Major Hazard Facility Safety Case Summary
Eastern Treatment Plant

March 2023

VICTORIA State Government

Melbourne Water

Contents

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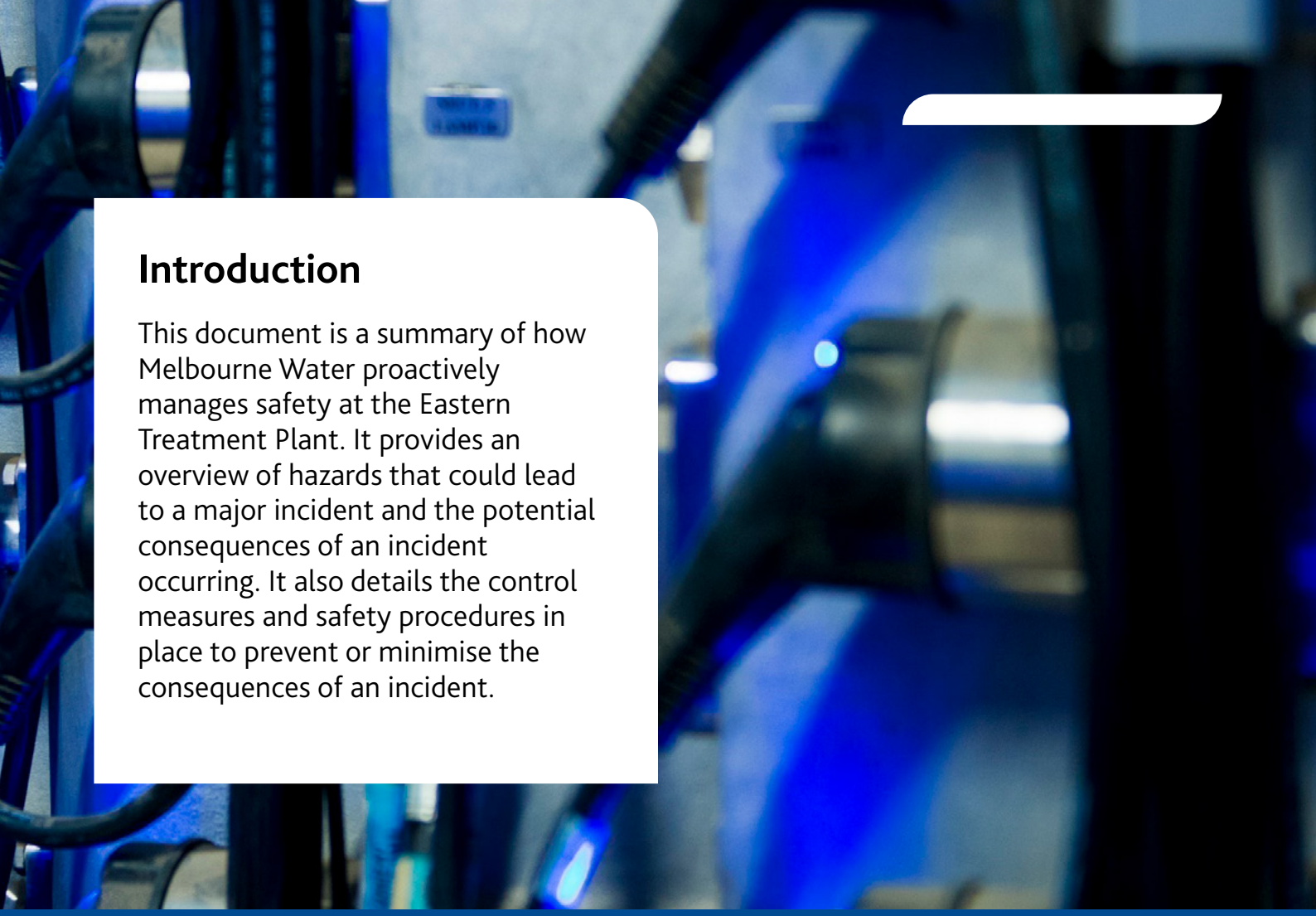


Introduction

This document is a summary of how Melbourne Water proactively manages safety at the Eastern Treatment Plant. It provides an overview of hazards that could lead to a major incident and the potential consequences of an incident occurring. It also details the control measures and safety procedures in place to prevent or minimise the consequences of an incident.

