Contingency Plans - a guide for wastewater producers and wastewater treatment plant operators

Updated April 2017*

EPA 696/17: This guideline has been provided to help licensees (specifically medium to large-scale operators) draft Contingency Plans that meet the standard acceptable to the Environment Protection Authority.

Introduction

Wastewater is hazardous to the environment, especially to inland, marine and ground waters. Therefore it needs to be carefully controlled, stored and distributed by industrial or agricultural wastewater producers and wastewater treatment plant operators. Contingency Plans (CP) are an important tool for responsible wastewater management.

A CP is defined as a plan of action to be taken in the event of foreseeable emergencies that may involve the risk of serious or material environmental harm.

CPs help prevent and manage incidents that could result in environmental impacts, such as:

- environmental harm, eg soil contamination, surface or groundwater pollution
- environmental nuisance, eg excessive odour, noise, dust or smoke
- unacceptable risk to public health.

CPs provide clear guidance during situations (such as accidental spillages, equipment or plant failure) when things are out of control and often not a good time for decision-making.

The CP may also be aligned with the company's Occupational Health and Safety policies or Emergency Response Procedures.

When is a CP required?

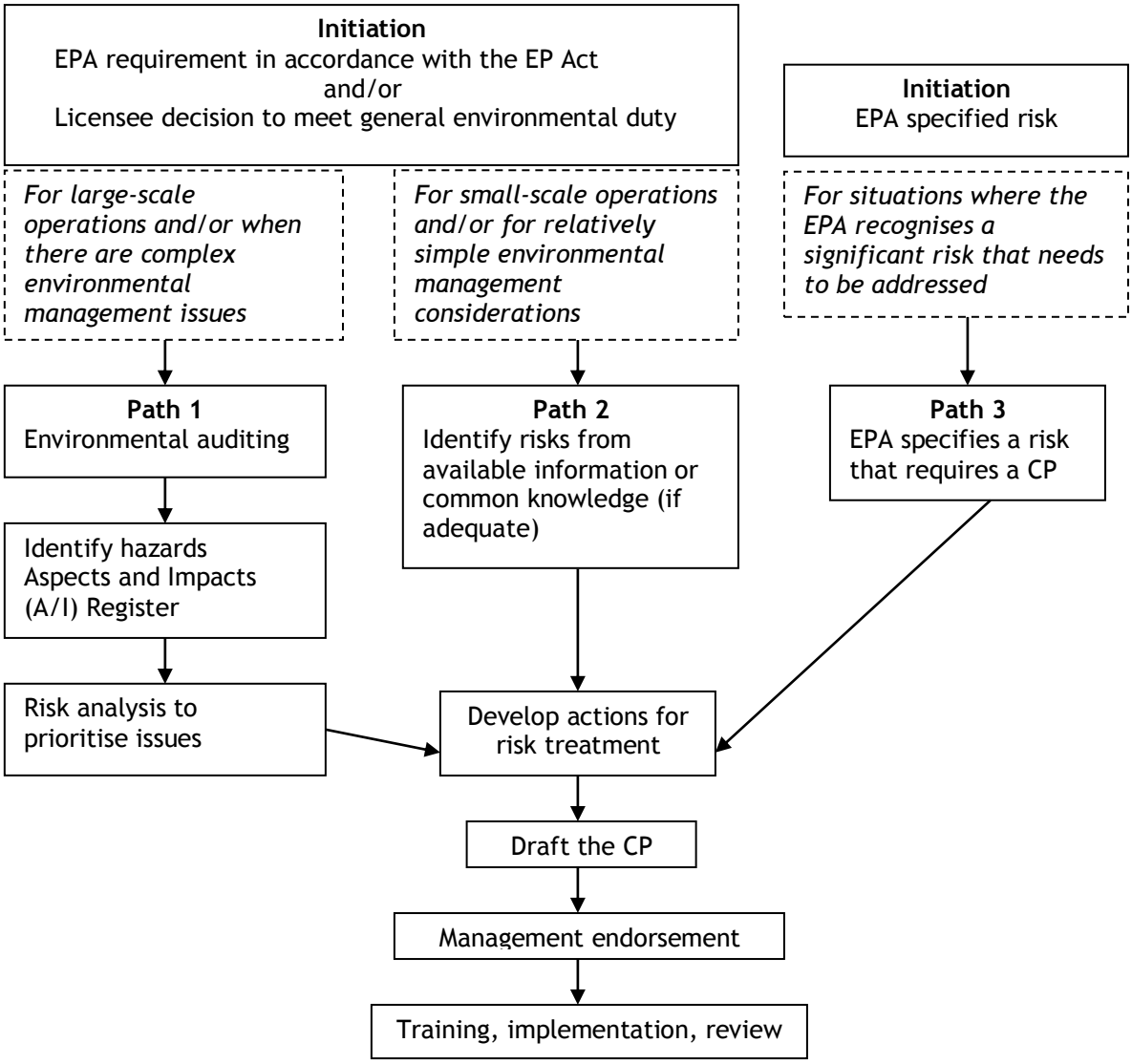
The most effective way to prevent an incident is to eliminate the hazard, however sometimes this option is not possible or is unreasonably expensive. In this case - where the hazard and subsequent risk/s remain - CPs can be used to manage the consequences and minimise the harm caused.

