



Ministry for the
Environment
Manatū Mo Te Taiao

Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand

Prepared by a Joint Working Group
of the Ministry for the Environment,
local authorities and petroleum
marketing companies

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Central Government

The Ministry for the Environment

Regional Authorities

Auckland Regional Council

Canterbury Regional Council

Environment Waikato

Taranaki Regional Council

Wellington Regional Council

Industry

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EXECUTIVE SUMMARY

The *Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand* offer guidance on specific measures which can be taken by the owners and managers of such sites to ensure that water discharges will not cause significant adverse effects on the environment. The Guidelines have been prepared by an Oil Industry Environmental Working Group with members from central and regional government and industry.

The Guidelines are in three parts. Part A - Objectives of the Guidelines discusses the purpose and scope of the Guidelines and sets out the legislative requirements for water discharges. Part B - Best Management Practices sets out the means by which facility owners and operators may comply with these requirements. Appendices contain supporting technical information.

Part A. Objectives

Chapter 1 sets out the purpose and scope of the Guidelines and lists some other guidelines relating to the oil industry. The purpose of the Guidelines is to assist in the sustainable management of water resources by ensuring that water discharges from petroleum industry sites meet the quality objectives laid down in regional policy statements and plans.

Chapter 2 describes the regulatory background for the management of water quality. Section 2.2 explains the different roles and responsibilities of regional councils and territorial local authorities and describes how the planning process operates under the framework of the Resource Management Act 1991. Section 2.3 lists those provisions of the Act which relate specifically to water quality. Sections 2.4 and 2.5 discuss some other important publications dealing with water quality management.

Part B. Best Management Practices

Chapters 3-6 discuss the drainage systems needed for dealing with water discharges from different types of site. Each of these chapters has three sections: a chapter summary; a section which specifies basic system design requirements; and a section which discusses the different types of drainage systems that are needed. Chapter 3 deals with retail service stations, Chapter 4 with truck stops, Chapter 5 with terminals and depots, and Chapter 6 with manufacturing plant sites.

Chapter 7 deals with the design of water treatment systems. Section 7.1 contains a summary of the chapter. Section 7.2 discusses how to estimate the total capacity needed in such systems, which depends on flow conditions. Sections 7.3 and 7.4 deal with containment systems, and section 7.5 discusses different types of treatment devices.

Chapter 8 deals with the day-to-day management of water treatment systems. Section 8.1 contains a summary of the chapter. Section 8.2 sets out the goals of such systems. Section 8.3 deals with the impact of site cleaning on the water treatment systems. Section 8.4 deals with risk mitigation. Sections 8.5 and 8.6 discuss maintenance and inspection of water treatment systems, and Section 8.7 deals with operating procedures. Section 8.8 briefly discusses other potential contaminants.

Chapter 9 deals with the monitoring of the performance of water treatment systems. Section 9.1 contains a summary of the chapter. Section 9.2 refers to earlier work on monitoring oil industry sites. Section 9.3 describes self-monitoring, and Section 9.4 deals with monitoring by regional councils. Section 9.5 describes appropriate sampling protocols.

Appendices

Appendix 1 contains some results of risk assessment studies. Appendix 1.1 gives estimates of the risks posed by spillages of fuel, especially at service stations and truck stops. Appendix 1.2 deals with the environmental effects of other, general automotive products sold and used at service stations and recommends best management practices. Appendix 1.3 summarises the results of a modelling study of the potential effects of stormwater discharges from oil interceptors on four different types of aquatic environment. These effects were found to be relatively minor under most conditions.

Appendix 2 contains some results from monitoring studies. Appendix 2.1 gives the results of two monitoring projects undertaken by NIWA Ltd for the oil industry and for the Auckland Regional Council. The oil industry project dealt with suspended solids and hydrocarbons, and the ARC project dealt only with suspended solids. Appendix 2.2 gives the results of a spill trial undertaken using an API interceptor. Appendix 2.3 shows the notified spill records of the petroleum marketing companies in New Zealand for the period 1992-95 in both graphical and tabular form. Appendix 2.4 shows the size distribution of oil particles in the discharges from different types of pumps run at various speeds. Appendix 2.5 shows the results of trials of the effect of a degreaser on the effectiveness of separators.

Appendix 3 provides more detail for service station owners and operators. It is in two parts. Appendix 3.1 sets out best management practices, and Appendix 3.2 is a generic surface spillage mitigation plan for service stations.

Appendix 4 contains selected national rainfall data. Appendix 4.1 gives rainfall data for sites throughout New Zealand, presented in terms of the annual amount of rainfall which falls during storms of a range of intensities. Appendix 4.2 comprises isohyet maps for storms with a 10% annual probability of occurrence. Appendix 4.3 interprets this data in terms of flow device configurations.

Appendix 5 deals with the design of oil-water separators. Appendix 5.1 gives the design calculations for API separators; Appendix 5.2 deals with parallel plate separators; and Appendix 5.3 presents the basic equations for separator design.

Appendix 6 contains worked examples of how to specify the oil-water separator needed on a typical site. Appendix 6.1 gives the calculations for an API interceptor and Appendix 6.2, for a corrugated plate interceptor.

Appendix 7 contains information on changeover valves supplied by Christchurch City Council.

Appendix 8 gives idealised site layouts for a service station, truck stop, storage depot, and manufacturing site.

DEFINITIONS

AGCS - Above-ground containment system: an above-ground (or partially depressed) bulk tank compound (i.e., one or more tanks in a group). Also referred to as a dike or bund.

ANZECC - The Australian and New Zealand Environment and Conservation Council.

Approved waste management contractor - A contractor registered by a local authority for the collection and disposal of refuse under the Offensive Trade provision of the Health Act 1956.

BTEX - Benzene, toluene, ethylbenzene, and xylenes.

BOD - Biochemical oxygen demand, also known as BOD₅ (in this document BOD refers to carbonaceous BOD unless noted otherwise)

Compound - Bunded area surrounding storage facilities.

Contaminant - Any liquid or solid that: (a) when discharged into water changes or is likely to change the physical, chemical, or biological condition of water; or (b) when discharged onto or into land or into air changes or is likely to change the physical, chemical, or biological condition of the medium.

Depot - Primary storage facility from where products are distributed to customers.

Detergent - A surface-active compound, either natural or synthetic, which acts as a cleansing agent by emulsifying the oils and greases (occurring on hardstanding surfaces) as a result of its ability to reduce interfacial tension between dissimilar liquids.

Diesel stop - Also known as a truck stop (see below).

DOL - Department of Labour (often the Occupational Safety and Health Service in these Guidelines).

Hydrotest (water) - Water which has been reticulated into a storage tank or pipeline for hydrostatic pressure testing of the structures.

Installation - Alternative name for a depot.

Oil(s) - Petroleum-based contaminants which have the potential to contaminate water.

Operational water - Water such as fire-fighting water, wash-down water, mains water (used for testing of equipment such as tanks or pipelines), sea water, or water which settles out of stored product.

PAH - Polycyclic aromatic hydrocarbons.

Petroleum marketing companies - Divisions of companies responsible for the handling and storage of refined petroleum products.

Receiving waters - Natural waters such as streams, ponds, lakes, rivers, groundwater, harbours, or the sea. Receiving waters do not include pipelines, which act only as a conduit between sites and receiving waters, but discharges to pipelines are as sensitive as the receiving waters downstream of them.

Retail sites - Sites such as service stations established for the purpose of dispensing fuels to the community.

RMA - The Resource Management Act 1991.

Terminal - Alternative name for depot.

Trade waste - Liquid waste from industrial or trade premises discharged to a territorial local authority sewerage system.

Truck stop - A staffed or unstaffed facility dispensing diesel (and sometimes gasoline and lubricating oil) to commercial customers.

UST - Underground storage tank.

PART A

OBJECTIVES

1. INTRODUCTION

1.1 The Purpose of these Guidelines

The *Environmental Guidelines for Water Discharges from Petroleum Industry Sites in New Zealand* offer guidance on specific measures which can be taken by the owners and managers of such sites to ensure that water discharges will not cause significant adverse effects on the environment.

The purpose of the Guidelines is to assist in the sustainable management of water resources by ensuring that water discharges from petroleum industry sites meet the quality objectives laid down in regional policy statements and plans. This is achieved by ensuring that such water discharges are not contaminated by petroleum products but that these are intercepted and managed by control systems which provide appropriate levels of protection for people, property, and the environment.

The Guidelines are intended to complement the Dangerous Goods Act 1974, the Dangerous Goods Regulations, the Hazardous Substances and New Organisms Regulations (or subsequent legislation), and the Resource Management Act 1991. They do not replace or supersede the requirements of these Acts and Regulations but provide guidance on how their requirements can be met, and how at the same time the environment can be protected from the potential hazards of petroleum product releases. Adoption of the provisions of the Guidelines, supported as necessary by detailed technical documentation, will enable site owners and managers to comply with national and local law.

1.2 The Scope of the Guidelines

The Guidelines are intended to assist in the management of the impacts of emissions and wastes on water discharges from petroleum industry sites, as shown in Figure 1.1. They deal with sites at which the principal products stored are gasoline, kerosene, diesel, lubricating oil and fuel oil. Four general types of site are discussed, as follows:

- retail service stations
- truck stops
- terminals and depots
- lubricating oil blending and grease manufacturing plants

The Guidelines do not deal with petroleum refineries or oil recycling sites, but do address the issue of waste oil collected at service stations.

