

File No: LTD/2063

May 2019

**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME
(NICNAS)**

PUBLIC REPORT

Chemical in ExpBMC-1801

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act) and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by the Department of Health, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of the Environment and Energy.

This Public Report is available for viewing and downloading from the NICNAS website or available on request, free of charge, by contacting NICNAS. For requests and enquiries please contact the NICNAS Administration Coordinator at:

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**Director
NICNAS**

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SUMMARY

The following details will be published in the NICNAS *Chemical Gazette*:

ASSESSMENT REFERENCE	APPLICANT(S)	CHEMICAL OR TRADE NAME	HAZARDOUS CHEMICAL	INTRODUCTION VOLUME	USE
LTD/2063	Qenos Pty Ltd	Chemical in ExpBMC-1801	Yes	< 1 tonne per annum	Component of catalyst for polyethylene production

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard Classification

Based on the available information, the notified chemical is a hazardous chemical according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia. The hazard classification applicable to the notified chemical is presented in the following table.

<i>Hazard classification</i>	<i>Hazard statement</i>
Pyrophoric Solids (Category 1)	H250 – Catches fire spontaneously if exposed to air
Substances and mixtures which, in contact with water, emit flammable gases (Category 1)	H260 – In contact with water releases flammable gases, which may ignite spontaneously
Skin Corrosion/irritation (Category 1)	H314 – Causes severe skin burns and eye damage
Serious eye damage/eye irritation (Category 1)	H318 – Causes serious eye damage

In Australia, additional non-GHS hazard statements apply (see *Guidance on the Classification of Hazardous Chemicals Under the WHS Regulations* for further information; SWA, 2012a). Based on the available information, the following additional (non-GHS) hazard statement is also recommended:

- AUH014 – Reacts violently with water

Human Health Risk Assessment

Provided that the recommended controls are being adhered to, under the conditions of the occupational settings described, the notified chemical is not considered to pose an unreasonable risk to the health of workers.

When used as a component of polyethylene production in the proposed manner, the notified chemical is not considered to pose an unreasonable risk to public health.

Environmental Risk Assessment

On the basis of the reported use pattern, the notified chemical is not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Hazard Classification and Labelling

- The notified chemical should be classified as follows:
 - Pyrophoric Solids (Category 1): H250 – Catches fire spontaneously if exposed to air
 - Substances and mixtures which, in contact with water, emit flammable gases (Category 1): H260 – In contact with water releases flammable gases, which may ignite spontaneously
 - Skin corrosion/irritation (Category 1): H314 – Causes severe skin burns and eye damage
 - Serious eye damage/eye irritation (Category 1): H318 – Causes serious eye damage

The above should be used for products/mixtures containing the notified chemicals, if applicable, based on the concentration of the notified chemicals present and the identities of the other components of the products/mixtures.

CONTROL MEASURES

Occupational Health and Safety

- A person conducting a business or undertaking at a workplace should implement the following engineering controls to minimise occupational exposure to the notified chemical, given their reactivity:
 - Enclosed/automated processes
 - Local exhaust ventilation
 - Use under an inert atmosphere
- A person conducting a business or undertaking at a workplace should implement the following safe work practices to minimise occupational exposure during handling of the notified chemical, given their reactivity:
 - Avoid contact with skin and eyes
 - Avoid spills and splashing during use
 - Prevent leaks
 - Remove all sources of ignition
- A person conducting a business or undertaking at a workplace should ensure that the following personal protective equipment is used by workers to minimise occupational exposure to the notified chemical, given their reactivity:
 - Impervious gloves
 - Safety glasses or goggles
 - Face mask or shield
 - Respiratory protection if ventilation is inadequate and/or inhalation exposure is expected
 - Protective clothing
 - Chemical safety boots

Guidance in selection of personal protective equipment can be obtained from Australian, Australian/New Zealand or other approved standards.

- A copy of the SDS should be easily accessible to employees.
- If products and mixtures containing the notified chemical are classified as hazardous to health in accordance with the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)* as adopted for industrial chemicals in Australia, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation should be in operation.

