



Water Quality
Protection
Guidelines
No. 10

Mining and Mineral
Processing

Above-ground fuel
and chemical
storage

2000



1. Introduction

Chemical substances, including corrosives, poisons, brines and hydrocarbons, may escape from storage facilities through various means including:

- absence of containment facilities;
- poor construction or deterioration of containment facilities;
- inappropriate equipment maintenance operations;
- poor 'housekeeping' practices;
- accidental damage;
- deliberate vandalism.

The release or leakage of tank contents to the environment may adversely impact on the quality of water resources.

2. Purpose

These guidelines are designed to minimise the potential impacts on water resources from poorly managed above-ground fuel and chemical storage facilities.

3. Scope

These guidelines apply to all mine sites where the volume of above-ground storage of fuel or toxic/ harmful chemicals exceeds 250 litres. Chemicals covered by these guidelines include, but are not limited to:

- Petroleum hydrocarbons, e.g. diesel, kerosene, petrol, solvents;
- acids and alkalis, e.g. sulphuric acid, sodium hydroxide, lime;
- liquid toxicants, e.g. cyanide;
- surfactants and frothers, e.g. detergents;
- water treatment chemicals; and
- brines.

4. Regulatory requirements

There are provisions under the *Environmental Protection Act 1986* to set conditions on the installation and operation of above-ground storage facilities on prescribed premises. The proponent should address this matter in its Notice of Intent (NOI).

The developer and site operator should also conform with the requirements of the regulations issued in accordance with the *Explosive and Dangerous Goods*

Act 1961. For further information contact the Department of Minerals and Energy (DME).

The DME may seek advice from the Commission if it considers the proposal may impact on water resources. This applies especially to areas proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* and the *Country Areas Water Supply Act 1947*.

The quality of public drinking water sources is protected by proclaiming Public Drinking Water Source Areas (PDWSAs) under the two Acts. PDWSAs include Catchment Areas, Water Reserves and Underground Water Pollution Control Areas.

The by-laws under these Acts enable the Water and Rivers Commission to control potentially polluting activities, to regulate land use, to inspect premises and to take steps to prevent or clean up pollution.

The Commission has defined three priority classifications for drinking water source areas: Priority 1, Priority 2 and Priority 3.

In addition, wellhead protection zones and reservoir protection zones are defined to protect the water source from contamination in the immediate vicinity of production wells and reservoirs.

5. Referral of proposals

5.1 Establishment within Public Drinking Water Source Areas

Any proposal for an above-ground bulk fuel and chemical storage system holding more than 250 litres should be submitted to the Commission for approval. The submission should include the following:

- a site plan showing the location of all existing and proposed above-ground bulk liquid storage tanks;
- construction details of the bund around the proposed above-ground storage system;
- details of the proposed inspection and maintenance schedule for the banded compound and any associated equipment to ensure they function effectively;
- a contingency plan for the containment, recovery and disposal of any spilt contained substances (the plan should be integrated with any other emergency plan required by other regulatory agencies);
- a completed permit application form (if the proposed facility is located within an Underground Water Pollution Control Area).

5.2 Establishment outside Public Drinking Water Source Areas

Proposals to establish above-ground tanks outside Public Drinking Water Source Areas do not require formal approval by the Commission. Proposals that fall within the requirements of the Dangerous Goods Regulations 1992 should be referred to the DME for approval. The DME may seek advice or refer the proposal to the Commission or DEP.

6.0 Best management practices

6.1 Tank siting

- a. Above-ground storage facilities should not be constructed:
 - in wellhead and reservoir protection zones within a Public Drinking Water Source Area;
 - on seasonally inundated land unless fill is placed to protect the tanks against flooding and the footings against erosion;
 - on floodplains i.e. areas that may be affected by a **1-in-20 year** flood;
 - within 30 metres of the bank of any seasonal water body or surface water drainage line;
 - within 100 metres of the bank of any permanent waterbody.
- b. All facilities should have a one-metre clearance between the finished ground surface and the historical maximum groundwater level.

6.2 Tank design

All tanks should be constructed and located within a bunded compound to Australian Standards *AS 1940 – The storage and handling of flammable and combustible liquids* and *AS 1692 – Tanks for flammable and combustible liquids*.