Message from the Eastern Treatment Plant Manager

While Melbourne Water's Eastern Treatment Plant has been licensed as a Major Hazard Facility since 2000, safety has been our priority since operations commenced in 1975.

Our commitment to safety is documented in the Eastern Treatment Plant Safety Case. The Safety Case has been developed in conjunction with our employees and contractors. Together we have worked to identify the hazards and risks associated with sewage treatment at the Eastern Treatment Plant, and implemented the controls needed to efficiently manage those hazards.

This Safety Case Summary has been developed to share information about how we manage safety at the Eastern Treatment Plant. It provides an overview of the hazards that could lead to a major incident and the potential consequences if an incident were to happen. It also details the control measures and safety procedures that we have put in place to prevent or minimise the consequences of an incident.

Melbourne Water is committed to providing a safe operating environment for our people and ensuring the health and safety of the local communities in which we operate.

Mike Smith
Head of Eastern Treatment Plant

About Melbourne Water's Eastern Treatment Plant

The Eastern Treatment Plant is managed by Melbourne Water and is located on Thompson Road in Bangholme. Occupying an area of more than 1100 hectares, the plant treats around 40 per cent of Melbourne's sewage – or more than 350 million litres a day. About 90 per cent of the sewage that flows to the Eastern Treatment Plant comes from homes and business, with the remainder coming from industry. In 2012 the Eastern Treatment Plant underwent a major upgrade and is now treating sewage to an advanced tertiary standard.

This means that the water released back into the environment is a much higher quality. The production of high quality recycled water increases opportunities for reuse.

In addition to treating Melbourne's sewage, Melbourne Water is also responsible for managing water supply catchments, treating and supplying drinking and recycled water and managing the waterways and major drainage systems in the Port Phillip and Westernport region.

Sewage treatment at the Eastern Treatment Plant involves the following steps:

Primary treatment

- Sewage is filtered to remove large objects (such as cotton buds, rags and other rubbish) using fine screens.
- Sewage then flows to primary sedimentation tanks where heavy items sink to the bottom and form sludge. This sludge is pumped to digesters where it is broken down by anaerobic bacteria.

Secondary treatment

- Sewage then flows to aeration tanks where organic matter is further broken down with the help of different types of bacteria.
- Further sedimentation then occurs where more sludge settles to the bottom and secondary treated water is formed. This sludge is also sent to the digesters.
- Treated water then flows to the tertiary treatment process.

Tertiary treatment

A major upgrade of the Eastern Treatment Plant now sees sewage being treated to an advanced tertiary standard.

The first stage of treatment is the addition of ozone to reduce colour and odour and to optimise the rest of the treatment process. Ozone is generated onsite using air as an oxygen source.

Treated water flows through biological media filters to remove remaining oil, grease, foam, and solids, and helpful bacteria break down organic compounds and reduce ammonia. The solids removed during this process are sent to the digestors for processing.

- Ozone is added for a second time for advanced disinfection.
- After this, the treated water is exposed to ultraviolet light for further disinfection.
- Chlorine is added as the third and final disinfection stage. The treated water then enters two large chlorine contact basins and is retained in these basins for at least 30 minutes. Treated water then flows to the outfall pump station where it is discharged to the 56km outfall pipeline and either recycled or released to the environment (Bass Strait).

Treatment examples

Sludge digestion and biosolids management

Sludge that is produced during primary, secondary and tertiary treatment is sent to digesters where it is broken down by bacteria. Once this process is complete, the remaining sludge is pumped to drying pans. Here it is dried and harvested as biosolids awaiting reuse.

Biogas use

Biogas (which contains methane) is produced and captured during the digestion process and is used to generate electric power and heat in the power station to help meet the energy needs of the treatment process.

