LYONDELLBASELL AUSTRALIA

POLYPROPYLENE PLANT

CORIO

MAJOR HAZARD FACILITY

SAFETY CASE SUMMARY

and

COMMUNITY INFORMATION
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Description of Facility

The Plant

LyondellBasell Australia Pty Ltd operates a 132,000 tonne per annum Polypropylene plant located on the west side of the Viva Energy Refinery in Corio, Victoria. The plant supplies product directly to the Australian market as well as producing product for export to the other regions in Asia.

Polypropylene is a plastic used extensively in Australia to manufacture food packaging, medical garments, car components, ropes, bottles, crates, outdoor furniture, etc. The LyondellBasell (formerly Shell Chemicals, Montell, Basell) plant has been in operation since 1979 and has been progressively expanded to meet growing demand for its products. Ongoing safety equipment and systems have been applied in line with industry best practice requirements.
Facility Location

The figure below shows the location of the LyondellBasell Polypropylene plant as part of the Corio Refinery site.
The Process

Product

The raw material for the process plant is Refinery Grade Propylene (RGP) – one of the components of commonly used Liquefied Petroleum Gas (LPG). The RGP which is a by-product of crude oil refining and is either piped from the Viva Energy Refinery or imported by road tanker from the Mobil Refinery or Qenos in Altona.

The following table explains the current processing of the raw material:

<table>
<thead>
<tr>
<th>Step</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The refinery grade propylene (RGP) is distilled to make polymer grade propylene (PGP).</td>
</tr>
<tr>
<td>2</td>
<td>The PGP is initially fed through a series of purification steps to remove water and other contaminants before being fed to the polymerisation reactor.</td>
</tr>
<tr>
<td>3</td>
<td>Specific catalyst components are dosed in small quantities to the pre-polymerisation reactor together with a small slipstream of propylene before being fed to the main reactor where polypropylene powder is produced as slurry in liquid propylene.</td>
</tr>
<tr>
<td>4</td>
<td>A continuous stream of slurry is withdrawn from the reactor and the polypropylene powder is separated from the propylene.</td>
</tr>
<tr>
<td>5</td>
<td>The propylene is recycled back to the reaction process and the polypropylene product is conveyed to the final step of the process where stabilising additives are dosed into the powder before it is extruded as small pellets from one of the plant’s two extruders.</td>
</tr>
</tbody>
</table>

Storage

The pellets are stored in large bunkers ready for dispatch to customers in 22t bulk containers or automatic bagging on site into 25kg bags.

Plant Flowscheme

A schematic process flow diagram of the plant is shown below.

Continued on next page
The Process, Continued

Geelong Polypropylene Plant Flowscheme

The propylene feed to Basell comes primarily from the refinery RCCU.

Current plant capacity is approx. 130 ktpa of PP Homopolymer.

In the solids/gas separation section, unreacted propylene gas is recovered and recycled back to the reactor.

Additives & stabilisers are added to the PP powder to give the end product properties desired by the customer. All additives are brought preblended in bulk bags.

Peroxide can be added to crack the polymer chains & increase the nib MFI.

The process technology used at Geelong is the Shell developed LIPP with Prepolymerisation.

LIPP = Liquid Propylene Process and refers to the propylene phase in the reactor.

Guard treaters are used to remove any minor impurities from the propylene feed, e.g. sulfur compounds. Catalyst is very sensitive to any feed contamination.

Hydrogen is added to the reactor to control the powder MFI ex the reactor.

Product storage consists of 6x50 tonne rundown bunkers & 5x250 tonne bulk bunkers.

Product can be dispatched in bulk containers (22 tonne each) or bagged off in 25 kg plastic bags.

Basell Geelong Polypropylene Plant Flowscheme
Schedule 9 Hazardous Materials

Introduction

The LyondellBasell Polypropylene plant is defined as a Major Hazard Facility under the Victorian Occupational Health and Safety Regulations 2007 as it contains hazardous materials in such quantities as to exceed the threshold values laid down in Schedule 9 of the Regulations. The Regulations identify a large number of potential hazardous materials in Schedule 9, of which only a few are used at the LyondellBasell Polypropylene plant as detailed below.

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene</td>
<td>Propylene is the raw material from which Polypropylene is produced. Up to 600 tonnes of the product can be stored on the plant and in the process. Propylene is a highly flammable gas and is one of the components of LPG. Propylene, if released from the process, can form gas clouds which if ignited can cause significant gas cloud explosions. Their effect can be harmful to property and personnel over large distances. Propylene is the only hazardous substance on the LyondellBasell plant, which exceeds the Regulation threshold and hence requires LyondellBasell to notify the WorkSafe Authority and prepare a Safety Case.</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>Hydrogen is used on the Polypropylene plant in small quantities to control the reaction conditions and the final product properties. Hydrogen is a colourless gas which can be easily ignited if released from the process.</td>
</tr>
<tr>
<td>Aluminium Alkyls</td>
<td>Alkyl materials are liquids used as part of the catalyst system in the polymerisation reaction. They react and ignite spontaneously upon contact with air or explosively if contacted with water. Alkyl materials are stable under the process storage conditions.</td>
</tr>
</tbody>
</table>

Other Dangerous Goods used on the plant include:-

- Nitrogen
- Ethanol
- Carbon Monoxide in Nitrogen gas
- Organic Peroxides (oxidizing materials)
- Catalyst (Flammable Liquid)
- Ethyl Mercaptan
The LyondellBasell Safety Case

Overall Safety Case Methodology

This section describes the overall methodology used to establish the Safety Case. The Safety Case approach to management of major hazard risk is an ongoing process for LyondellBasell.

