to detect loss of product.
- Release detection monitoring including manual or automatic tank gauging, vapour monitoring and groundwater monitoring should be conducted regularly.

Improving Environmental Performance

Improvements resulting from the audit findings

Follow up by DECC confirms that issues identified during the compliance audits have been addressed by licensees. These include:

- establishing regular inspection and maintenance programs for bulk tank storage systems
- constructing containment systems around storage tanks with adequate capacity to contain spills and leaks and ensuring that containment systems have impervious surfaces to prevent spills and leaks from discharging outside the system
- rendering safe, puncturing or crushing containers that are not for reuse, and providing secondary containment for empty containers, properly sealing all empty containers and/or disposing of the empty containers
- developing and implementing procedures to ensure that all operational staff are trained in emergency management procedures and that emergency management drills are undertaken on a regular basis
- providing suitable spill containment for transfer points outside a bund
- providing tanks with level indicators or high-level alarms
- establishing regular inspection and maintenance programs for stormwater and capture systems
- establishing ongoing operational monitoring of equipment, including underground pipes and storage tanks
- developing and implementing emergency management plans
- upgrading emergency management plans to deal with firewater management and management of non-hazardous materials and all other types of incidents
- obtaining emergency response equiment and placing them appropriately to enable emergencies to be dealt with immediately
- implementing procedures to maintain emergency response equipment.

Licence reviews

Section 78 of the POEO Act requires DECC to review environment protection licences once every five years. The licence reviews:

- focus on desired environmental outcomes
- enhance consistency between licences issued to the industry
- improve the effectiveness of the licensing system
- strengthen DECC's accountability to stakeholders.

By successfully integrating reviews with other regulatory activities, such as compliance audit programs, a more holistic licensing approach has been developed. The findings of this program will be used to guide the review of licences.

Ongoing regulatory activities

The findings of this report will continue to be used to guide the assessment of any future applications for new licences resulting in the implementation of best practice to prevent site contamination.

Guidance material has been developed to assist our officers to identify and address past, present and future (proposed) activities that have the potential to cause site contamination. The material includes:

- a risk based assessment process for licensed activities based on potential risks of causing site contamination (high, moderate and low risk)
- checklists identifying activities on sites that were found during audit programs to have the potential to cause soil contamination and/or groundwater contamination and best practice measures that could mitigate or prevent site contamination occurring
- a checklist identifying issues/parameters/measures that could be observed or taken during site inspections to identify potential site contamination.

Helping local government

This report also provides valuable information that will help local government to pro-actively regulate sites and reduce the risks of future contamination.

To support councils in this environment protection regulatory role, this report is being sent to all local councils and regional organisations of councils in NSW.

Related Initiatives

In addition to ongoing compliance and environmental improvements implemented as part of this program, other educational and regulatory actions are being undertaken.

Education package – Chemical storage, handling and spill management practices

DECC recently completed a Strategic Environmental Compliance and Performance Review focusing on liquid chemical storage, handling and spill management practices. The review included an audit of industrial and government premises, best environmental management practices and the development of educational material.

The education package was developed to provide guidance to industry on practices to manage environmental risks and assist in understanding their legal obligations. The education package includes:

- development of guidance for managing environmental risks associated with the storage and handling of liquid substances; the guide is currently being finalised and will be available on DECC's website
- development of a training package for industry and council representatives. Two workshops were successfully piloted in Parramatta and Maitland. Further delivery of the training course is currently being finalised and the training material will also be made available electronically to industry and councils for their use.

Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2007

DECC is finalising the Protection of the Environment Operations (Underground Petroleum Storage Systems) Regulation 2007. The proposed Regulation mandates a preventative approach to minimising the risk of soil and groundwater contamination from leaking underground petroleum storage systems (UPSS), and also ensures a consistent minimum level of environment management at UPSS sites across the state.

The proposed UPSS Regulation will apply to all premises with underground petroleum storage systems, except where the premises already have a licence issued under the POEO Act (i.e. scheduled activity storing more than 2000 tones of petroleum products).

The Regulation will contain requirements to have an appropriate level of equipment and the necessary processes in place, consistent with current industry guidance documents such as *CP4-2002 Code of Practice for the Design, Installation and Operation of Underground Petroleum Storage Systems* (AIP 2002). This will include infrastructure and systems for primary leak detection, groundwater monitoring, implementation of an environmental management plan, the need to retain relevant records, and the requirement to provide a validation report to local councils when part or all of the UPSS is replaced or decommissioned. For existing UPSS, these requirements will be phased in over 1–3 years.

Galvanisers Industries Project

This project was undertaken by DECC's Metropolitan Branch and focused on soil, surface water and groundwater contamination from premises in Sydney that are scheduled under the POEO

Act for *mineral processing or metallurgical works* activities and that undertake galvanising. Key objectives of the project related to identifying potential sources of leaks that could cause soil, surface water and groundwater contamination; better understanding of the extent of problems within this industry; identifying common issues between premises; providing long-term solutions to assist in preventing any recurrence of incidents; and consistent and robust regulation of galvanising industries in Sydney and Wollongong.

The project found that licensees/activities involved were generally in compliance with the environmental legislation and licence conditions. However, the project also identified a high risk/potential for soil and groundwater contamination due to current practices in the industry. Prevention of these environmental risks is reasonably achievable at low costs to the operators.

The environmental risks were attributed to a range of functions that took place outdoors, in unroofed areas or outside bunded areas, including storage of raw materials/chemicals, storage of finished products, storage of drums and tanks and unloading of materials.

Recommendations of the project related to:

- conducting all activities, that have the potential to pollute waters, within a roofed and bunded area
- collecting and disposing of liquid waste and wastewater in accordance with current legislation and guidelines
- conducting regular monitoring and reporting of surface water, soil and groundwater quality
- taking action where soil and groundwater contamination is evident to prevent further contamination and/or migration of contaminants
- ensuring major spills can be contained on site
- storing all wastes within sealed, bunded and roofed areas
- conducting regular inspections/environmental audits, in particular to the tanks where very large quantities of chemicals as acids and caustic are kept to detect any early signs of tank deterioration and to prevent material loss
- making councils aware of the findings and recommendations to enable that a similar approach can be applied to non-licensed activities within the galvanising industry sector.

The recommendations of the project are currently being implemented.

Small Waste Facility Environmental Risk Assessment and Mitigation Package

Thirteen rural and regional councils recently participated in a trial of a new management tool developed by DECC designed to help operators of small landfills and transfer stations in assessing the environmental risks of their facilities and identifying potential risk mitigation measures.

The Small Waste Facility Environmental Risk Assessment and Mitigation Package (E-RAMP) is an easy-to-use Excel-based tool which DECC has developed to assist operators. This tool will help build a risk profile of a facility based on a range of information about its operations, management and surrounding environment.

Based on feedback from councils that participated in the trial the documentation and software was found by 100% respondents to be ‘clear’ to ‘very clear’. Results of the trial are now being considered for broader application, including being used as a tool to prevent contamination of land.

Liquid Waste Fact Sheets – Protecting the environment and your business

Five fact sheets providing important information to businesses about best management practices and managing liquid waste have been released by DECC. The fact sheets address each of the following issues:

- handling liquid waste
- storing liquid waste
- preventing spills
- responding to spills
- reducing liquid waste through cleaner production.

These fact sheets are available on DECC's website at
www.environment.nsw.gov.au/publications/liquidwastefs.htm

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