6.3 Bunded compound design

- a. All storage tanks should be located within a bunded compound.
- b. The bunded compound should extend sufficiently beyond the plan perimeter of the tank (when

- projected down to the bund) so that a jet of liquid from any perforation of the tank or process equipment will be contained.
- c. The bunded compound should be lined with low permeability (less than 10^{-9} m/s) material that is not adversely affected by contact with stored fuels or chemicals. Where permitted in Public Drinking Water Source Areas, the bund should be constructed of waterproof reinforced concrete or an approved equivalent.
 - d. The bunded compound should be constructed or protected in a manner that permits full recovery of contents spilt from the tank and ensures that the lining material is not damaged.
 - e. The bunded compound should have sufficient capacity to fully contain leakage from storage tanks and not be overtopped during extreme rainfall events. This capacity should equate to not less than 110% of the capacity of the largest contained tank system and at least 25% of the total capacity of all tanks for a multiple tank system that do not have manifolded connections between tanks. Consideration must be given to the volume of any additional objects stored inside the bund.
 - f. The compound should also contain, where it is uncovered, sufficient freeboard to contain incident rainfall from a **1-in-20 year** return frequency 72-hour storm event and 110% of tank content. The current edition of the Institution of Engineers *Australian Rainfall and Runoff* should be consulted to calculate the rainfall volume.
 - g. All process equipment subject to routine maintenance (valves, meters, pumps, gauges), should be situated within the bunded compound.
 - h. Suitable security measures should be installed to prevent deliberate contamination of groundwater by intruders when the site is unattended. These should include:
 - fencing of the compound or adequate security at the site;
 - locking of the valve controls.
 - i. The base of the bund should be graded towards a sump to allow for the collection of any liquids from within it.
 - j. Incompatible or reactive chemicals should be stored in separate bunds.



- k. All fuels and chemicals stored within the bund should be clearly labelled with a weather-resistant notice detailing the types and quantities of liquids stored within the containers. Material safety data (MSD) sheets covering all stored chemicals should be available on site for reference in dealing with spillage incidents. A storage volume gauge is recommended for tanks with capacity exceeding 1 kilolitre.

6.4 Refilling area

- a. All vehicles should be refilled on hardstand within a contained area.
- b. The containment should be designed to allow access to vehicles while still containing a spill within the containment compound.
- c. The refilling area should drain towards a collection sump.

6.5 Mobile refuelling vehicles

- a. This refers to vehicles that refuel plant and equipment where they are operating. For temporary or mobile fuel storage that is stationary (i.e. plant will travel to it to refuel), refer to the *Water Quality Protection Note 'Temporary Above Ground Chemical Storage in Public Drinking Water Source Areas'*. A copy of the note can be obtained found on the Commission's web site at: <http://www.wrc.wa.gov.au/protect/policy>
- b. The total volume of fuel or other chemicals carried by a mobile refuelling vehicle should not exceed 10 000 litres.
- c. Refuelling pipework should be of the 'snap-on – fast-fill' type (for large plant) or auto-shut-off nozzles (for small plant) or an approved equivalent.
- d. All care should be taken when coupling and uncoupling hoses between vehicles to minimise any loss of liquids.
- e. An emergency response plan should be prepared to address any spill that may result from a mobile refuelling vehicle. The plan should be made available to all operators of mobile refueling equipment.

6.6 Bund maintenance

- a. Any spilt or leaked material including any clean-up liquid should be decanted by a manually controlled pump (not valving). Any collected liquid should be reclaimed, treated and disposed of in accordance with the requirements of the DEP.
- b. The bund should be maintained to prevent accumulation of stormwater within it through regular pumping using a manually operated pump. Where tanks are permitted in P1 and P2 Public Drinking Water Source Areas, the bunded compound should be roofed. The compound should have a minimum of 1 metre overhang extending from the edge of the bund or vertical deflectors to prevent the intrusion of wind-driven rainfall.
- c. Stormwater runoff from roofs and similar structures should be directed away from the bunded compound. Only uncontaminated stormwater may be discharged to soakage or drain systems.
- d. Contaminated stormwater should be collected in sealed waterproof containers and disposed of in accordance with the requirements of the DEP.



7. Useful references

1. Standards Australia (1993). AS 1940 – *The Storage and Handling of Flammable and Combustible Liquids*, Standards Association of Australia, Homebush, NSW.
2. Standards Australia (1989). AS 1692 – *Tanks for Flammable and Combustible Liquids*, Standards Association of Australia, Homebush, NSW.
3. Swan River Trust (no date). *Policy DE 16 – Above Ground Fuel Storage Tanks*, SRT Perth.
4. The Institution of Engineers, Australia (1987). *Australian Rainfall and Runoff: A guide to flood estimation*, IEA, ACT.
5. Waterways Commission (No date). *DAMP 12 Fuel Storage Facilities – Draft*, WWC, Perth.