In New Zealand, refinery-supplied storage facilities are located close to deep-water ports, except for the Wiri Oil Terminal which is adjacent to an estuarine environment. Other facilities are located adjacent to a wide variety of environments which may:

- (a) support aquatic ecosystems and/or other wildlife,
- (b) be used as recreational waters, or
- (c) be used for drinking purposes.

In designing systems to protect the external receiving water environments adjacent to petroleum industry sites, the aim is to separate catchment areas on the site which are not likely to be contaminated by oil from those which are potentially contaminated by oil (for example, around fill points) and to make separate provision for the handling of industrial effluents such as those from vehicle washes.

The Guidelines give detailed advice on the design of new facilities and facilities which are being substantially upgraded, i.e., those sites where major site engineering works are being undertaken so as to allow all catchments to be segregated and engineering controls to be installed. However, following the procedures within the Guidelines will assist all sites, irrespective of whether they are new, redeveloped, or unchanged, in meeting their obligations under the Resource Management Act.

1.3 The Structure of the Guidelines

The remainder of Part A - Objectives of the Guidelines discusses the legislative requirements in more detail (Chapter 2). Part B - Best Management Practices sets out the means by which facility owners and operators may comply with these requirements. This is achieved by good design, diligent management of sites, and periodic performance monitoring, both by owners and operators and by authorities. Compliance with the conditions in Part B is considered to be a useful basis for a resource consent.

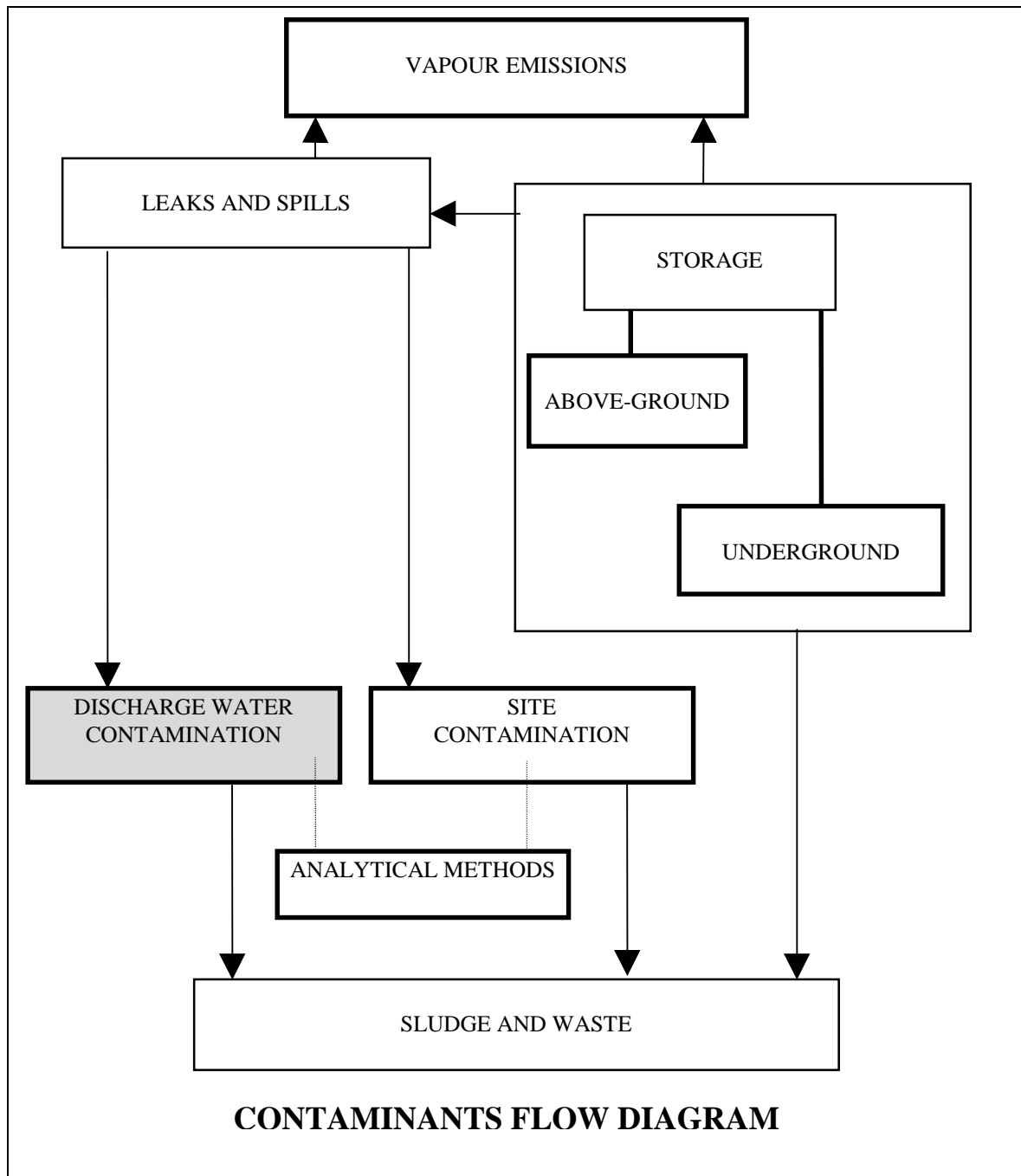
Chapters 3-6 discuss the four types of site mentioned above. They describe how the different types of activity on the sites affect the water discharges and show how the sites should be designed to allow effective separation and treatment of water which may be exposed to contamination. Chapters 7-9 deal with the management and monitoring of systems.

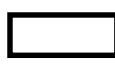
Appendices 1-8 provide supplementary information for those readers who need more technical detail than is given in the main text. They include, for example, detailed methodologies for designing specific treatment devices.


1.4 Relationship with Other Guidelines

This guideline is one of a suite of inter-related guidelines developed for the New Zealand Petroleum Industry as shown on the following pages. In some instances there is a close relationship between this and “Assessment and Management of Petroleum Hydrocarbon Contaminated Sites” because discharges sometimes contaminate sites while, conversely, contaminated sites occasionally discharge contaminants to stormwater systems and surface water bodies. Also, both guidelines are linked to “Analytical Methods for Determining Petroleum Products in Soil and Water” as shown in the diagram which follows.

Figure 1.1. The scope of these Guidelines and of other petroleum industry guidelines.



 These items covered by other specific guidelines

 Addressed by these Guidelines

1.5 Other Guidelines

Other environmental management codes of practice or guidelines which deal with the oil industry and which have been published or are being developed by the Ministry for the Environment, the Department of Labour, local authorities, and the petroleum marketing companies include:

Design, Installation and Operation of Underground Petroleum Storage Systems. Occupational Safety and Health Service, Department of Labour. 1992. (due to be revised)

Management of Existing Underground Petroleum Systems. Occupational Safety and Health Service, Department of Labour. May 1995. (due to be incorporated with the above in a revised publication)

Transportation and Disposal of Petroleum Storage Tanks and Related Wastes. Occupational Safety and Health Service, Department of Labour. May 1995.

Above-ground Bulk Tank Containment Systems. Ministry for the Environment. June 1995.

Assessment and Management of Petroleum Hydrocarbons Contaminated Sites (currently being finalised).

Analytical Methods for Determining Petroleum Products in Soil and Water (currently being finalised).

Facility Vapour Emissions and Air Quality (currently in early stages of development).

Petroleum Storage and Handling at Farms and Small Commercial Sites (to be developed in the future).

Other publications on water quality are listed in Sections 2.4 and 2.5.

2. THE REGULATORY BACKGROUND FOR WATER QUALITY MANAGEMENT

2.1 Chapter Summary

This chapter describes the regulatory background for the management of water quality. Section 2.2 explains the different roles and responsibilities of regional councils and territorial local authorities and describes how the planning process operates under the framework of the Resource Management Act 1991. Section 2.3 lists those provisions of the RM Act which relate specifically to water quality. Sections 2.4 and 2.5 discuss some other important publications dealing with water quality management.

2.2 Plans and Resource Consents

Discharges of water from a site may be:

- to a stream, lake, or other freshwater body;
- to a stormwater system (and, in exceptional circumstances, to sewers);
- to the coastal marine area (harbour, estuary, coast);
- to land (soakage field); or
- to groundwater.

Under the Resource Management Act 1991 (the RM Act), the responsibility for controlling such discharges rests with regional councils, and unitary authorities where they operate as regional councils (Gisborne, Marlborough, and Tasman District Councils, and Nelson City Council). It is essential that the relevant council is consulted as early as possible in planning a new operation, or an extension or upgrade of an existing facility.

The relevant territorial local authority may be responsible for managing discharge permits for stormwater systems under delegated authority from the regional council. Where the territorial local authority manages a sewerage system, connections will need to be authorised by way of a permit from the local authority.

In addition to the RM Act, regional councils generally are in the process of preparing regional resource management plans. Most, if not all, regional councils have prepared transitional regional plans to cover the transition from previous legislation to the RM Act. The regional council should be consulted for proper interpretation of these plans.