* Updated according to *Environment Protection (Water Quality) Policy 2015.*

There are typically three ways in which most CPs are initiated:

- the Environment Protection Authority (EPA) may require a CP through an environmental authorisation according to Section 53 of the *Environment Protection Act 1993* (the EP Act). A CP would be required particularly if an activity is being undertaken in a sensitive receiving environment such as a river floodplain, near surface water, or in a designated Water Protection or Marine Protected Area, or if the facility operates on such a large scale that an incident would likely cause a high environmental impact
- a licensee may assess the risks at their site and determine that a CP is needed to meet their general environmental duty
- the EPA may require a CP for a specific identified risk.

The figure below describes the most common paths taken in initiating and implementing CPs.



Pathways for developing and implementing a CP

Pathways for developing CPs

General environmental duty

Licensees have a general environmental duty, as outlined in Section 25 of the EP Act:

> A person must not undertake an activity that pollutes, or might pollute, the environment unless the person takes all reasonable and practicable measures to prevent or minimise any resulting environmental harm.

CPs will assist licensees in meeting their general environmental duty and other relevant legislation requirements under the EP Act. However, more importantly, CPs can also support licensees in best management practice; providing tools to assist in environmental management, and demonstrating to stakeholders their commitment to environment protection.

The EPA recommends the development and implementation of a CP as good management practice that will benefit any facility which produces wastewater. Responsible operators should assess their site and processes to determine if they have any hazards that require a CP.

Environmental auditing

Environmental risks may vary with specific site conditions, regional features and operational processes employed in the facility. In complex situations when not all information is available, the EPA recommends an auditing phase[†] in the plan to identify the hazards that have the potential to cause an environmental impact.

However, in straightforward cases or when all the relevant information is available, licensees can commit to a course of action to address the risks right away.

Identification of hazards

During the auditing phase the licensee identifies hazards and gathers the necessary information to enable them to develop an environmental Aspects and Impacts Register (A/I Register) of their activities and products.

An example of an A/I Register used to identify and respond to hazards commonly identified in food processing industries is provided in Appendix 1.

Risk analysis

As soon as the aspects and impacts have been identified, a risk analysis can be used to prioritise risks that require urgent measures, ideally utilising a process that engages operators and staff.

For each aspect and impact, the likelihood of an environmental incident occurring and the level of impact (consequence) is assessed as:

Risk = consequence x likelihood

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[1] Environmental auditing is also a necessary component for Environmental Management Systems (EMS) to be certified to International Standard ISO 14001 standard. See www.iso14000-iso14001-environmental-management.com.

This is done using a Risk Matrix (RM), such as the EPA version shown in Appendix 2. The risk can then be prioritised which will determine the type and urgency of action that is required.

Further information on risk analysis and management can be obtained from the Australian Standard AS 4360:2004 Risk Management.

An example of a simple risk assessment for dredging and earthworks operations is provided in Appendix 3.