Transport and Packaging

- Due to the pyrophoric nature of the notified chemical, introducers of the chemical should consider their obligations under *Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code)* (NTC, 2018).

Storage

- The handling and storage of the notified chemical should be in accordance with the Safe Work Australia Code of Practice for *Managing Risks of Hazardous Chemicals in the Workplace* (SWA, 2012a) or relevant State or Territory Code of Practice.
- The following precautions should be taken regarding storage of the notified chemical:
 - Store in original unopened container under an inert atmosphere

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by physical containment, collection and subsequent safe disposal.
- In the event of an emergency, unnecessary personnel should be evacuated and all ignition sources removed.

Disposal

- Where reuse or recycling are not appropriate, dispose of the notified chemical in an environmentally sound manner in accordance with relevant Commonwealth, state, territory and local government legislation.

Regulatory Obligations

Secondary Notification

This risk assessment is based on the information available at the time of notification. The Director may call for the reassessment of the chemical under secondary notification provisions based on changes in certain circumstances. Under Section 64 of the *Industrial Chemicals (Notification and Assessment) Act (1989)* the notifier, as well as any other importer or manufacturer of the notified chemical, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemical is listed on the Australian Inventory of Chemical Substances (AICS).

Therefore, the Director of NICNAS must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under Section 64(1) of the Act; if
 - the importation volume exceeds one tonne per annum notified chemical;
- (2) Under Section 64(2) of the Act; if
 - the function or use of the chemical has changed from component of catalyst for polyethylene production or is likely to change significantly;
 - the amount of chemical being introduced has increased, or is likely to increase, significantly;
 - the chemical has begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the chemical on occupational health and safety, public health, or the environment.

The Director will then decide whether a reassessment (i.e. a secondary notification and assessment) is required.

Safety Data Sheet

The SDS of the product containing the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Qenos Pty Ltd (ABN: 62 054 196 771)
231 – 238 Maidstone Street
ALTONA VIC 3018

NOTIFICATION CATEGORY

Limited-small volume: Chemical other than polymer (1 tonne or less per year)

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details exempt from publication include: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, impurities, additives/adjuvants and use details.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Schedule data requirements are varied for all physico-chemical endpoints.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

ExpBMC-1801 (Product containing the notified chemical at < 1% concentration)

MOLECULAR WEIGHT

> 500 g/mol

ANALYTICAL DATA

Measurement of spectral data not possible under normal working conditions

3. COMPOSITION

DEGREE OF PURITY

> 95%

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: solid

The imported product is a yellow-brown suspension containing the notified chemical in mineral oil. The notified chemical appears as a slurry in the product.

<i>Property</i>	<i>Value</i>	<i>Data Source/Justification</i>
Melting Point/Freezing Point	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Boiling Point	Not determined	Chemical not isolated and high reactivity precludes study from being conducted. The SDS presents a boiling point > 400 °C for the product*.
Density	Not determined	Chemical not isolated and high reactivity precludes study from being conducted. The SDS presents a relative density of 0.93 for the product*.
Vapour Pressure	Not determined	Chemical not isolated and high reactivity precludes study from being conducted.

Property	Value	Data Source/Justification
Water Solubility	Not determined	Chemical not isolated and high reactivity precludes study from being conducted.
Hydrolysis as a Function of pH	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Partition Coefficient (n-octanol/water)	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Adsorption/Desorption	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Dissociation Constant	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Flash Point	Not determined	Chemical not isolated and high reactivity precludes study from being conducted. The SDS presents a flash point of 7 °C for the product* (determined using Pensky-Martens Closed Cup method).
Flammability	Pyrophoric	Highly reactive
Autoignition Temperature	Not determined	Chemical not isolated and high reactivity precludes study from being conducted. The SDS estimates at > 400 °C for the product*.
Explosive Properties	Not determined	Chemical not isolated and high reactivity precludes study from being conducted
Oxidising Properties	Not determined	Chemical not isolated and high reactivity precludes study from being conducted

* determined for the imported product (ExpBMC-1801) containing the notified chemical at < 1%

DISCUSSION OF PROPERTIES

Reactivity

The notified chemical is a catalyst component that is pyrophoric and highly reactive with water. It will degrade upon reaction with air, water, and during end-use in the manufacture of polyethylene. Based on the composition of the notified chemical, aluminium oxide and aluminium hydroxide are assumed to be the predominant degradants. Trace amounts of zirconium oxide may also be present. Methane may be released during degradation.

