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STD/1440

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

PUBLIC REPORT

**STD/1439: Component of XCAT VP-100 Catalyst
STD/1440: Component of XCAT VP-110 Catalyst**

This Assessment has been compiled in accordance with the provisions of the *Industrial Chemicals (Notification and Assessment) Act 1989* (Cwlth) (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 Ageing, and conducts the risk assessment for public health and occupational health and safety. The assessment of environmental risk is conducted by the Department of Sustainability, Environment, Water, Population and Communities.

For the purposes of subsection 78(1) of the Act, this Public Report may be inspected at our NICNAS office by appointment only at Level 7, 260 Elizabeth Street, Surry Hills NSW 2010.

This Public Report is also 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
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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
STD/1439 STD/1440	Qenos Pty Ltd	STD/1439: Component of XCAT VP-100 Catalyst STD/1440: Component of XCAT VP-110 Catalyst	Yes	STD/1439: ≤10 tonnes per annum STD/1440: ≤10 tonnes per annum	Catalysts for polyethylene production

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification

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

<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
Acute Toxicity (Category 4)	H302 – Harmful if swallowed
Skin Corrosion (Category 1)	H314 – Causes severe skin burns and 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

Based on the available information, the notified chemicals are recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004) with the following risk phrases:

R22 – Harmful if swallowed
R34 – Causes burns

Human health risk assessment

Provided that control measures are in place to minimise exposure, including the use of enclosed/automated processes and PPE, and transport, storage and handling are in accordance with the appropriate codes of practice, the risk to the health of workers from use of the notified chemicals is not considered to be unreasonable.

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

Environmental risk assessment

On the basis of the assessed use pattern, the notified chemicals are not considered to pose an unreasonable risk to the environment.

Recommendations

REGULATORY CONTROLS

Hazard Classification and Labelling

- The notified chemicals should be classified as follows:
 - Acute Toxicity (Category 4): H302 – Harmful if swallowed
 - Skin Corrosion (Category 1): H314 – Causes severe skin burns and 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.

- Due to the physico-chemical properties of the notified chemicals, the notifier should consider their obligations under the Australian Dangerous Goods Code.

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 chemicals, given their reactivity:
 - Enclosed, automated processes
 - 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 chemicals, given their reactivity:
 - Avoid contact with skin and eyes
 - Avoid inhalation
 - Avoid spills and splashing during use
 - Prevent leaks and spills
 - A shower and eyewash station should be available
- 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 chemicals, given their reactivity:
 - Coveralls
 - Impervious gloves
 - Goggles and face shield
 - Respiratory protection (if ventilation is inadequate and/or if inhalation exposure to the notified chemicals is expected)

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

- A copy of the (M)SDS should be easily accessible to employees.
- If products and mixtures containing the notified chemicals are classified as hazardous to health in accordance with the *Globally Harmonised System for the 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.

Disposal

- The notified chemicals should be disposed of to landfill.

Storage

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

Emergency procedures

- Spills or accidental release of the notified chemicals 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.

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 chemicals 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 chemicals, have post-assessment regulatory obligations to notify NICNAS when any of these circumstances change. These obligations apply even when the notified chemicals are 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(2) of the Act; if
 - the function or use of the chemicals has changed from catalysts for polyethylene production, or is likely to change significantly;
 - the amount of chemicals being introduced has increased from 10 tonnes per annum, or is likely to increase, significantly;
 - the chemicals have begun to be manufactured in Australia;
 - additional information has become available to the person as to an adverse effect of the chemicals 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.

No additional secondary notification conditions are stipulated.

(Material) Safety Data Sheet

The (M)SDSs of the notified chemicals were provided by the notifier and were reviewed by NICNAS. The accuracy of the information on the (M)SDSs remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)

Qenos Pty Ltd (ABN: 62 054 195 771)
471-513 Kororoit Creek Road
ALTONA VIC 3018

NOTIFICATION CATEGORY

STD/1439: Standard: Chemical other than polymer (more than 1 tonne per year)

STD/1440: Standard (Reduced fee notification): Chemical other than polymer (more than 1 tonne per year) – Chemical is being notified at the same time as a similar chemical.