Development of actions for risk treatment

Once a high or significant risk is identified, appropriate risk treatment needs to be developed. The recommended hierarchy for risk treatment from highest to lowest is shown below.

- eliminating the hazard, eg replace plant equipment
- reducing the hazard, eg modify plant or equipment, install controls or alarms, build in redundancy or backup systems, engage the services of qualified contractors to manage the system
- blocking the pathway, eg bunding, fencing, provide spill kit
- administrative control, eg update or develop methods or procedures.

Eliminating the hazard is the most effective form of risk treatment, although at times this may require high capital investment. If this is the preferred option, development of an Environment Improvement Program (EIP) may be the most appropriate course of action. Otherwise, a CP utilising the other risk treatment options described above may be the best alternative.

Refer to Appendix 1 for examples of risk treatment actions that might be included in a CP.

In addition to EIP and CP, other possible courses of action include:

- a preventative maintenance program, eg inspection frequency based on run-time hours, pipe thickness testing
- wastewater irrigation management plans and monitoring programs
- training programs, eg staff environmental awareness programs, new employee/contractor site induction.

In complex facilities, such as municipal wastewater treatment plants or large-scale food processing facilities with on-site wastewater management systems, a stepwise plan of action is recommended, shown in Appendix 4.

Drafting the CP

A CP can only be effective if it is clear and concise, specifically addresses all the significant risks, and where the proposed risk treatment actions can be objectively measured or demonstrated. Persons implementing the CP must be able to understand and execute these actions at indicated timelines or when the need arises.

Some guidelines and references that may be useful in the development of a CP are provided in Appendix 5.

Management endorsement

The CP should be approved by company management prior to implementation.

Training, implementation and review

For the CP implementation to be effective, appropriate training will need to be provided to both permanent and contractual staff on the actions to be undertaken in the event of an incident.

Once an incident has occurred, appropriate risk treatment will need to be incorporated in the CP to prevent similar incidents occurring in future. The EPA also recommends testing of risk treatment actions (eg prior to vintage, plant or equipment start-up), where possible to ensure that they are still appropriate to address the risks.

The CP implementation should be incorporated in the company's internal audit process.

The CP must be reviewed and updated:

- regularly (at nominated intervals preferably at least once every three years)
- in response to any alterations to processes and infrastructure that may result in increased risk of environmental harm
- in response to issues identified from process monitoring or testing
- in response to environmental incidents or serious complaints.

Incident notification and emergency communication procedure

The EPA recommends that a procedure for the notification and communication of incidents be included in the CP. This procedure is most effectively presented using a flow diagram and should include:

- the company's internal protocol for reporting an incident to responsible company officers (including main and back-up staff names, titles and phone numbers)
- the protocol (including phone numbers) for reporting to relevant emergency authorities, eg Metropolitan Fire Service (MFS)/Country Fire Service (CFS), Transport SA, Department of Health (DH), EPA, Natural Resources Management (NRM) boards, local councils, etc.

It should be noted that under Section 83 of the EP Act, in case of any incident that may result in material harm or serious environmental harm, a person must, as soon as reasonably practicable after becoming aware of the incident, notify the EPA of the details of the incident. Failure to notify the EPA is an offence.

Environmental incidents must be reported using the EPA hotline 1800 100 833.

When reporting an incident, the EPA will require the following details:

- location of the incident
- time and date of the incident
- nature of the release
- licensee's name
- name and telephone number of contact person.

Other relevant procedures or documents

Implementation of the CP may require other procedures and documents such as:

- incident reporting sheets
- containment, mitigation or remediation procedures
- incident cause investigation procedures
- plant and equipment maintenance sheets
- Material Safety Data Sheets (MSDS).

These documents can be attached to the CP. However, when reports relate to other requirements of EPA Authorisations (eg Irrigation Management Plans, Environmental Monitoring Programs), to minimise unnecessary confusion they can be referenced in the CP if they are relevant to the implementation of the plan, but should not be incorporated into the document.

Currency of these guidelines

These guidelines offer advice to assist in compliance with the general environmental duty and specific environmental policies. They are subject to amendment and people relying on the information should check with the EPA to ensure that it is current at any given time.