It is often advisable to utilise the services of an experienced person or consultant to prepare an application for a resource consent and the supporting “assessment of environmental effects”, where required. Sometimes the consultant or contractor who is responsible for the project has the expertise to do this. The regional council can advise the best course of action. This depends essentially on the complexity of the activity for which a consent is sought.

For most projects involving service stations, the discharge of water will be to a stormwater system via an oil interceptor. This may be a “permitted” activity provided the interceptor meets certain design criteria (for example, those set out in these Guidelines), but the regional

council should be contacted to confirm that this is the case for the project under consideration.

Should a resource consent be required, the process set out below has to be worked through. The potential time required for this process should not be under-estimated. It is very important to consult with neighbours and affected persons well in advance of the date planned for final consent. If there is strong objection from affected persons (neighbours), considerable time delays and expense can be incurred. The issue of a resource consent at the end of this process is not guaranteed. Again, it is essential that the regional council is consulted as soon as possible in planning for the project.

Stage 1 - Scoping. Do you need a discharge permit and do you comply with the Resource Management Act?

Surface water discharges are the responsibility of regional councils (or unitary authorities where a regional council does not exist). The rules governing discharges in the regional plan will have been established according to the requirements of the RM Act. You should:

- Identify the water course or land you are discharging to.
- Ascertain the nature and composition of your surface water discharge, and the degree to which it complies with standards in these Guidelines to determine whether the effects are minor.
- Discuss the proposal with the regional council and/or your professional advisers to determine the quality of the receiving water that the regional council is seeking to achieve through the relevant discharge rules and to establish whether a resource consent is required. If you are discharging into the coastal marine area different rules may apply.

If a consent is required:

- Obtain the relevant plans/rules on water discharges from the regional council.
- Determine whether a controlled or discretionary consent is required for the discharge.
- Determine whether there are other consents which you may need to apply for at the same time.
- Determine whom you may need to consult with prior to preparation of your application, e.g., affected parties, iwi, and the Department of Conservation for coastal discharges.

Stage 2. Preparation

The basic information requirements are set out in section 88 and the 4th Schedule of the RM Act. Before drafting your application, consult with the regional council on the extent of any additional information they will require to assess the application, including any specific requirements in their plan. The extent of information provided should match the nature of the discharge and its potential effect on the environment. If you comply with these Guidelines,

depending on the receiving environment, the extent of additional information may be minimal. However, as a council can ask for further information and delay processing the application, early quality consultation with all parties is recommended.

What information should you provide with your application?

- A description of the nature and composition of the discharge, the sensitivity of the receiving water to adverse effects, and what other alternative methods of discharge there are.
- An assessment of the actual or potential effects of the discharge on the environment; e.g., if the receiving water is used for or is being managed for the gathering or cultivating of shellfish for human consumption, whether the discharge will affect this. The assessment will need to include whether any of the effects outlined in S 70 of the RM Act arise (see section 2.3.4 below).
- Ways in which adverse effects can be mitigated, e.g., the degree to which the discharge complies with these Guidelines and the nature of other on-site environmental management systems
- You may need to include plans showing the discharge points.
- Any other resource consents required. You are generally required to lodge all required applications at the same time.
- Duration of the consent you are seeking (the RM Act provides for up to 35 years) and any conditions you consider appropriate, e.g., self-monitoring for compliance.
- An outline of who the affected parties are and information on whom you have consulted.

Specialists' reports may be required to obtain this information. If so, they should be attached to and form part of the application.

Stage 3. Notification, assessment, and decision

Notification

The need to publicly notify the application may be stated in the rules in the plan. If they do not, and if you comply with these Guidelines and can demonstrate that there are no affected parties or that the affected parties agree with the application, the regional council is likely to determine that the application need not be notified. The decision on whether or not to notify rests with the council.

Hearings

If a hearing is required you will need to support the application with technical information. You will receive a copy of the recommendations of council staff on the application. This may include conditions on any consent granted. You will need to consider this report and address any matters raised at the hearing. This may require evidence from the experts who have written the specialists' reports accompanying your application.

Decision

If the application is granted it may be subject to conditions. Careful examination of the conditions is required to ensure that they are acceptable and can be complied with. If they are not acceptable you can object to them and seek their amendment or deletion. If the council rejects this objection you may need to appeal any unacceptable conditions. Even if the consent and conditions are acceptable to you, any party who has made submissions to the application may appeal the decision.

If the application is declined you will need to appeal the decision. Alternatively, you may need to work with the council to redesign your interception equipment to meet a higher standard or reassess the method you use to discharge water prior to reapplying for consent. Early consultation with the council at the initial scoping stage of the application should avoid this in most instances.

Costs

Councils can charge fees for processing the application (including the costs of any hearing) and monitoring compliance with the terms of the consent. They can also set financial contributions or alternative means of settlement such as riparian planting (in accordance with the rules in the plan) to offset any environmental effects.

2.3 Provisions of the Resource Management Act

This section explains the provisions of the RM Act which relate to water quality. Much of the information provided is in the form of direct quotes from the Act, and these are printed here in *italic type*. Guidance on the interpretation of the RM Act is provided by case law.

2.3.1 Provisions Related to Contaminants

The RM Act imposes specific responsibilities on individuals and bodies corporate designed to protect natural waters. The most notable of these include:

- s.15 (1) *No person may discharge any:*
- (a) *Contaminant or water into water;*
 - (b) *Contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; or*
 - (c) *Contaminant from any industrial or trade premises into air; or*
 - (d) *Contaminant from any industrial or trade premises onto or into land - unless the discharge is expressly allowed by a rule in a regional plan and in any relevant proposed regional plan, a resource consent, or regulations.*

- s.15 (2) *No person may discharge any contaminant into the air, or into or onto land, from -*
- (a) *Any place, or*
 - (b) *Any other source, whether moveable or not -*
in a manner that contravenes a rule in a regional plan or proposed regional plan unless the discharge is expressly allowed by a resource consent, or allowed by Section 20 (certain existing lawful activities allowed).

2.3.2 Provisions Related to Adverse Effects

- s.17 (1) *Every person has a duty to avoid, remedy, or mitigate any adverse effect on the environment arising from an activity carried on by or on behalf of that person, whether or not the activity is in accordance with a rule in a plan, a resource consent, section 10, section 10A, or section 20.*
- (2) *The duty referred to in subsection (1) is not of itself enforceable against any person, and no person is liable to any other person for a breach of that duty.*
- (3) *Notwithstanding subsection (2), an enforcement order or abatement notice may be made or served under Part XII to -*
- (a) *Require a person to cease, or prohibit a person from commencing, anything that, in the opinion of the Environment Court or an enforcement officer, is or is likely to be noxious, dangerous, offensive, or objectionable to such an extent that it has or is likely to have an adverse effect on the environment; or*
 - (b) *Require a person to do something that, in the opinion of the Planning Tribunal or an enforcement officer, is necessary in order to avoid, remedy, or mitigate any actual or likely adverse effect on the environment caused by, or on behalf of, that person.*
- (4) *Subsection (3) is subject to section 319(2) (which specifies when a Planning Tribunal shall not make an enforcement order).*

2.3.3 Functions, Powers, and Duties of Local Authorities

The functions, powers, and duties of local authorities under the RM Act are set out in sections 30-38. Clauses having particular relevance to water quality occur in s.30, which states:

- s.30 *Functions of regional councils under this Act -*
- (1) *Every regional council shall have the following functions for giving effect to this Act in its region:*
- ...
 - (c) *The control of the use of land for the purpose of -*
 - ...
 - (ii) *The maintenance and enhancement of the quality of water in water bodies and coastal water.*
 - ...
 - (d) *In respect of any coastal marine area in the region, the control (in conjunction with the Minister of Conservation) of -*
 - ...
 - (iv) *discharges of contaminants into or onto land, air, or water and discharges of water into water.*

2.3.4 Rules about Discharges

Under the RM Act, regional councils may use various methods to meet water quality objectives. One method is the power to make rules relating to discharges.

- s.70 (1) *Before a regional council includes in a regional plan a rule that allows as a permitted activity -*
- (a) *A discharge of a contaminant or water into water; or*
 - (b) *A discharge of a contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water; -*
the regional council shall be satisfied that none of the following effects are likely to arise in the receiving waters, after reasonable mixing, as a result of the discharge of the contaminant (either by itself or in combination with the same, similar, or other contaminants).
 - (c) *The production of conspicuous oil or grease films, scums or foams, or floatable or suspended materials:*
 - (d) *Any conspicuous change in the colour or visual clarity:*
 - (e) *Any emission of objectionable odour:*
 - (f) *The rendering of fresh water unsuitable for consumption by farm animals:*
 - (g) *Any significant adverse effects on aquatic life.*
- (2) *Before a regional council includes in a regional plan a rule requiring the adoption of the best practicable option to prevent or minimise any actual or likely adverse effect on the environment of any discharge of a contaminant, the regional council shall be satisfied that, having regard to -*
- (a) *The nature of the discharge and the receiving environment; and*
 - (b) *Other alternatives, including a rule requiring the observance of minimum standards of quality of the environment, -*
The inclusion of that rule in the plan is the most efficient and effective means of preventing or minimising those adverse effects on the environment.
- s.107 (1) *Except as provided in subsection (2), a consent authority shall not grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 allowing -*
- (a) *The discharge of a contaminant or water into water; or*
 - (b) *A discharge of a contaminant onto or into land in circumstances which may result in that contaminant (or any other contaminant emanating as a result of natural processes from that contaminant) entering water, -*
if, after reasonable mixing, the contaminant or water discharged (either by itself or in combination with the same, similar or other contaminants or water) is likely to give rise to all or any of the following effects in the receiving waters:
 - (c) *The production of any conspicuous oil or grease films, scums or foams, or floatable or suspended materials:*
 - (d) *Any conspicuous change in the colour or visual clarity:*
 - (e) *Any emission of objectionable odour:*
 - (f) *The rendering of fresh water unsuitable for consumption by farm animals:*
 - (g) *Any significant adverse effects on aquatic life.*
- (2) *A consent authority may grant a discharge permit or a coastal permit to do something that would otherwise contravene section 15 that may allow any of the effects described in subsection (1) if it is satisfied -*