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, polymer constituents, residual monomers, impurities, additives/adjuvants, use details and import volume.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

Variation to the schedule of data requirements is claimed as follows: All physico-chemical, toxicological and ecotoxicological endpoints.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

None

NOTIFICATION IN OTHER COUNTRIES

None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)

STD/1439: XCAT VP-100 Catalyst (product containing 90-100% notified chemical)
STD/1440: XCAT VP-110 Catalyst (product containing 90-100% notified chemical)

ANALYTICAL DATA

Reference NMR spectra were provided.

3. COMPOSITION

DEGREE OF PURITY >98%

ADDITIVES/ADJUVANTS None identified

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: White to off-white powder*

Property	Value		Data Source/Justification
	STD/1439	STD/1440	
Melting Point/Freezing Point	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Boiling Point	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Density	319 kg/m ³ *	481 kg/m ³ *	Measured (study summary only provided)
Vapour Pressure	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Water Solubility	Not Determined	Not Determined	High reactivity precludes studies from being conducted.

Hydrolysis as a Function of pH	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Partition Coefficient (n-octanol/water)	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Adsorption/Desorption	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Dissociation Constant	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Particle Size	Inhalable fraction (<100 µm): 100% Respirable fraction (<10 µm): 9.8% by volume*	Inhalable fraction (<100 µm): 98.5% Respirable fraction (<10 µm): 13.4% by volume*	Measured
Flammability	Pyrophoric*	Pyrophoric*	The notified chemicals will spontaneously ignite when exposed to air.
Autoignition Temperature	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Explosive Properties	Not Determined	Not Determined	High reactivity precludes studies from being conducted.
Oxidising Properties	Not Determined	Not Determined	High reactivity precludes studies from being conducted.

* XCAT VP-100 or XCAT VP-110

DISCUSSION OF PROPERTIES

For full details of tests on physical and chemical properties, refer to Appendix A.

Reactivity

The notified chemicals are pyrophoric and highly reactive with water. They will degrade upon reaction with air, water and during end-use in the manufacture of polyethylene. The degradation releases a flammable gas.

Physical hazard classification

Based on the limited submitted physico-chemical data depicted in the above table and the high reactivity of the notified chemicals, the notified chemicals are recommended for hazard classification according to the *Globally Harmonised System for the 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 (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

5. INTRODUCTION AND USE INFORMATION

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

STD/1439: Imported as a component (90-100%) of a solid powder.

STD/1440: Imported as a component (90-100%) of a solid powder.

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>STD/1439</i>	<i>Tonnes</i>	2-10	2-10	2-10	2-10	2-10
<i>STD/1440</i>	<i>Tonnes</i>	-	-	2-10	2-10	2-10

PORT OF ENTRY
Melbourne

IDENTITY OF MANUFACTURER/RECIPIENTS
Qenos Australia Pty Ltd and polyethylene producers.

TRANSPORTATION AND PACKAGING
The notified chemicals will be imported (by sea) in 120-gallon reusable, pressurised, portable tanks under 5-30 psi nitrogen pressure, such as Unitotes. The portable tanks will be transported within Australia by road.

USE
Catalysts for polyethylene production.

OPERATION DESCRIPTION
Upon delivery of the products containing the notified chemicals to polyethylene production sites, they will be transferred to feed vessels, using closed system transfer and nitrogen pressure. They will then be pumped into the polymerization reactor. The notified chemicals will be encapsulated into the polyethylene and will be removed from the reactor as part of the polyethylene. The polyethylene will be treated with steam upon discharge from the reactor, which will deactivate any residual notified chemicals encapsulated in the polymer.

Due to the reactive nature of the notified chemicals, closed system transfers are mandatory. Prior to line disconnection, the system will be flushed and the residue collected as hazardous waste. Emptied product containers will be returned to the international supplier for cleaning.

The polyethylene production unit will be located in an unconfined area that is subject to outside ambient conditions and open to the atmosphere.

The polyethylene produced (containing the deactivated notified chemicals at levels of parts per million), will be transferred to a storage bin for packaging and shipment to other sites, where it will be formed into plastic articles.