Disclaimer

This publication is a guide only and does not necessarily provide adequate information in relation to every situation. This publication seeks to explain your possible obligations in a helpful and accessible way. In doing so, however, some detail may not be captured. It is important, therefore, that you seek information from the EPA itself regarding your possible obligations and, where appropriate, that you seek your own legal advice.

Further information

Legislation

Online legislation is freely available. Copies of legislation are available for purchase from:

Service SA Government Legislation Outlet
Adelaide Service SA Centre
108 North Terrace
Adelaide SA 5000

Telephone: 13 23 24
Facsimile: (08) 8204 1909
Website: shop.service.sa.gov.au
Email: ServiceSAcustomerservice@sa.gov.au

General information

Environment Protection Authority
GPO Box 2607
Adelaide SA 5001

Telephone: (08) 8204 2004
Facsimile: (08) 8124 4670
Freecall: 1800 623 445 (country)
Website: www.epa.sa.gov.au
Email: epainfo@epa.sa.gov.au

Appendix 1 Example of an Aspects and Impacts Register (A/I Register) for food processing industries

This A/I Register provides a limited list of typical hazards in food processing industries with on-site wastewater management systems for the purpose of providing examples. The aspects and impacts listed may not be applicable or may not present major risks to some facilities. Similarly, the risk treatment actions listed in the fifth column are provided as examples and may not present a complete or effective solution under similar situations.

The EPA recommends that an environmental audit be undertaken by each facility to produce a comprehensive list that covers all the activities on site. The major risks requiring actions should be determined using a risk matrix such as shown in Appendix 2.

Aspect	Aspect details	Impact	Risk Analysis	Risk Treatment Action
1 Power failures/interruptions	Power disruption to pump transferring wastewater from sump to irrigation area Power disruption to treatment lagoon aerator	Overflow of wastewater (leading to surface water pollution) Lack of oxygen supply resulting in anaerobic conditions (leading to odour generation)	A risk analysis can be carried out at this point to clarify decisions on risk treatment action (See Appendix 2)	Provision of back-up diesel pump Provision of power generator
2 Floods and storms	Inundation of wastewater storage, treatment and disposal system by floodwaters	Pollution of surface waters		Installation of stormwater diversion systems
3 Accidental damage of tanks by forklifts	Escape or spillage of products to surface water	Pollution of surface or groundwater		Bunding in accordance with *EPA Guidelines—Bunding and spill management*
4 Rupture of product (or wastewater) tanks	Escape or spillage of product (or wastewater) to surface or groundwater	Pollution of surface or groundwater		Bunding in accordance with *EPA Guidelines—Bunding and spill management*

5 Failure of pumps, pipes, valves and fittings	Escape or spillage of product (or wastewater) to surface water Runoff to neighbouring properties	Pollution of surface waters Damage to property		Installation of pressure gauge with electrical interlock system; provision of back-up pump (in case of pump failure)
6 Accidental spillage of hazardous substance during loading, unloading or handling	Escape of hazardous substance to stormwater drains	Pollution of surface waters	A risk analysis can be carried out at this point to clarify decisions on risk treatment action (See Appendix 2)	Provision of spill kits
7 Accidental discharge of hazardous materials into the effluent stream	Release of toxic materials that could inhibit biological wastewater treatment processes Release of toxic materials to wastewater-irrigated crops	Lack of biological activity (leading to odour generation) Damage to crops		Installation of in-line pH or dissolved oxygen probes in wastewater system for detection
8 Accidental spillage of product during loading or unloading	Discharge to stormwater drains	Pollution of surface waters		Bunding in accordance with *EPA Guidelines—Bunding and spill management*
9 Spillage of product to wastewater treatment system	Plant overloading	Odour generation		Provision of back-up aerators
10 Temporary unavailability of trained wastewater treatment plant operators	Inability to troubleshoot leading to reduced plant efficiency or plant shutdown	Odour generation		Training of back-up staff
11 Vandalism	Damage to equipment, tanks	Escape of product (or wastewater) Escape of fumes, gases		Installation of security and control devices (eg video surveillance, locking mechanisms)

Appendix 2 Example of a model for risk assessment

The EPA has developed the Environmental Harm Risk Matrix (see below) for the assessment of the risk of environmental harm. It is based on the definitions of environmental harm from the EP Act, applied within the framework of the Australian Standard AS/NZS 4360:2004 Risk Management. This risk matrix is suitable for use in any situation where the level of risk of environmental harm is to be assessed.