Major Hazard Facility

A Major Hazard Facility (as defined by the Occupational Health and Safety Regulations 2017) is an industrial site that stores, handles or processes large quantities of hazardous chemicals and dangerous goods including petroleum products. The Eastern Treatment Plant has been classified as a Major Hazard Facility since 2000.

Major Hazard Facilities have to demonstrate their operational safety through a Safety Case developed specifically for their unique operations and situation. This document is a summary of Melbourne Water's Safety Case for the Eastern Treatment Plant.

Major Hazard Facilities are also required to have a Licence to Operate. The Eastern Treatment Plant has been licensed as a Major Hazard Facility since 2002 (shown in Appendix 1). The Safety Case is regularly reviewed by WorkSafe.

Hazardous Materials

The Eastern Treatment Plant has a number of materials onsite that could cause hazards. The following table provides an overview of these materials.

Chlorine is the only material which is above the threshold amount, making the Eastern Treatment Plant a Major Hazard Facility.

Material	Description
Acetylene	Acetylene is stored onsite in very small quantities and is used for oxy-acetylene cutting. Many non-Major Hazard Facility sites store this substance.
Chlorine	Chlorine is a greenish yellow gas at high concentration or an amber liquid when stored under pressure or at low temperatures. It has a pungent and irritating odour and is used in the sewage treatment process to disinfect treated sewage.
Hydrogen	Hydrogen is used to calibrate an instrument called a 'gas chromatograph' that measures the presence of hydrogen in the sludge gas produced by the digester.
Liquefied petroleum gas (LPG)	Like many other industrial sites, LPG is used as a fuel for forklifts.
Natural Gas	Like many households and other businesses, the plant uses natural gas for heating and other purposes. Natural gas is a highly flammable colourless gas. It has a pungent odour. It is used in the plant's power station, outfall pump station hot water heaters and waste gas burners.
Oxygen	Oxygen is a non-irritant and non-toxic gas and is a major component of the tertiary treatment process. Oxygen can make existing fires burn rapidly. Oxygen is used to produce ozone which in turn is used to disinfect sewage.
Ozone	Ozone is a non-flammable oxidising gas and is generated on-site form oxygen feed as supplied by a combination of onsite oxygen generation and liquid oxygen storage. Ozone is a component in the disinfection of water in the tertiary treatment process.
Sludge Gas	Sludge gas is a highly flammable colourless gas, with an earthy odour. It is produced in the digesters as a by-product of the anaerobic solids decomposition process. Sludge gas has very similar properties to natural gas.

Safety Management System

The Eastern Treatment Plant uses Melbourne Water's Safety Management System as the foundation for how it manages health and safety at the site. The Safety Management System forms a large basis of the Safety Case by setting systems and processes to ensure proactive safety management.

The Safety Management System includes: policies, strategic frameworks, guidelines and standards, management procedures, forms and checklists which are available to all employees via the Melbourne Water Intranet.

Safety Assessment

Safety assessments are regularly undertaken at the Eastern Treatment Plant. Safety assessments help to identify potential major incidents, identify the hazards that could lead to a major incident and assess the likelihood and consequences of a major incident taking place.

Safety assessments also identify the control measures needed to eliminate or reduce the risk of a major incident, and in the event of an incident occurring, the controls required to reduce the severity of the consequences. As a result of having undertaken this assessment, Melbourne Water has a detailed understanding of the risks to health and safety associated with major incidents at the Eastern Treatment Plant, and the effective controls in place to manage them.

Hazards and Controls

A hazard is an event that could lead to a major incident, while controls are the systems, procedures and equipment that have been put in place to prevent hazards and major incidents from happening.

Hazards that could lead to a major incident at the Eastern Treatment Plant include:

- mechanical or structural equipment failure causing leaks
- chlorine tanker collision or crash
- loss of containment from maintenance or capital project activities
- an uncontrolled fire or ignition

The controls in place to protect against these hazards include:

- safety relief systems,
- automatic shutdown systems,
- fire and gas detection and control systems,
- routine maintenance program,
- operating and maintenance procedures,
- work permit systems and training.