- (a) *That exceptional circumstances justify the granting of the permit; or*
 - (b) *That the discharge is of a temporary nature; or*
 - (c) *That the discharge is associated with necessary maintenance work - and that it is consistent with the purpose of this Act to do so.*
- (3) *In addition to any other conditions imposed under this Act, a discharge permit or coastal permit may include conditions requiring the holder of the permit to undertake such works in such stages throughout the term of the permit as will ensure that upon the expiry of the permit the holder can meet the requirements of subsection (1) and of any relevant regional rules.*

2.3.5 Rules Relating to Water Quality

- s.69 (1) *Where a regional council -*
- (a) *Provides in a plan that certain waters are to be managed for any purpose described in respect of any of the classes specified in the Third Schedule; and*
 - (b) *Includes rules in the plan about the quality of water in those waters, - the rules shall require the observance of the standards specified in that Schedule in respect of the appropriate class or classes unless, in the council's opinion, those standards are not adequate or appropriate in respect of those waters in which case the rules may state standards that are more stringent or specific.*
- (2) *Where a regional council provides in a plan that certain waters are to be managed for any purpose for which the classes specified in the Third Schedule are not adequate or appropriate, the council may state in the plan new classes and standards about the quality of water in those waters.*
- (3) *Subject to the need to allow for reasonable mixing of a discharged contaminant or water, a regional council shall not set standards in a plan which result, or may result, in a reduction of the quality of the water in any waters at the time of the public notification of the proposed plan unless it is consistent with the purpose of this Act to do so.*

2.4 The ANZECC Water Quality Guidelines

The ANZECC *Australian Water Quality Guidelines for Fresh and Marine Waters*, although not adopted in New Zealand, establish desirable water quality for a number of environments, namely aquatic ecosystems, recreational water, water for drinking, agricultural water and industrial water (for use in boilers, cooling systems, etc.).

2.5 Other Water Quality Guidelines

The Ministry for the Environment has developed the following guidelines for receiving water quality management.

Water Quality Guidelines No. 1, June 1992. (Guidelines for the Control of Undesirable Biological Growths in Water).

Water Quality Guidelines No. 2, June 1994. (Guidelines for the Management of Water Colour and Clarity).

Resource Management Ideas: No. 10. (A discussion of reasonable mixing in water quality management).

A Methodology for Deriving Aquatic Guideline Values for Toxic Contaminants.

PART B

BEST MANAGEMENT PRACTICES

3. RETAIL SERVICE STATIONS

3.1 Chapter Summary

This chapter discusses the drainage systems needed for dealing with water discharges from retail service stations. Section 3.2 specifies basic system design requirements, and section 3.3 discusses the different types of drainage systems that are needed. Figure 3.1 shows the drainage systems in graphical form. Further information on best practice in service station forecourt management is given in Appendix 3, and a detailed site plan for a service station is given in Appendix 8.

For requirements common to all classes of site, see Chapters 7-9.

3.2 Categories of Site Usage

Drainage systems within a site fall into the four basic categories described below. (See also Figure 3.1.)

Category 1 - drainage systems are dedicated to the capture and disposal of stormwater from the following areas where the presence of oil contaminants is unlikely to occur

- (i) Roofed areas.
- (ii) Paved open areas within the site which are utilised for vehicle movement, driveways, and parking areas should be graded so that runoff discharges into stormwater collector sumps before subsequently draining into a dedicated stormwater system.
- (iii) Unpaved areas (i.e., metallised or grassed areas) should be graded such that runoff discharges into underground drains or gutters, soakage areas, or natural water courses as approved by the local authority. The discharges should pass through appropriate stormwater collector sumps before entering the drainage system.

Stormwater runoff from all Category 1 areas should be discharged directly to dedicated stormwater drains and should be segregated from site drainage which services oil-contaminated areas.

Category 2 - drainage systems are dedicated to the capture of stormwater (and wash water, if permitted by a resource consent) which contains oil contaminants generated from forecourts, etc. and which requires appropriate treatment prior to disposal to stormwater drains or sewers. Such water is likely to come from two main areas.

- i) Paved forecourt areas beneath the canopy, where vehicle refuelling takes place, tanks are filled (at some sites), and waste oil containers are stored; together with areas immediately beyond the canopy “footprint” which lead to the same drainage system. Drainage from paved forecourt areas should be directed by appropriate surface grading into grated sumps, gutters, and/or grated drains leading to drainage systems or treatment devices dedicated only to rainwater runoff, which finally discharge into stormwater drains, soakage trenches, or natural water courses as approved by local authorities.
- (ii) Slabs surrounding remote fill points for UST’s. (where present). Drainage from

hardstanding areas immediately surrounding filling points for underground storage tanks should be directed by appropriate surface grading into grated sumps, gutters, and/or grated drains leading to drainage systems or treatment devices dedicated only to rainwater runoff, which finally discharge into stormwater drain or sewer systems, soakage trenches, or natural water courses as approved by local authorities.

Category 3 - drainage systems are dedicated to the capture of wastes from car washes or toilets, ablutions, and kitchens and similar wastes for disposal direct to sewers or, where no sewer exists, at the direction of the local authority

Special designs and conditions apply to the drainage systems for car wash areas (automatic or manual). Each is considered as a specific case having regard to effluent generation, effluent segregation, output quality, treatment required, and disposal. The question of whether to discharge or recycle car wash effluent should be evaluated in consultation with the network utility operator.

In **sewered areas**, systems should be initially discussed with local network utility operators to confirm the acceptability of the effluent or if pre-treatment is required before effluent finally discharges to the network utility operators' systems. Consents will be required for industrial "trade" discharges to sewers.

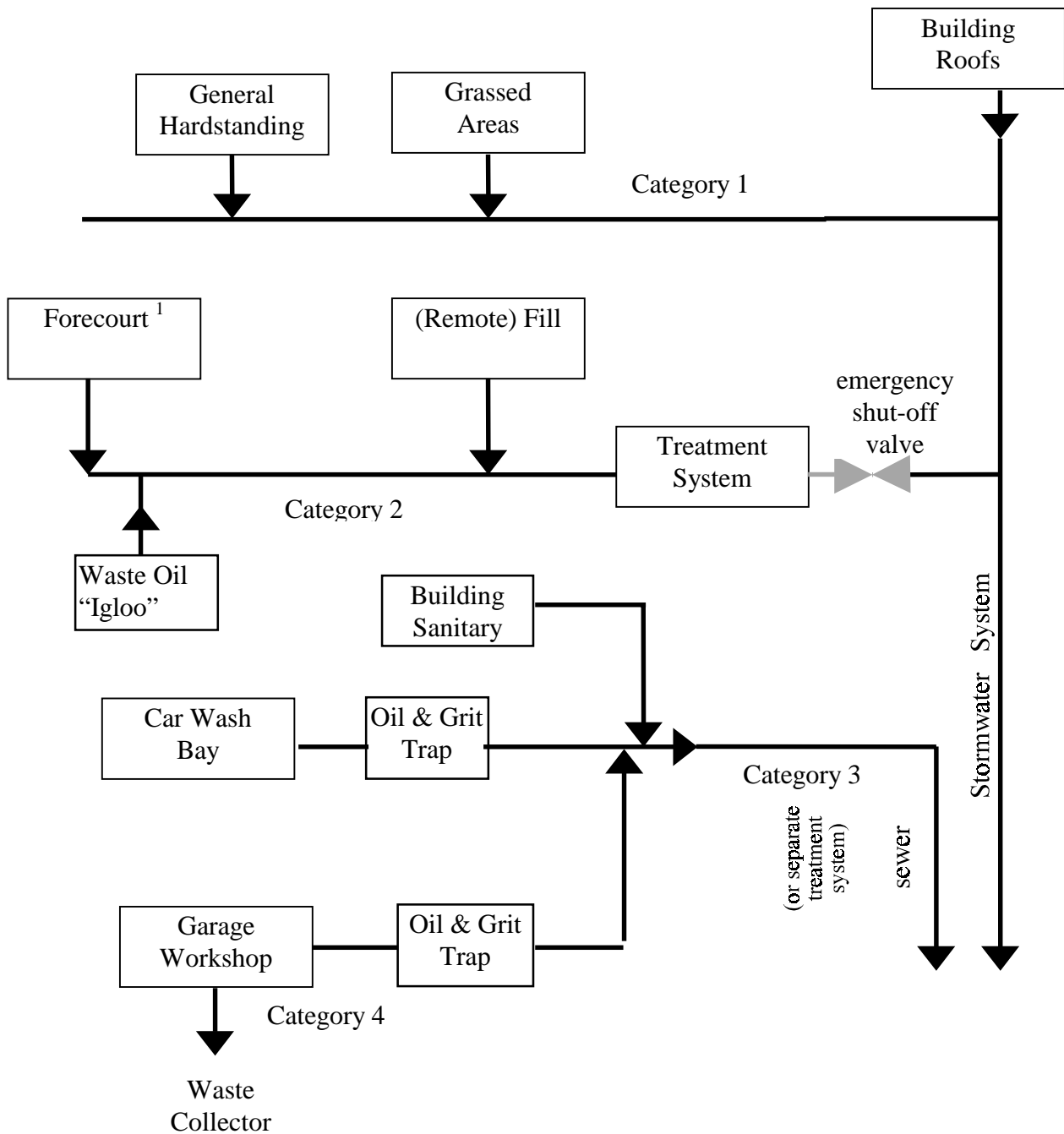
In **unsewered areas**, systems should be initially reviewed with local authorities to determine disposal options.