CONSEQUENCE	Daily or more often	Once a week or more often	Once a month or more often	Once a year or more often	Once in ten years or more often	Once in 100 years or more often	Less often than once in 100 years
Level 5 High-level serious environmental harm	A5	B5	C5	D5	E5	F5	G5
Level 4 Serious environmental harm	A4	B4	C4	D4	E4	F4	G4
Level 3 Material environmental harm	A3	B3	C3	D3	E3	F3	G3
Level 2 Environmental nuisance and default non-compliance	A2	B2	C2	D2	E2	F2	G2
Level 1 Minor consequence	A1	B1	C1	D1	E1	F1	G1
	LIKELIHOOD						

EPA Environmental Harm Risk Matrix[3]

How to use the risk matrix

After the environmental hazards at a site have been identified and documented in an A/I Register, they can be assessed using risk analysis. Risk analysis allows hazards to be ranked based on the level of risk, and determines which hazards present a big enough risk to consider risk treatment.

Risk = consequence x likelihood

[3] Chart sourced from *EPA Guidelines—A risk-based approach for regulating authorisation: a guideline for EPA staff* (in production).

The alpha-numeric codes are used to identify and record the location of a risk in the matrix. The red area signifies a risk that the EPA considers as significant enough to require appropriate risk treatment. The EPA calls these 'priority risks'.

Assessment of consequence

Assessing the level of harm, to either human health and well-being or to the natural environment, can be a complex issue. Hazards cause environmental harm in many different ways, at a range of temporal and spatial scales, to a broad range of receptors[4]. There are a large number of combinations of these factors.

These multiple factors mean there is no simple formula for quantifying the degree of harm that can be applied to all situations. However, the *Hazard—Pathway—Receptor* model provides an excellent tool for understanding the likely consequences of a hazard (see *EPA Guidelines: A risk-based approach for regulating authorisation*). Always attempt to estimate consequence first, then the likelihood of that consequence.

The likely consequence level of an impact may be known from past experience when the event has occurred before, or from similar events. Often, it may be necessary to estimate the consequence from knowledge of the system. Research of similar cases may provide useful information.

The consequence ratings in the risk matrix are based on the definitions of environmental harm from the EP Act.

Level 1—Minor consequence

Harm that is below the threshold of environmental nuisance and does not breach the EP Act is categorised as minor.

Level 2—Environmental nuisance and default level for non-compliance

Environmental nuisance is:

- any adverse effect on an amenity value of an area that:
  - is caused by pollution
  - unreasonably interferes with, or is likely to unreasonably interfere with, the enjoyment of the area by persons occupying a place within, or lawfully resorting to, the area.
- any unsightly or offensive condition caused by pollution.

By default, any 'environmental' contravention of the EP Act, or associated Environmental Protection Policies (EPPs) or Regulations, is also categorised at this level. If a breach leads to a higher consequence it will be classified at a higher level but never at a lower level.

Level 3—Material environmental harm

Environmental harm must be treated as material environmental harm if:

- it consists of an environmental nuisance of a high impact or on a wide scale

[4] In this model 'temporal' means duration of impact, 'spatial' means the area likely to be affected and 'receptors' means all things that are impacted upon.

- it involves actual or potential harm to the health or safety of human beings that is not trivial, or other actual or potential environmental harm (not being merely an environmental nuisance) that is not trivial
- it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $5,000.

Level 4—Serious environmental harm

Environmental harm must be treated as serious environmental harm if:

- it involves actual or potential harm to the health or safety of human beings that is of a high impact **or** on a wide scale, or other actual or potential environmental harm (not being merely an environmental nuisance) that is of a high impact **or** on a wide scale
- it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $50,000.