Physical Hazard Classification

Based on the physico-chemical data submitted and depicted above, the notified chemical is recommended for physical hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia. The recommended hazard classification is presented in the following table.

Hazard Classification	Hazard Statement
Pyrophoric solids (Category 1)	H250 – Catches fire spontaneously if exposed to air
Substances and mixtures which, in contact with water, emit flammable gases (Category 1)	H260 – In contact with water releases flammable gases which may ignite spontaneously

In Australia, additional non-GHS hazard statements apply (SWA, 2018). Based on the available information, the following additional hazard statement is also recommended:

- AUH014 – reacts violently with water

Based on the information provided, the notified chemical is classified as follows according to *Australian Code for the Transport of Dangerous Goods by Road and Rail* (ADG code; NTC, 2017):

Class 4 (Divisions 4.1, 4.2 and 4.3) – Flammable solids; Substances liable to spontaneous combustion; Substances which in contact with water emit flammable gases.

5. INTRODUCTION AND USE INFORMATION

MODE OF INTRODUCTION OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

The notified chemical will not be manufactured in Australia but will be imported as part of a suspension in mineral oil at < 1% concentration.

MAXIMUM INTRODUCTION VOLUME OF NOTIFIED CHEMICAL (100%) OVER NEXT 5 YEARS

<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
<i>Tonnes</i>	< 1	< 1	< 1	< 1	< 1

PORT OF ENTRY

Melbourne

TRANSPORTATION AND PACKAGING

The product containing the notified chemical (at < 1% concentration) will be imported in 120 gallon pressurizable, portable tanks or intermediate bulk containers (IBCs) and transported to industrial end users from the port of entry by road. The product containing the notified chemical will be stored in the original unopened containers under an inert atmosphere (5 – 30 psi nitrogen pressure).

USE

The notified chemical (at < 1% concentration) will be used as a component of a catalyst system for polyethylene production.

OPERATION DESCRIPTION

At the end-use site, the imported product containing the notified chemical will be transferred to a feed tank under closed conditions passing through a strainer to remove agglomerated material. The product containing the notified chemical will then be pumped from the feed tank into a polymerization reactor where polyethylene will be produced.

After polymerization, unreacted residual notified chemical will be deactivated using steam. Degradants of the notified chemical, including aluminium oxide, aluminium hydroxide and trace amounts of zirconium compounds, will be encapsulated in the polyethylene product. Unreacted notified chemical in the feed stream will be removed from the polyethylene product. The resulting polyethylene (containing degradants of the notified chemical at < 40 ppm) will then be transferred to a storage bin and pelleted before being packed for shipment.

Due to the reactive nature of the notified chemical, closed systems will be used for transfer. Feed lines will be flushed and drained prior to disconnection. Residues from the feed lines will be collected as hazardous waste. The strainer with collected agglomerates will be removed from housing and contents will be emptied into a hazardous waste collection container as required. The hazardous waste will be incinerated by a licensed waste disposal company.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

<i>Category of Worker</i>	<i>Exposure Duration (hours/day)</i>	<i>Exposure Frequency (days/year)</i>
Transport and storage	1	~ 70
Operators – Cleaning/disconnection of line	0.25	~ 70
Operators – Cleaning strainer	1	~ 180
Maintenance	1	~ 12
Operators – Waste handling	1	~ 12

EXPOSURE DETAILS

Transport and storage workers are unlikely to be exposed to the notified chemical except in the event of an accident.