Category 4 - drainage systems are dedicated to the capture of washings and waste from workshops. All internal floor areas should be graded into floor sumps with silt collectors leading via dedicated drains to an effective effluent collection and treatment device before final discharge to systems as directed by local authorities and/or network utility operators

Changes in grade at the entrances to such work areas should be such as to prevent external surface water entering workshop drainage and vice versa.

Hazardous waste for off-site disposal must be collected by an approved waste management contractor (see Definitions) and transported in accordance with NZ5433:1988 "Code of Practice for the Transport of Hazardous Substances on Land".

Figure 3.1. A typical flow diagram for surface waters reticulated from a retail service station site.



Notes

1. Forecourt stormwater runoff is acceptable as a Category 2 discharge; but forecourt washings should be directed to sewer or collected for disposal if they are not permitted by a discharge consent.

4. TRUCK STOPS

4.1 Chapter Summary

This chapter discusses the drainage systems needed for dealing with water discharges from truck stops. Section 4.2 specifies basic system design requirements, and section 4.3 discusses the different types of drainage systems that are needed. Figure 4.1 shows the drainage systems in graphical form. A detailed site plan for a truck stop is given in Appendix 8. The overall approach for handling surface water runoff from truck stops is similar to that for retail service stations.

For requirements common to all classes of site, see Chapters 7-9.

4.2 Categories of Site Usage

Drainage systems within a site fall into two basic categories, as follows:

Category 1 - drainage systems are dedicated to the capture and disposal of stormwater from areas where the presence of oil contaminants is unlikely to occur. These include:

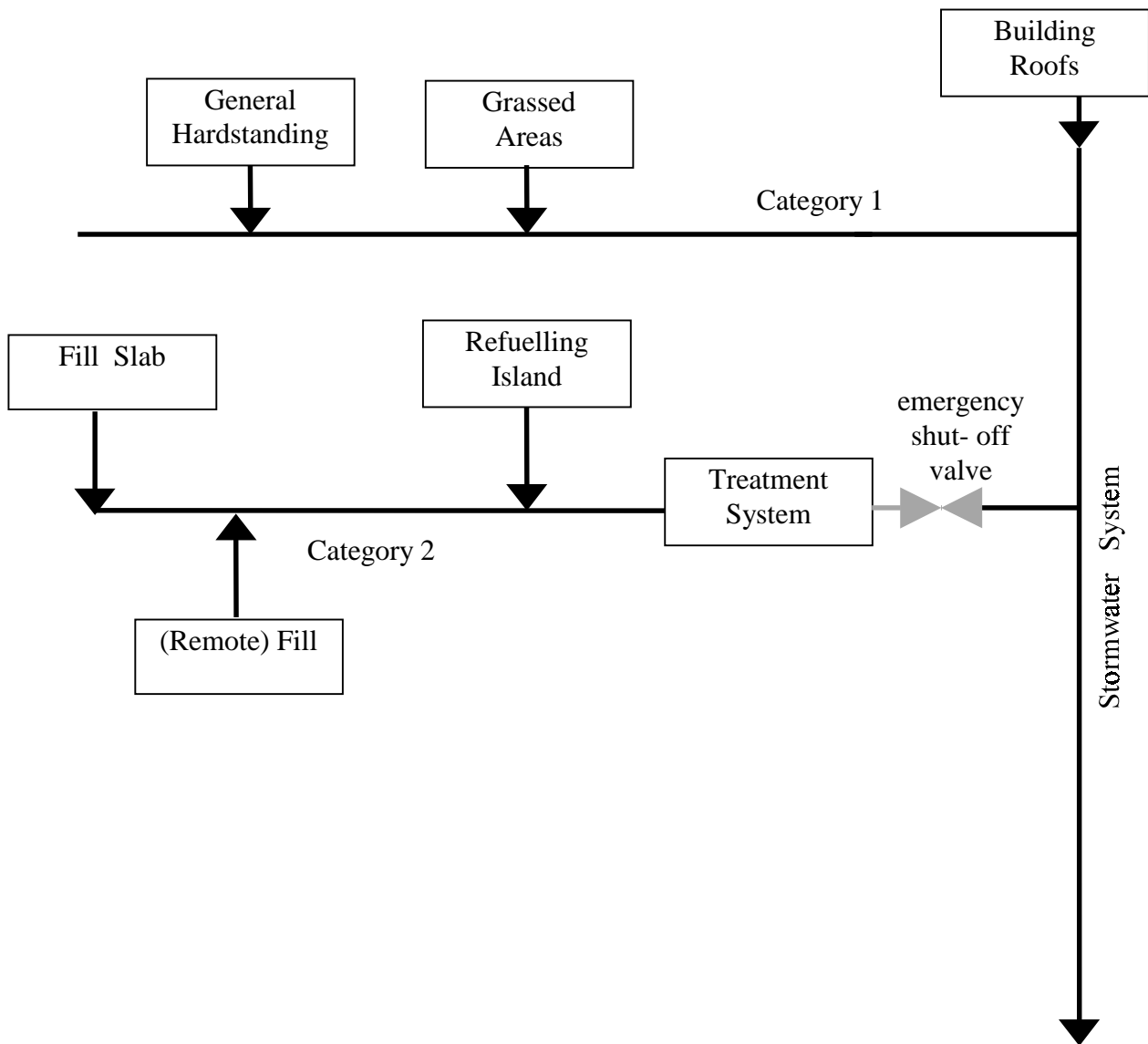
- (i) Roofed areas.
- (ii) Paved open areas within the site which are utilised for vehicle movement, driveways, and parking areas should be graded so that runoff discharges into stormwater collector sumps before subsequently draining into a dedicated stormwater system.
- (iii) Unpaved areas (metalled or grassed areas) should be graded so that runoff discharges into underground drains or gutters, soakage areas, or natural water courses as approved by the local authority. Discharges should pass through appropriate stormwater collector sumps before entering the drainage system.

Stormwater runoff from all Category 1 areas should be discharged directly to dedicated stormwater drains and should be segregated from site drainage which services oil-contaminated areas.

Category 2 - drainage systems are dedicated to the capture of wash water and stormwater which contains oil contaminants from refuelling areas and which requires appropriate treatment prior to disposal to stormwater drains or to sewers.

Drainage from paved areas should be directed by appropriate surface grading into grated sumps, gutters, and/or grated drains leading to drainage systems or treatment devices dedicated only to rainwater runoff, which finally discharge into stormwater drains, sewers, soakage trenches, or natural water courses as approved by local authorities.

Figure 4.1. A typical flow diagram for surface waters reticulated from a truck stop site.



5. TERMINALS AND DEPOTS

5.1 Chapter Summary

This chapter discusses the drainage systems needed for dealing with water discharges from terminals and depots. Section 5.2 specifies basic system design requirements, and section 5.3 discusses the different types of drainage systems that are needed. Figure 5.1 shows the drainage systems in graphical form. A detailed site plan for a bulk storage site is given in Appendix 8.

For requirements common to all classes of site, see Chapters 7-9.

5.2 Use of Areas

Drainage systems within a bulk storage site may consist of some or all of the following elements:

Category 1A - drainage systems are dedicated to the capture and disposal of stormwater from areas where the presence of oil contaminants is unlikely to occur.

Category 1B - drainage systems are dedicated to the capture of operational water. This is typically of similar quality to stormwater, but may or may not require treatment. The definition of operational water includes:

- (i) The release of fire system water under test conditions or during an incident
- (ii) New storage system hydrotest water
- (iii) Older storage system hydrotest water
- (iv) Water released from tank bottoms
- (v) Stormwater from compounds and truck parks.