Level 5—High-level serious environmental harm

A high level of serious environmental harm occurs if:

- it involves actual or potential harm to the health or safety of human beings that is of a high impact **and** a wide scale, or other actual or potential environmental harm (not being merely an environmental nuisance) that is of a high impact **and** a wide scale
- it results in actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding $500,000.

Assessment of likelihood

Likelihood is the chance of an environmental impact (consequence) occurring. In the EPA risk matrix, likelihood is expressed as the time period an event is predicted to occur in (eg once a month or once a year).

The level of risk is based on the likelihood of a consequence, not the likelihood of the aspect. This is because the probability of an aspect does not necessarily equal the probability of the environmental consequence (or impact) that can be caused by the aspect. For example:

- A nutrient emission may only cause an algal bloom under certain circumstances, such as when the temperature and hydrology are suitable. Therefore, while nutrient emission may occur every day, the chance of an algal bloom may only be once a year. Furthermore, there may be no chance of a bloom in winter, as the appropriate environmental conditions may only be present in summer.
- The likelihood of a rendering plant emitting odour may be once a week. However, odour emissions may only impact on residents when the wind is blowing in one direction. Therefore, the likelihood of an impact is the probability of the odour emission multiplied by the probability of the wind blowing towards local residents.

In some cases, however, the chance of an aspect will equal the chance of an impact. A spill of winery wastewater into a permanent river, for example, will always deplete oxygen leading to fish kills and the death of other aquatic organisms.

The *Hazard—Pathway—Receptor* model is a useful tool to help consider the likelihood of harm. Thinking about how the hazard impacts on the environment will help determine the relationship between these factors and the conditions under which an aspect will cause harm.

If the likelihood of an aspect is predictable and the relationship between the aspect and the impact is well understood, assessment of likelihood of consequence will be relatively simple.

When aspects are not predictable, or the relationship between an aspect and an impact is not well understood, assessment of the likelihood of a consequence will be more difficult. In these cases, estimating the probability of a risk will require some personal judgment. When assessing likelihood of consequence, base the assessment on factual evidence whenever possible.

Appendix 3 Example of risk analysis for dredging and earthworks operations

Both dredging and earthworks drainage are licensable activities under the EP Act. Both activities involve the use of mechanised machinery in the vicinity of aquatic environments and are required to develop contingency plans under their EPA licence.

Typical Aspect (Cause): Accidental discharge of diesel, petrol, hydraulic liquid due to human or system errors; equipment damage, breakdown or faults

Impact (Effect): Water pollution caused by hydrocarbons that degrade water quality and can harm wildlife and vegetation

Based on EPA experience with these activities:

Likelihood: Once a year or more often

Consequence: Level 2—environmental nuisance or material harm depending on the amount of hydrocarbon lost and the receiving environment

A risk analysis using the EPA Environmental Harm Risk Matrix (Appendix 2) shows that the risk (D2) falls outside the red (shaded) area, indicating that the risk is low. However, as part of best management practice, the EPA recommends the following risk treatment:

- availability of oil spill kit
- availability of help telephone numbers
- availability of stepwise procedures to follow during spill events.

Appendix 4 Example of stepwise action plan applicable to complex or large-scale operations

Example: Break in the recycled water main

Purpose and Scope

This contingency plan describes a course of action to follow if a leak in the recycled water main from *(organisation's name)* Wastewater Treatment Plant (WWTP) is discovered.

The recycled water main provides a chlorinated supply of recycled water to irrigators and *(facility's name)* for toilet flushing, through approximately eight kilometres of reticulation pipework ranging in size from 750 mm diameter at the storage tank down to 150 mm.

A break in the recycled water main could result in the discharge of recycled water into an area of public access or watercourse, and disruption of supply to irrigators. The recycled water is disinfected with chlorine and is potentially harmful to biota in vegetated watercourses. It contains nutrients that could stimulate undesirable algal growths in stormwater systems.

(Maintenance company name) is responsible for maintaining the recycled water pipe network.

References

Occupational Health and Safety

- Safety work instructions

Environmental Incident Reporting

- Contingency Plan Part C

Contacts/notification details

- Contingency Plan Part B for all contacts

Health Alert Reporting

- Contingency Plan Part C

User Qualifications/Training

Only personnel trained in the following shall undertake actions under this plan:

- knowledge of the risks associated with working with recycled water
- knowledge of the setting up road restriction signs (may not be necessary).