Due to the closed system operation at the polyethylene production site, exposure of workers to the notified chemical (at < 1% concentration) is expected to be minimal. Dermal or ocular exposure to the notified chemical may occur when connecting and disconnecting transfer lines, cleaning the strainer and during routine maintenance. Exposure is expected to be minimised by safe work practices including flushing of the system prior to hose disconnection and through the stated use of personal protective equipment (PPE) including impervious gloves, safety glasses or goggles, face mask/shield, protective clothing, chemical safety boots and respiratory protections if local ventilation is inadequate.

Once in the manufactured polyethylene product, the notified chemical will be deactivated to form degradants present at a low concentration (< 40 ppm). The degradants are expected to be encapsulated within the polymer matrix and not available for exposure.

6.1.2. Public Exposure

The notified chemical is for industrial use only. Therefore the public may be exposed to the notified chemical (at < 1% concentration) only in the event of a transport accident. The public may come into contact with manufactured polyethylene products (containing deactivated notified chemical at < 40 ppm). The polyethylene products may be used to produce domestic water pipes which may contact with drinking water. However, as the notified chemical will be deactivated to form degradants and encapsulated in the polymer matrix, it is not expected to be available for exposure.

6.2. Human Health Effects Assessment

No toxicology data were submitted. The notified chemical will spontaneously ignite when exposed to air or water. The high reactivity of the notified chemical precludes the possibility to generate toxicology data. Given such high reactivity, the notified chemical is expected to be highly hazardous via all exposure routes; however details of human health hazards are difficult to be studied. The notifier has stated that the notified chemical is likely to be corrosive to the skin and eyes due to its pyrophoric nature and is a skin sensitiser based on available containment information.

The notifier has also advised that, after polyethylene is produced, exposure to degradant products of the notified chemical including mainly aluminium oxide and aluminium hydroxide is possible. The degradants will be present at low concentration < 40 ppm and immobilised in the polymer matrix. As only trace amounts of the zirconium compounds are expected to be present after degradation, hazards associated with the zirconium compounds are expected to be less than those associated with the predominant degradants aluminium oxide and aluminium hydroxide. The available information on some of the possible inorganic degradation products of the notified chemical suggests that the degradants are likely to be of low acute oral toxicity, non- to slightly irritating to the skin, eyes and respiratory tract, and non-mutagenic (NCBI, 2019a, b, c).

Health Hazard Classification

Based on consideration of total weight of evidence, given its pyrophoric nature the notified chemical is a hazardous chemical according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS)*, as adopted for industrial chemicals in Australia. The hazard classification applicable to the notified chemical is presented in the following table.

<i>Hazard classification</i>	<i>Hazard statement</i>
Skin Corrosion/irritation (Category 1)	H314 – Causes severe skin burns and eye damage
Serious eye damage/eye irritation (Category 1)	H318 – Causes serious eye damage

6.3. Human Health Risk Characterisation**6.3.1. Occupational Health and Safety**

The notified chemical is pyrophoric and will only be handled by trained workers. The appropriate transport, storage and handling of products containing the notified chemicals, e.g. in accordance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail (ADG code)* (NTC, 2007) and the *Safe Work Australia Code of Practice: Managing Risks of Hazardous Chemicals in the Workplace* (SWA, 2012a), should minimise the risks to transport and storage workers.

The primary risks associated with use of the notified chemical are due to its high reactivity. This reactivity requires the implementation of strict control measures when handling the notified chemicals (including enclosed, automated processes and the wearing of PPE). Due to these control measures exposure to the notified chemicals is expected to be negligible.

After polymerization, the notified chemical will be deactivated to form degradants including aluminium oxide, aluminium hydroxide and trace amounts of zirconium compounds, encapsulated in the polyethylene matrix and will not be available for exposure. Degradant products may also include small organic compounds such as 1,3-cyclopentadiene. However, these will also be encapsulated in the polyethylene matrix and will not be available for exposure.

Provided that the recommended controls are being adhered to, under the conditions of the occupational settings described, the notified chemical is not considered to pose an unreasonable risk to the health of workers.