Glossary and Abbreviations

1. Permeability The capacity of a porous rock, sediment or soil for transmitting a fluid when subjected to unequal pressure.
2. Priority 1 (P1) P1 source protection areas are managed in accordance with the principle of risk avoidance. The source protection objective for P1 areas is to ensure no degradation of source water quality. Land is generally in public ownership and development is generally precluded from P1 areas.
3. Priority 2 (P2) P2 source protection areas are managed in accordance with the principle of risk minimisation. The source protection objective for P2 areas is to maintain existing water quality. Land is generally in private ownership and typically supports low intensity rural and rural lifestyle uses. Urban and industrial land uses are precluded.
4. Priority 3 (P3) P3 source protection areas are managed in accordance with the principle of risk management. The source protection objective for P3 areas is to maintain water quality within health guidelines. Land is generally in private ownership and may support urban, light industrial and rural uses. Heavy industry and processing/treatment of animal wastes are precluded.
5. Reservoir protection zone Area around a reservoir defined to protect the reservoir water body. A reservoir protection zone usually consists of a 2-kilometre buffer from the high-water level of the reservoir and includes the reservoir itself.
6. Wellhead protection zone Area around a well defined to protect a bore from contamination in the immediate vicinity. Wellhead protection zones usually have a radius of 500 metres in Priority 1 and Priority 2 areas and 300 metres in Priority 3 areas. In some locations wellhead protection zones may be aligned to geological features or be based on detailed groundwater modelling.



Further enquiries

Any project where the proponent/operator is unable to comply with these guidelines, or where site conditions prevent the application of these guidelines, should be submitted to the Commission as early as possible in the development of the proposal so that the matter may be resolved.

Any queries relating to the **content of these guidelines** should be directed to:

Program Manager Assessment and Advice
Water Quality Protection Branch
Water and Rivers Commission
Level 2, Hyatt Centre
3 Plain Street
EAST PERTH, WESTERN AUSTRALIA 6004
Phone (08) 9278 0300
Fax (08) 9278 0585

For further enquiries on any matter relating to the **management of water resources**, please contact the Water and Rivers Commission's regional offices.

Swan-Goldfields-Agricultural Regional Office

849 Albany Highway
VICTORIA PARK WA 6100 Phone (08) 9362 0555 Fax (08) 9362 0500

Or

254 Fitzgerald St
NORTHAM WA 6401 Phone (08) 9690 2821 Fax (08) 9622 7155

North West Regional Office

Chiratta Road
KARRATHA WA 6714 Phone (08) 9144 2000 Fax (08) 9144 2610

South West Regional Office

U2 Leschenault Quays,
Austral Parade
BUNBURY WA 6230 Phone (08) 9721 0666 Fax (08) 9721 0600

Or

'Sholl House'
21 Sholl St
MANDURAH WA 6210 Phone (08) 9535 3411 Fax (08) 9581 4560

Mid-West Gascoyne Regional Office

Pass Street
Geraldton WA 6530 Phone (08) 9964 5978 Fax (08) 9964 5983

South Coast Regional Office

5 Bevan Street
ALBANY WA 6330 Phone (08) 9842 5760 Fax (08) 9842 1204

These guidelines are also available from the Water and Rivers Commission's web page at:

<http://www.wrc.wa.gov.au/protect/policy/>



Other related guidelines in this series include:

WATER QUALITY PROTECTION GUIDELINES NO. 1

Water quality management in mining and mineral processing: An overview

WATER QUALITY PROTECTION GUIDELINES NO. 2

Tailings facilities

WATER QUALITY PROTECTION GUIDELINES NO. 3

Liners for waste containment

WATER QUALITY PROTECTION GUIDELINES NO. 4

Installation of minesite groundwater monitoring bores

WATER QUALITY PROTECTION GUIDELINES NO. 5

Minesite water quality monitoring

WATER QUALITY PROTECTION GUIDELINES NO. 6

Minesite stormwater

WATER QUALITY PROTECTION GUIDELINES NO. 7

Mechanical servicing and workshop facilities

WATER QUALITY PROTECTION GUIDELINES NO. 8

Laboratory waste discharge

WATER QUALITY PROTECTION GUIDELINES NO. 9

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