Actions Required

The following actions shall be performed and ticked off as completed:

1 Immediate Corrective Actions	
• Process operator shall contact the plant supervisor and plant manager.	☐
• Process operator shall isolate the recycled water supply from the WWTP and the affected part of the system, where possible, using the appropriate valves located within the WWTP.	☐
• Plant supervisor shall notify users whose supply will be cut off (this may be done first depending upon the severity of the break) requesting them to shut down valves to their system(s).	☐
• Plant supervisor shall contact (maintenance company name) services to arrange network isolation and repairs to the main.	☐

2 Actions to Minimise Impacts	
• If the leak is within the WWTP boundary, the plant supervisor or designated deputy shall contain the spill wherever practicable, to prevent runoff into water courses and/or the stormwater drainage system. These actions should not compromise other health, environmental or safety considerations. Infiltration of recycled water into vegetated areas should be maximised in preference to allowing runoff to the stormwater drainage network.	☐
• If the leak is outside the WWTP boundary, the plant supervisor or designated deputy shall instruct (maintenance company name) to arrange containment and clean up of the spill (wherever practicable).	☐
• For leaks within the WWTP boundary, the plant manager shall determine the appropriate method of disposal of contained recycled water following consultation with the EPA.	☐

3 Notification/Reporting Refer to *Part B* for contact details. The plant manager, or designated deputy shall:	
• Contact persons as per Environmental Incident Reporting procedure.	☐
• Contact persons as specified in the Health Alert Reporting procedure if required.	☐
• Complete and send Environmental Incident Report if required.	☐
• Completed and send Health Alert Report if required.	☐

4 Records Documented evidence that the plan was actioned correctly:	
• Completed Contingency Plan Checklist	☐
• Post event debriefing records	☐
• Health Alert/Notification Report if required	☐
• Environmental Incident Report	☐

Details of Incident

Complete as a record of what occurred:

Date Occurred:

Personnel Involved:

General Comments:

Declaration

I certify that the above is an accurate account of what occurred:

_____ _____ _____

Supervisor

Name *Signature* *Date*

Appendix 5 Relevant information

Legislation

National Environment Protection Council Service Corporation 1999, *National Environment Protection (Assessment of Site Contamination) Measure*, NEPC, Adelaide, www.ephc.gov.au/nepc/corp_nepc.html.

South Australian *Environment Protection Act 1993*

South Australian *Occupational Health, Safety & Welfare Act 1986*

South Australian Environment Protection Authority 2003, *Environment Protection (Water Quality) Policy 2015*

Guidelines and references

Australian Standard AS 4360:2004 Risk Management

Department of Health 2009, *Water and Wastewater Incident Notification and Communication Protocol V10*, DOH, Adelaide.

South Australian Environment Protection Authority 2004, *Guidelines for wineries and distilleries,* EPA, Adelaide, viewed 22 May 2009, www.epa.sa.gov.au/pdfs/guide_wineries.pdf.

——2007, *EPA Guidelines—Bunding and spill management,* EPA, Adelaide, viewed 22 May 2009, www.epa.sa.gov.au/pdfs/guide_bunding.pdf.

——2005, *South Australian STEDS Guidance Notes for the preparation of an operation and maintenance manual,* EPA, Adelaide.

——2005, *Code of Practice for industrial, retail and commercial sites* (draft), EPA, Adelaide.

——2009, *Code of Practice for wastewater overflow management (draft)*, EPA, Adelaide.

——2006c, *EPA Guidelines: Regulatory monitoring and testing: Monitoring plan requirements,* EPA, viewed 22 May 2009, www.epa.sa.gov.au/pdfs/guide_mpr.pdf.

——2007, *EPA Guidelines—Environmental regulation using a risk-based approach: a guideline for EPA staff,* EPA, Adelaide.

South Australian Environment Protection Agency & Department of Human Services 1999, *South Australian Reclaimed Water Guidelines*, EPA, Adelaide.