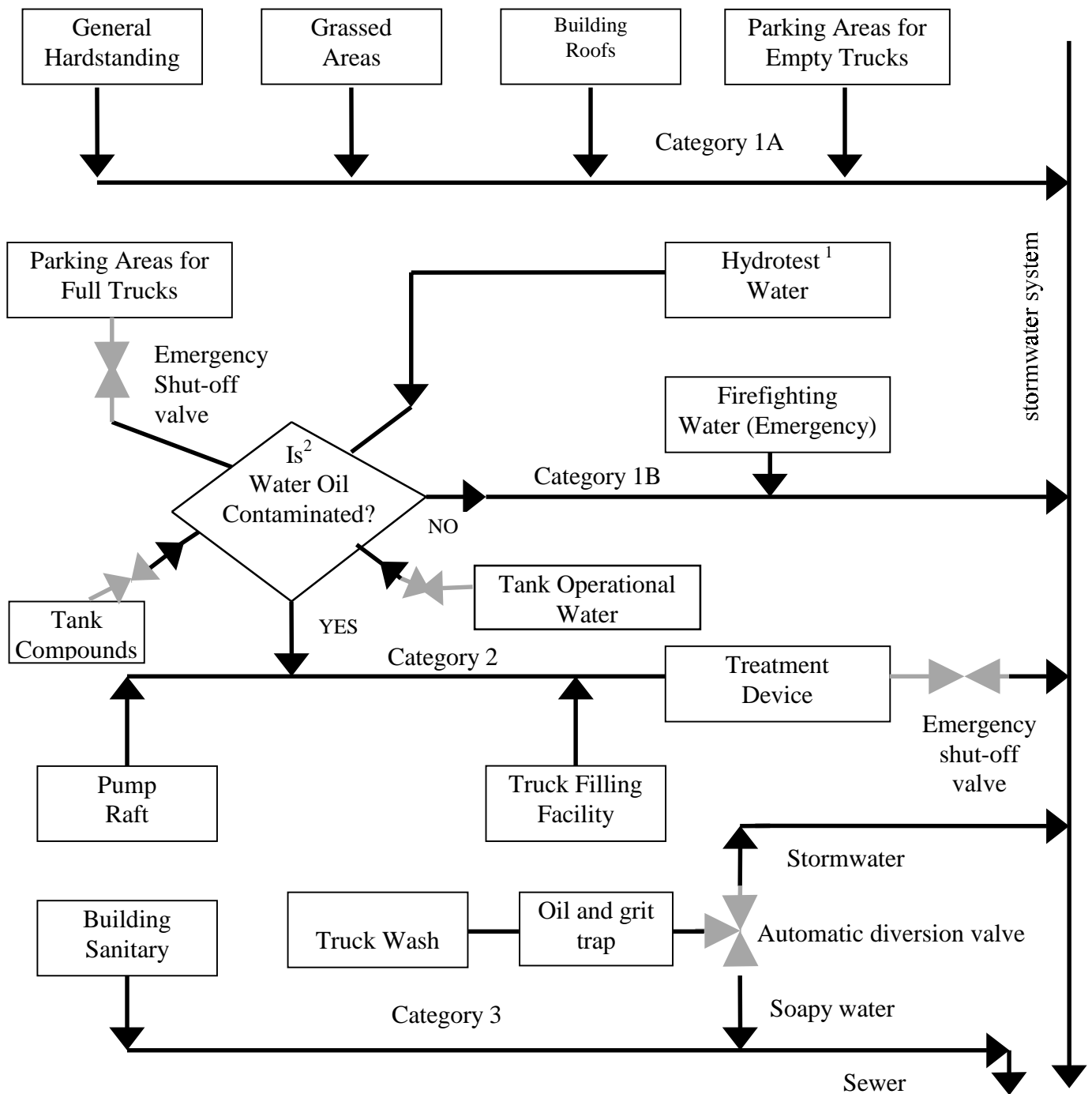
If these discharges are shown to contain negligible quantities of hydrocarbons, they may be discharged to stormwater drains; if not, they should be directed to a suitable treatment device (see Figure 5.1).

Category 2 - drainage systems are dedicated to the capture of operational water, wash water and stormwater which may contain oil contaminants, and which requires treatment prior to disposal to stormwater drains. Such water may be:

- (i) From pump rafts and filling transfer facilities
- (ii) Contaminated category 1 water

Category 3 drainage systems are dedicated to capture of waste from truck washes or toilets, ablutions, and kitchens and similar wastes for disposal direct to sewer.

Figure 5.1. A typical flow diagram for surface waters reticulated from a bulk storage site.



Notes

1. Release of hydrotest water and tank operational water may be to stormwater drains if permitted by a discharge consent.
2. Hydrotest water and tank operational water may require testing before it may be released.

6. LUBRICATING OIL AND GREASE MANUFACTURING PLANTS

6.1 Chapter Summary

This chapter discusses the drainage systems needed for dealing with water discharges from manufacturing plant sites. Section 6.2 specifies basic system design requirements, and section 6.3 discusses the different types of drainage systems that are needed. Figure 6.1 shows the drainage systems in graphical form. A detailed site plan for a manufacturing plant site is given in Appendix 8.

For requirements common to all classes of site, see Chapters 7-9.

6.2 Use of Areas

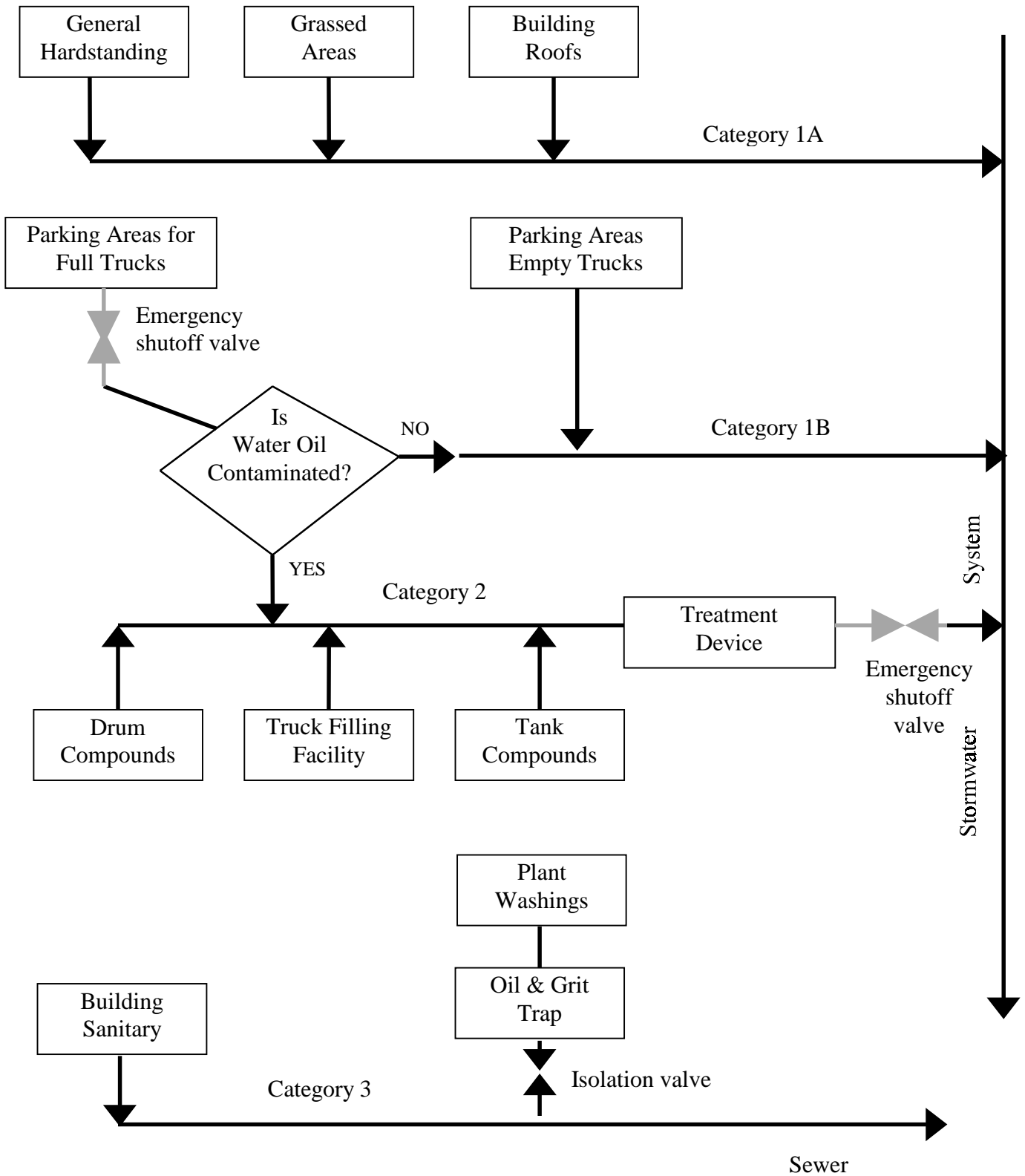
Drainage systems within a site consist of the following areas:

Category 1 (1A and 1B) - drainage systems are dedicated to the capture and disposal of stormwater from areas where the presence of oil contaminants is unlikely to occur.

Category 2 - drainage systems are dedicated to the capture of operational water, wash water, and stormwater which may contain oil contaminants and which requires treatment prior to disposal to stormwater drains.

Category 3 - drainage systems are dedicated to the capture of waste from toilets, ablutions, and kitchens and similar wastes, and plant washings which may have contaminants such as detergents or other cleansing agents.

Figure 6.1. A typical flow diagram for surface waters reticulated from a manufacturing plant site.