There are also controls to minimise the consequences of a major incident. These include:

- plant layout
- fire and gas detection and control systems
- locally and remotely monitored 24 hours alarms
- chlorine gas scrubber
- emergency shutdown systems, and
- emergency response and contingency plans.

Control Measures

The Eastern Treatment Plant has more than 300 unique control measures that are fully documented in a control register. The Register also details scheduled maintenance instructions, asset identification numbers, and standard operating procedures. In order to ensure that the controls are operating as they should, Melbourne Water undertakes ongoing performance monitoring, reviewing and testing of each individual control.

Control Measures example

Leak Detection and Emergency Shutdown Systems

There are a number of chlorine, natural/sludge gas and ozone sensors located around the plant. When activated, these sensors automatically stop the supply of chlorine, natural/sludge gas and ozone in the treatment processes, thereby reducing the potential impact of and incident.

These sensors also trigger a number of warning systems (flashing lights and sirens) located around the site to inform people onsite in the unlikely event that a gas leak has occurred. These Emergency Shutdown Systems are regularly tested as part of routine maintenance activities.

Potential Major Incidents

An analysis of the Eastern Treatment Plant indicated that a potential chlorine or ozone leak, whilst having a low probability of off-site impact, are the most likely major hazard incident types.

The potential incidents identified through the safety assessment include:

- an uncontrolled release of chlorine
- an uncontrolled release of oxygen
- an uncontrolled release of ozone
- an uncontrolled release of sludge gas or natural gas
- an internal explosion in the sludge or natural gas system

While a chlorine leak in any state will lead to the formation of toxic chlorine gas, safety assessments show that only the release of corrosive liquid chlorine has the potential for an off-site impact.

The uncontrolled release of toxic ozone would be unlikely to have an off-site impact due to the small storage quantities on site.

The uncontrolled release of sludge, natural gas or oxygen could result in a fire or explosion and would most likely be contained onsite due to the location of these areas within the boundary of the plant. Extensive fire protection systems in operation at the Eastern Treatment Plant will, in most cases, contain fires to the building of origin.

Emergency Response

Melbourne Water ensures that adequate resources (people, equipment and skills) are available at the site, or can be readily obtained, for use in the event of any potential major incident.

The Eastern Treatment Plant has a comprehensive Emergency Response Plan (ERP) that has been developed in conjunction with Fire Rescue Victoria (FRV), Victoria Police, local councils and WorkSafe Victoria.

The ERP is designed to limit the consequences of a major incident by:

- assisting with the evacuation of people from the immediate area of danger
- evacuating people from the site as necessary
- providing information to emergency services (FRV and police) to enable them to respond more effectively
- isolating parts of the facility to reduce the magnitude of a major incident.

An incident resulting in the release of liquid chlorine could result in a toxic chlorine gas cloud which has potential to reach areas beyond the boundary of the plant (extremely low probability); the exact locations would depend on the wind speed and direction. In the unlikely event of a major incident, the FRV together with Victoria Police has responsibility to notify and inform the affected communities.

Public emergency warnings are delivered through a State Control platform that allows for graduating levels depending on the severity and consequences of the given emergency. These warning and advice messages can be issued for any level of event and are not restricted to landline phones and mobile SMS but may appear on the various social media platforms, website pages and distributed to media for immediate radio or TV broadcast.