6.3.2. Public Health

The notified chemical is intended for use in industrial settings by trained workers. The public may be exposed to degradants of the notified chemical via the manufactured polyethylene articles including pipes for drinking water. However, the degradants of the notified chemical will be present at low concentration (< 40 ppm) and will be encapsulated into the polyethylene matrix.

While some level of minimal exposure to consumers or the general public may potentially occur through migration of the degradants of the notified chemical (when used at < 40 ppm) from the polyethylene matrix, this migration is not an intended use of the notified chemical, or inherent in the proposed use of the chemical. The degradant aluminium oxide meets the Food and Drug Administration (FDA) criteria to be approved for use as an indirect additive in polymers used in ultra-filtration membranes for the processing of food (FDA 2019a), while zirconium oxide is approved for use as an indirect additive in polymers used in ultra-filtration membranes for the processing of food and as a component of paper and paperboard in contact with aqueous and fatty foods (FDA 2019a, b). The potential degradant 1,3-cyclopentadiene is approved for use as an indirect additive in adhesives and components of coatings (resinous and polymeric coatings) (FDA, 2019c). No migration data was provided to show the potential for the degradants to migrate out of the end-use polyethylene products. However, based on the low mobility and low concentration of degradants present, and their approval for use in other food contact products, the degradants are not expected to pose an unreasonable risk to public health.

When used in the proposed manner, the notified chemical is not considered to pose an unreasonable risk to public health.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified chemical will be imported in mineral oil for use as a catalyst system in polymerisation processes. Accidental spills of the suspension containing the notified chemical during import, transport or storage may occur if the containers are breached. Spills are expected to be collected by an approved waste contractor for disposal, in accordance with local government regulations.

RELEASE OF CHEMICAL FROM USE

The majority of the notified chemical will be consumed during the polymerisation process and encapsulated in the manufactured polyethylene. Due to its reactive nature and use in a closed system, release of the notified chemical to the aquatic environment during use is expected to be negligible. Agglomerated product, line flushes and other wastewater containing the residual notified chemical will be collected, treated and disposed of by an approved waste contractor. Empty containers containing the residual notified chemical will be exported back to the supplier in the USA to be cleaned and reused.

RELEASE OF CHEMICAL FROM DISPOSAL

The reacted notified chemical will share the fate of the polyethylene in which it is encapsulated and is expected to be disposed of to landfill. Disposal of spilt material will also occur to landfill via an approved waste contractor.

7.1.2. Environmental Fate

No environmental fate data were submitted. The majority of the notified chemical will be reacted and encapsulated in the manufactured polyethylene. Thus release of the notified chemical to the aquatic environment is expected to be negligible. Most of the notified chemical will share the fate of the polyethylene in which it is reacted and encapsulated, and is expected to be disposed of to landfill at the end of their useful lives. On contact with air or water, the notified chemical will rapidly react to form refractory insoluble metal oxides and hydroxides, and small organic molecules. In landfill, the reacted notified chemical will be present in the polyethylene matrix and will be neither bioavailable nor mobile and is expected to decompose to form the same products as formed on contact with water.

7.1.3. Predicted Environmental Concentration (PEC)

The predicted environmental concentration (PEC) has not been calculated as release of the notified chemical to the aquatic environment is expected to be negligible based on the reported use pattern.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted. The notified chemical is a catalyst component that is pyrophoric and highly reactive with water. On contact with air or water, the notified chemical will rapidly react to form refractory insoluble metal oxides and hydroxides and small organic molecules which have low water solubility and are not expected to be harmful to aquatic organisms.

7.2.1. Predicted No-Effect Concentration (PNEC)

A predicted no-effect concentration (PNEC) for the aquatic compartment has not been calculated since ecotoxicity data for the notified chemical is not available.

7.3. Environmental Risk Assessment

A Risk Quotient (PEC/PNEC) has not been calculated as release of the notified chemical to the aquatic environment is expected to be negligible based on the reported use pattern. Therefore, under the reported use conditions, the notified chemical is not expected to pose an unreasonable risk to the environment.

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