7. DESIGN REQUIREMENTS

7.1 Chapter Summary

This chapter deals with the design of water treatment systems for all the generic classes of sites discussed in Chapters 3-6. Section 7.2 discusses how to estimate the total capacity needed in such systems, which depends on flow conditions. Sections 7.3 and 7.4 deal with containment systems, and section 7.5 discusses different types of treatment devices.

7.2 Flow Conditions

Treatment systems for oil-contaminated water should have sufficient capacity to treat 90-95% of stormwater runoff from the potentially contaminated catchment areas on a long-term basis. A design flow rate to achieve this objective is dependent on rainfall intensity which varies throughout the country. Appendix 4.1 gives rainfall statistics and the corresponding design rainfall intensities at various locations.

Additional provisions to consider are: (i) a downstream flow-control device such as an orifice plate which will restrict the flow rate and thereby restrict the effluent contaminant concentration; and (ii) a downstream overflow weir to ensure that separated oil does not discharge over the sides of the oil/water separator during extreme storm events such as the 10-year-return-period storm events shown by isohyets in Appendix 4.2 (extracted from the New Zealand Building Code Handbook). Examples of how to configure flow-control devices may be found in Appendix 4.3.

Furthermore, provision should be made for the collection and treatment of “washdown” water. This may or may not be combined with the stormwater, depending on local requirements and the nature of the effluent.

7.2.1 Non-bunded Areas

For non-bunded sites, grades and levels should enable separation of potentially oil-contaminated areas from the remainder of the site.

For potentially contaminated catchment areas, the design discharge Q is determined by the greater of the two values below:

(i) $Q = C.i.A$, as a consequence of a storm event

where $C =$ runoff coefficient (0.9 to 1.0 for impermeable surfaces)
 $i =$ rainfall intensity (see Appendix 4)
 $A =$ catchment area

For service station canopies, it is assumed that rain falls on a one metre strip beneath the longest side of the canopy together with areas immediately beyond the canopy “footprint” which drain to the under-canopy drainage system.

(ii) where a consent or by-law allows discharge of washdown water, $Q =$ the discharge from the washdown hose (typically 20-30 litres per minute).

Other conditions relevant to the design of interceptors are:

- Water temperature: take average winter conditions.
- Contaminant density (specific gravity): use the highest density value for the principal products stored at the site. Average densities are: diesel, 0.85 kg/litre; kerosene, 0.79 kg/litre; gasoline: 0.75 kg/litre.
- Minimum diameter of globule to ensure nominal 98% capture of entrained petroleum products.

Oil-contaminated water discharges typically contain a wide range of oil globule diameters, and effluent quality can be managed by designing systems to capture the larger globules. The API nominates 150 micrometres, which is supported by oil industry monitoring and other historical data in Appendix 2 (the low incidence of spillage would suggest that rarely will devices be required to perform to their ability). However, greater assurance of water quality can be given if a 60 micrometre minimum globule size is targeted for capture.

7.2.2 Bunded Areas

For bunded or controlled areas, the system should be capable of removing contaminants at the maximum discharge rate resulting from the release of impounded water (e.g., water which accumulates over a weekend).

7.3 Spill Retention Provision - Truck Stops and Service Stations

A statistical review of past spill events demonstrates that the following containment volumes will ensure containment of 99.9% of historical spills. Spills outside these parameters will be managed according to an appropriate site-specific contingency plan (see Chapter 8).

- (i) Retail service station: 2500 litres
- (ii) Truck stop: 2500 litres

The selection of the above spill containment volumes is supported by oil industry spillage records from 1992-1995 and to some extent by a risk assessment study commissioned by Caltex and undertaken by Woodward-Clyde. These are summarised in Appendices 1 and 2.

7.4 Spill Retention Provision - Terminals, Depots, and Manufacturing Plants

Containment of spills within the tank farm bunded area is addressed in the AGCS guideline, referred to in Sections 1.4 and 5.2 of these Guidelines. Areas outside the AGCS system should have enough capacity to contain the largest single storage unit, e.g., the largest compartment on a road tanker, which is nominally 8000 litres, or 30,000 litres for non-compartmented or manifolded vehicles such as aviation tankers.

7.5 Treatment Devices

7.5.1 Devices for the Capture of Oil Contaminants (and Suspended Solids)

Treatment devices which use the gravity separation principle to remove oil from water are the most practicable option to achieve the desired discharge quality outcome of section 8.2. Several different types are currently recommended, and they include:

- corrugated-plate separators (CPIs)
- American Petroleum Institute Separators (APIs) - single channel only
- or equivalent new technologies such as vertical gravity separators (VGSs).

Such treatment devices should normally be designed using the methodologies in Appendix 6.

The performance of triple-interceptor-trap separators (TITs) has often been effective in the past, but because their performance cannot be guaranteed to the level of the other options listed above, they should not be used for new installations, unless their effectiveness is proven to the regulatory authorities. Proof will require a simulated 2500 litre spill to coincide with the Guideline Design Storm and compliance with the discharge water quality of 15 mg/litre TPH (section 8.2).

Devices such as hydrocyclones, which remove oil from water by centrifugal action rather than by gravity separation, are also an effective option for water treatment but are not considered in these Guidelines.

The use of grassed swales, reed beds, etc. should be considered to provide treatment of discharges where appropriate, e.g., for general stormwater.

7.5.2 Protection from Other Contaminants

Where hardstanding areas are cleaned by methods other than those listed in section 8.3, either the resulting effluent should be recovered or change-over valves or systems should be provided to enable surfactants to be diverted to sewers. Typical change-over equipment is shown in Appendix 7 (courtesy of Christchurch City Council).

Consumable items such as those available from service stations (a typical inventory is shown in Appendix 1.2) need not be considered in the design of treatment devices, but accidental release of these products must be mitigated as described in Appendix 1.2.

Additional treatment devices such as those used to enable wash water to be recycled are outside the scope of these Guidelines.

7.5.3 Underground Drains

All underground drains should be designed to local authority requirements, and should be of sufficient capacity to discharge the design storms laid down by the Building Act New Zealand standards [refer to B.A.N.Z. isohyets located in Appendix 4.2] or, alternatively, storms

nominated by the local authority. Drains, including any elastomeric joints, for oil-contaminated systems should be resistant to hydrocarbons and fuel aromatics.

7.5.4 Sampling Points

Accessible effluent sampling points and discharge outlets should be provided for all new sites and for sites undergoing significant redevelopment.

7.5.5 Storm Flow By-Passes

By-passes are sometimes installed at depots to enable release of large volumes of stormwater. Their use is not normally required at retail or truck stop sites because the capacity of the separator is sufficient to absorb the extreme storm event (see Appendices 4 and 6).

If by-passes are installed, they need to be carefully designed to ensure that they do not cause other problems such as releasing large quantities of oil products following a spill event. They must also be maintained to ensure that they continue to function as intended.

7.5.6 As-Built Plans

A set of as-built plans showing the location of the discharge point and oil separator and the layout of the stormwater system showing all access points on the site should be made available, where requested, to the appropriate authority within three months of the completion of the stormwater system.

8. MANAGEMENT OF SYSTEMS

8.1 Chapter Summary

This chapter deals with the day-to-day management of water treatment systems. Section 8.2 sets out the goals of such systems. Section 8.3 deals with the impact of site cleaning on the water treatment systems. Section 8.4 deals with risk mitigation. Sections 8.5 and 8.6 discuss maintenance and inspection of water treatment systems, and Section 8.7 deals with operating procedures. Section 8.8 briefly discusses other potential contaminants.

8.2 Discharge Water Quality

The basic goal of site water treatment systems is the protection of the environment. When evaluating the effects of discharges on the environment it is necessary to consult widely to gain an understanding of, and consensus on, the environmental objectives to be achieved. It is through this process and the informal hearing process that agreed, often staged improvements can be determined. If the matter cannot be resolved by this means, a formal hearing may be required to achieve a decision.

In order to minimise the impact of discharges on the environment it is important to assess their impacts on the receiving waters and to take steps to avoid any adverse effects. In practice this is done by setting water quality targets.

In order to comply with the provisions of the RM Act and preserve receiving water quality, every site manager should endeavour to minimise releases of contaminants to the environment. The point of compliance is usually the point at which the discharger loses control of the effluent. Generally, the maximum levels of contaminants allowable in stormwater systems which discharge into the environment or into reticulated district systems are:

Total petroleum hydrocarbons = 15 mg/litre) averaged over the
Total suspended solids = 100 mg/litre) design storm event

Unless other levels can be justified by either a site-specific or generic assessment of effects.

A separator system which is designed to remove 60 (or 150) micrometre oil globules, and which is appropriately maintained, should remove hydrocarbon product such that total hydrocarbon concentrations in the discharge water, averaged over the design storm event, are significantly less than 15 mg/litre.

However, in setting these limits:

- (a) It is recognised that there will sometimes be periodic excursions under extraordinary storm conditions (see Sections 7.2 and 7.5.4).
- (b) It is the responsibility of site owners and operators to encourage lower levels of contaminant release.

Operating within these limits will ensure minimal adverse toxic effects; and working well within them will generally minimise the period of conspicuous discolouration.