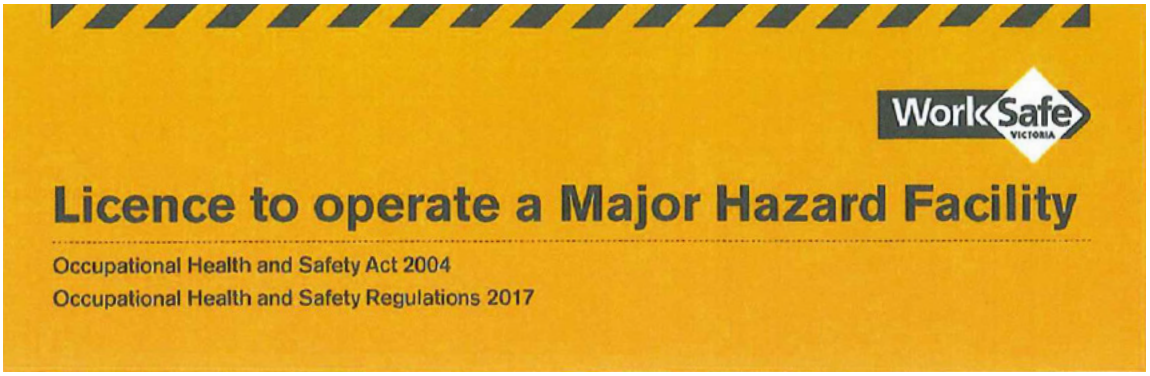
Depending on the event instructions may include shelter-in-place which could include closing doors and windows and turning off air conditioning systems in the event of a major chlorine realise to prevent it from entering properties. If an evacuation is required, the FRV and Victoria Police will notify and coordinate with the local community directly.

There is also the possibility of traffic disruption on Thompson Road, EastLink and/or Mornington Peninsula Freeway during an event as described above. If there is impact on surrounding roadways, Victoria Police will introduce traffic control points as appropriate.

Safety training

Melbourne Water undertakes practical testing of the Emergency Response Plan (ERP) with the assistance of emergency services such as FRV, Victoria Police and Local Government Emergency Management personnel to ensure efficient and effective response to reduce the consequences should a major incident occur.

Appendix 1
Eastern Treatment Plant MHF Licence to Operate



WorkSafe VICTORIA

Licence to operate a Major Hazard Facility

Occupational Health and Safety Act 2004
Occupational Health and Safety Regulations 2017

This Licence is issued to the operator

Melbourne Water Corporation
990 Latrobe St.,
DOCKLANDS
VIC 3008

ACN: 81 945 386 953

and authorises the facility:

Eastern Treatment Plant
Thompson Rd.,
BANGHOLME
VIC 3175

to operate as a Major Hazard Facility.

Licence Number	Date Granted	Effective Date	Expiry Date
MHL 007/06	23 June 2022	06 August 2022	05 August 2027

Conditions and Schedule 14 materials associated with this licence are detailed in subsequent page(s).

Simon Farrar — Director, Major Hazards and Dangerous Goods — 27 July 2022

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Appendix 1
Eastern Treatment Plant MHF Licence to Operate

Licence to operate a Major Hazard Facility

Conditions:

No Conditions.

The Schedule 14 materials present or likely to be present at the facility are listed in tables 1 and 2 below

Extracted from Table 1 of Schedule 14, *Occupation Health and Safety Regulations 2017*

ITEM	MATERIAL	CAS or UN No. Included UNDER NAME
18	CHLORINE	CAS No. 7782-50-5
35	METHANE or NATURAL GAS, including biogas upgraded to the equivalent quality of natural gas	CAS No. 74-82-8
39	OXYGEN (compressed or refrigerated liquid)	CAS No. 7782-44-7

Extracted from Table 2 of Schedule 14, *Occupation Health and Safety Regulations 2017*

MATERIAL	MATERIAL DESCRIPTION
Ozone	Item 10. Oxidising gases, hazard category 1

The small quantities of other Schedule 14 materials mentioned in the Safety Case that may be present at the facility are noted.

Simon Farrar — Director, Major Hazards and Dangerous Goods — 27 July 2022

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More Information

This information brochure presents a summary of the Major Hazard Facility Safety Case for the Eastern Treatment Plant. If you have any questions relating to the information in this document, contact the Major Hazard Facility and Safety Systems Lead on 131 722 or email **enquiry@melbournewater.com.au**

More information regarding the requirements for Major Hazard Facilities is available from the WorkSafe Victoria website: **www.worksafe.vic.gov.au**

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