The overall objective of the Safety Case for the LyondellBasell Geelong site is to demonstrate that the major hazard risk posed to our people and our neighbours has been reduced so far as practicable. To start this process requires a clear understanding of what we mean by major hazard risk and also how we intend to demonstrate that the risk has been reduced far enough.

Our Safety Case addresses risk to people due to Major Incidents. We have defined a Major Incident as

“an uncontrolled release of Schedule 9 materials that has the potential to cause a fatality.”

Schedule 9 materials processed, stored and produced on the Geelong site are propylene, metal alkyls, hydrogen and organic peroxides.

The main product made at the site, polypropylene, is not a Dangerous Good or Schedule 9 material. The sections of the plant that handle polypropylene have therefore only been reviewed to ensure that the potential for carryover and leakage of Schedule 9 materials has been adequately controlled.

Continued on next page
The LyondellBasell Safety Case, Continued

**Key Elements**

There are 3 key elements of our strategy for controlling Major Incidents in a technical sense. These are:

- Conducting a comprehensive and systematic Safety Assessment to establish the level of risk due to Major Incidents and to review the controls in place to eliminate, prevent, reduce or mitigate the risks. The Safety Assessment includes the development of performance indicators to monitor and confirm the ongoing adequacy of control measures.
- Continuing to improve the overall Safety Management System (SMS) for the site as an integral part of the LyondellBasell’s Business Management system. The SMS is independent of Viva Energy and linked to both the LyondellBasell corporate requirements and the control of the identified hazards.
- Reviewing and updating our Emergency Response Plan in light of the identified Major Incidents.
Overall Safety Case Methodology

Introduction
The overall method adopted for the LyondellBasell Safety Case is shown below. The 3 key elements are shown as independent parallel activities, but at a detailed level there are many inter-linkages. In addition, all 3 activities rely on the identified hazards as a key input. All 3 activities also have resulted in identified actions that form a key aspect of our demonstration that risk has been reduced so far as is practicable (SFAP). Other aspects of this demonstration are made in the Safety Assessment based on the assessed level of risk.

Risk assessment diagram

Effects
Our assessment of risk includes potential effects on our people, and also third parties such as neighbours at Viva Energy and BOC. Much of the information used to develop the Safety Case was used to complete a Property Protection Assessment.

Employee Involvement and Learning's
In compiling the Safety Case, maximum input was gathered from employees throughout the workshops, in coordination of the work and in the development of various sections of the report.

Continued on next page
**Overall Safety Case Methodology, Continued**

| **Culture** | LyondellBasell Australia has an open culture of communication, consultation and broad participation in the management of the facility. During the initial development and the recent re-development of the Safety Case, it was the policy of management to involve as many levels and functions of the organisation in all aspects of the process. Allowance had to be made for the constraints of time and the need to continue safe operation of the plant and complete key projects required to ensure the plant’s future viability. |
| **Personnel involved** | The key vehicle for the systematic safety assessment process adopted was the use of participative facilitated workshops. A cross sectional slice of all levels of the organisation was typically employed. |
Contact Details

The contact for the LyondellBasell site is the Site Manager:-

David Stannard
LyondellBasell Australia Pty Ltd
Refinery Road
CORIO
Victoria 3214

Tel : 03 5228 4020
     : 03 9541 3095 (Fax)
     : 1800 816 854 (24 Hour Emergency Response)

Email : david.stannard@lyondellbasell.com

Community care
LyondellBasell Australia is a Responsible Care member company of the Plastics and Chemical Industry Association of Australia and therefore gives an undertaking to provide members of the community with all reasonably requested and non-confidential information concerning its operation. Requests for information can be addressed to the above contact.

Certification
LyondellBasell Australia holds current ISO 9001 International Quality Management certification and ISO 14001 International Environmental Management system accreditations for its operations at Corio.

Licence to Operate
As required by the OHS Act (2004) and the OHS Regulations 2007 LyondellBasell Australia obtained a five year Licence to Operate a Major Hazard Facility at Refinery Road, Corio, on 29 November, 2010. LyondellBasell’s licence was renewed in 2015. LyondellBasell will apply again for a renewal of the licence in 2020.
**Major Incident**

The LyondellBasell Australia has completed vigorous safety assessments (hazard identification / risk assessments) at the LyondellBasell site and deemed that a Major Incident at the LyondellBasell site could impact on nearby commercial operations but is likely to only have a minor impact on the nearest residential areas (refer to p8).

**Emergency Response Plan**

The Geelong site (i.e. the entire Corio Refinery site) has a documented Site Emergency Response Plan, which is managed and implemented by Viva Energy. This plan includes procedures to advise local authorities, local industry, schools, the community and the media of major incidents that may impact on the community.

Key telephone number lists are maintained in the Emergency Plan for direct contact by the Emergency Response organisation as required. Police will notify the local neighbourhood and domestic dwellings of any potentially hazardous situation and/or any required action following consultation with/advice from the Site Emergency Plan team.