These thresholds are justified on the following bases:

- Monitoring in Auckland by NIWA (see Appendix 2) and internationally (e.g., in California) by the oil industry has demonstrated that discharges from oil industry sites are no worse (and often better) than discharges from the general roads and quick-stop parks but dirtier than discharges from long-term parks.
- The majority of the “contaminated” discharges enter reticulated district systems where they typically contribute only a small percentage of the total load. The oil-contaminated catchments of sites such as service stations and truck stops are particularly small, typically about 100 square metres.
- Modelling work by Woodward-Clyde using PAH as a surrogate for typical “oil” discharges demonstrated that, except for the most sensitive sites, there will be no significant adverse effects on the receiving water, but that discharges to estuarine beaches are generally deposited and often retained there, as for general stormwater deposits. BTEX compounds were not considered to be the critical ones in stormwater discharges because they tend to volatilise before they can do harm. The findings of the Woodward-Clyde study are summarised in Appendix 1.3.

Sites which discharge into environments which are very sensitive to storm discharges should be the subject of individual assessments (or alternatively, generic assessments for sites of that nature).

8.3 Cleaning of Hardstanding Areas

It has been demonstrated (see Appendix 2.5) that degreasers such as PES-51 (distributed by Process Lubricants of Auckland) do not affect the operation of oil-water separators or result in the carry-over of substances that have a significant adverse effect on receiving waters. Dry processes using absorbent materials, vacuum cleaning methods, and methods whereby the effluent is collected for removal off-site are also acceptable. Also refer to Appendix A 3.1.4.

Where receiving waters are very sensitive to wash-down effluents, the potential impact of these effluents can be negated by closing the interceptor outlet valve during cleaning and slowly opening the valve on completion, if releases are allowed for by a discharge permit.

8.4 Risk Mitigation

Each site should have an appropriate response plan to be followed in case of any release of product which should be consistent with the Maritime Safety Act “Tier 1/Category 1” contingency plan requirements. On request, the petroleum marketing companies can provide site owners and operators with details of generic plans which may be used as a basis for the development of site-specific response plans. Appendix 3.2 contains an example of such a generic service station plan.

Should a surface spillage occur on a site, the immediate essential steps, some of which can be taken concurrently, are:

- Stop the release at source
- Contain the release where possible (close the isolating valve, if present)
- Respond to any emergencies
- Report the release to the appropriate authorities and to the owner
- Assess the degree of contamination
- Develop a corrective action plan in conjunction with the appropriate authority and clean up the released product.

The above steps should be included in the contingency plan.

When the immediate problems have been dealt with, the owner and the operator must review all the circumstances leading up to the product release and make any changes needed to avoid a repetition of the incident.

The changes needed may include, but are not limited to:

- Repair or replacement of worn or faulty equipment
- Revision of operating procedures
- Improved staff training
- Improvements to equipment or facilities

Site staff should be trained to respond to accidental product releases.

Sites should be equipped with appropriate recovery equipment such as absorbent pads or booms to enable the contingency plan to be effectively implemented.

8.5 Maintenance of Stormwater Drainage Systems

Drains should be labelled to indicate the function they perform, e.g., stormwater drain, sewer.

Open drains and gratings must be kept clear of any rubbish or debris. Clean as required.

Piped drains may become partially blocked. Watch for local flooding around gratings and entry points. Clean them out if there is evidence that the blockage has caused flooding and clean up any surface slick or staining caused by the flooding event.

Grit traps should be inspected monthly (or as appropriate, based on experience) and cleaned as required.

Oil separators should be inspected weekly and reasonably soon after deliveries and following any spillage of product on the site. Clean them out if there is any significant quantity of product or oily material (more than 3 mm) or sediment (more than 150 mm) in the device.

Other stormwater treatment devices, where installed, must be inspected and cleaned in accordance with a programme of regular maintenance appropriate for the device, and designed to maintain efficient and effective operation.

Overall inspections of the stormwater drainage system must be made by the site occupier at least once every month. Any deficiencies that may affect the proper performance of the system must be noted and promptly remedied.

Detergents, cleaning agents, or other washing methods that will cause a reduction in performance outside the oil separator device design parameters should not be used on a forecourt and other areas draining to oil separators. A washing method using proven, acceptable cleaners that will allow the oil separator to operate to the required standard should be identified in the stormwater management plan for the site.

Maintenance schedules should be listed in consent terms and operating procedures.

8.6 Records of Inspections

The site manager must ensure that a record of maintenance and inspections, i.e., cleaning activities, which notes the date of each inspection, observations made, and any action taken, is maintained on site. Each entry should be signed by the person making the inspection.

The record must be made available to the authority for inspection on request.

8.7 Operating Procedures

Each site should be equipped with operating procedures and mitigation equipment appropriate for that site. Sites should retain evidence that staff and contractors are fully trained in the functions for which they have responsibility. An example of best management practices can be found in Appendix 3.

Fuel card customers using unmanned facilities such as truck stops should be provided with advice on emergency procedures.

Tanker driver attendance is mandatory while underground tanks are being replenished. Under no circumstances are tanks to be filled beyond their licensed capacity. Drivers and staff should be made aware of and trained in the operation of the interceptor emergency shut-off valve, if present, so that they will be able to operate it promptly if necessary in the event of a fuel spillage occurring.

8.8 Other Potential Contaminants of Concern

BOD levels, although they sometimes exceed normally acceptable limits, are not a serious concern because release is generally of short duration and their magnitude is not dissimilar to what is found in general stormwater systems. Makepeace, Smith & Stanley record an international stormwater (total) BOD₅ range of 1.0 to 770 mg/litre and a mean range of 9 to 31 mg/litre.

BTEX compounds are rarely detected in water discharges from oil/water separators, particularly separators designed in accordance with this guideline. This is because spilled gasoline, the source of BTEX, generally volatilises before it reaches the separator, unless the spilled volume is large. The small proportions of BTEX compounds which are discharged to the stormwater systems or surface water bodies disappear quickly as a result of volatilisation

or biodegradation. Reference¹ considers the effects of BTEX compounds to be ‘minor’ which is in contrast to the ‘major’ concern assigned to some PAH’s.

A schedule of other potential contaminants of concern may be found in the petroleum marketing companies’ guideline *Sampling Protocols and Analytical Methods for Determining Petroleum Products in Soil and Water*. Experience from oil industry testing programmes would indicate that other contaminants are of such low concentrations that they do not lead to significant adverse effects in receiving waters. Appendix 2 gives some results from oil industry monitoring studies.

Reference

Makepeace, David K.; Smith, Daniel W. and Stanley, Stephen J. *Urban Stormwater Quality : Summary of Contaminant Data*. Environmental Engineering and Science, Department of Civil Engineering, University of Alberta, Edmonton, Alberta T6G 2G7.

9. MONITORING BY SITE MANAGEMENT

9.1 Chapter Summary

This chapter deals with the monitoring of the performance of water treatment systems. Section 9.2 refers to earlier work on monitoring oil industry sites. Section 9.3 describes self-monitoring, and Section 9.4 deals with monitoring by regional councils. Section 9.5 describes appropriate sampling protocols.

9.2 Results from Previous Oil Industry Monitoring Programmes

The results from some previous industry monitoring programmes are given in Appendix 2. They include the self-monitoring of effluents from oil industry sites undertaken over the years 1991-1995, the results of studies by NIWA of effluent from an oil company site, and the results of an API interceptor spill trial in 1998.

9.3 Continuing Self Monitoring

On-going monitoring of stormwater effluent streams for hydrocarbons and suspended solids, where required, should be undertaken under flow conditions which may be natural, e.g., during storm or other events (such as banded area releases), or induced.

9.3.1 Facilities Designed In Accordance With these Guidelines

Initial monitoring is required to establish performance, and thereafter monitoring is reduced to a minimal level.

9.3.2 Facilities Designed to a Lesser Standard

Initial monitoring is required to establish performance, and then monthly monitoring is required, although this may be reduced to a lower frequency by agreement with the consenting authority, following contamination trend analysis.

9.4 Monitoring by Regional Councils

Regional councils will often monitor the exercise of a consent to determine compliance with conditions and the effect on the environment. In many cases this monitoring is carried out on a routine or regular basis and involves the sampling of a number of sites in the programme to maximise efficiency and spread costs. In situations where there is a history of poor management or non-compliance, the monitoring can become focused on that site. Should this occur, most councils will charge for the full amount for the monitoring carried out and the advantages of scale are lost to that poor performer.

9.5 Sampling Protocol

Monitoring programmes to check for the degree of compliance (self-monitoring) should be of a standard that is acceptable to the regional council. When setting up a monitoring

programme reference should be made to the council before it is initiated. This will avoid duplication and provide consistent data for comparison with any limits set.

9.5.1 General

Samples should typically be taken of a flowing effluent and be collected from the nearest practical point to the outlet of the treatment device. In some situations, especially in older installations, this may not be possible, and samples will have to be taken from inside the treatment device as close as possible to the outlet. Details of sampling and analytical protocols should be discussed and agreed to with the local authority concerned.

9.5.2 Analytical Laboratories

Analyses should be carried out by laboratories which are Telarc-registered (or have been externally audited for compliance with ISO Technical Guideline 25) for the contaminant analyses proposed.

9.5.3 Methods of Analysis

Samples should be analysed for total petroleum hydrocarbons (TPH) and total suspended solids (TSS) in accordance with the relevant method in the petroleum marketing companies' guideline *Sampling Protocols and Analytical Methods for Determining Petroleum Products in Soil and Water*.