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 workers	1	6
Plant workers – Charging tanks	0.25	50
Plant workers – Servicing	2	50
Plant workers – Line clearing	0.25	5

EXPOSURE DETAILS

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

Due to the closed-system operation at the polyethylene production sites, exposure of workers to the notified chemicals is expected to be minimal. Dermal or ocular exposure to the notified chemicals may occur whilst connecting and disconnecting transfer lines, whilst changing catalyst types, during line servicing, and during clearing of plugged injection lines. Exposure to the notified chemicals will be minimised by flushing of the system prior to hose disconnection (including oxidation and purging of equipment and lines) and through the use of personal protective equipment (PPE: goggles, face shield, impervious gloves, protective clothing and respiratory protection).

Once present in the manufactured polyethylene, the notified chemicals will be in deactivated form, at low

concentration (parts per million) and will be encapsulated into the polyethylene matrix, with the bioavailability expected to be low.

6.1.2. Public Exposure

The notified chemicals are intended for industrial use only, therefore the public may be exposed to the notified chemicals only in the event of a transport accident. The public may come into contact with the notified chemicals via manufactured polyethylene articles. However, the notified chemicals will be present in a deactivated state and will be encapsulated into the polyethylene matrix, with the bioavailability expected to be low.

6.2. Human Health Effects Assessment

No toxicity data were submitted. The generation of such data is precluded by the high reactivity of the notified chemicals.

The notified chemicals will spontaneously ignite when exposed to air. Therefore, any exposure is expected to be to the degradation products, including metal oxides and hydroxides and oxides of carbon.

Based on the expected negligible lipophilicity of the inorganic degradation products of the notified chemicals, passive diffusion across the gastrointestinal (GI) tract and dermal absorption are not expected to occur. The potential for accumulation of degradation products in the lungs cannot be ruled out.

The available information on some of the possible inorganic degradation products of the notified chemicals suggest that the chemicals are of low acute oral toxicity, non- to slightly-irritating to the skin, eyes and respiratory tract and non-mutagenic. The available information on some of the other possible degradation products indicates the potential for hazardous effects, particularly via the inhalation route.

Given the high reactivities of the notified chemicals, the notifier has indicated that the chemicals should be considered as being corrosive and harmful via the oral route.

Health hazard classification

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

<i>Hazard classification</i>	<i>Hazard statement</i>
Acute Toxicity (Category 4)	H302 – Harmful if swallowed
Skin Corrosion (Category 1)	H314 – Causes severe skin burns and eye damage

Based on the available information, the notified chemicals are recommended for hazard classification according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004), with the following risk phrases:

R22 – Harmful if swallowed
R34 – Causes burns

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

The notified chemicals are 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 Dangerous Goods Code (NTC, 2007) and the Safe Work Australia Code of Practice for *Managing Risks of Hazardous Chemicals in the Workplace* (SWA, 2012b), should minimise the risks to transport and storage workers.

The primary risks associated with use of the notified chemicals will be due to their high reactivity. The high 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 (or the degradation products following their incorporation into the polyethylene matrix) is expected to be negligible.

Therefore, provided that control measures are in place to minimise worker exposure, including the use of enclosed/automated processes and PPE, and transport, storage and handling are in accordance with the appropriate codes of practice, the risk to the health of workers from use of the notified chemicals is not considered to be unreasonable.

6.3.2. Public Health

The notified chemicals are intended for use in industrial settings by trained workers. The public may be exposed to the notified chemicals via the manufactured polyethylene articles. However, the notified chemicals will be present at very low concentrations in a deactivated state and will be encapsulated into the polyethylene matrix. Therefore, when used in the proposed manner, the risk to public health from use of the notified chemicals is not considered to be unreasonable.

7. ENVIRONMENTAL IMPLICATIONS

7.1. Environmental Exposure & Fate Assessment

7.1.1. Environmental Exposure

RELEASE OF CHEMICAL AT SITE

The notified chemicals will be imported into Australia as components of finished products in pressure rated metal containers. Accidental spills and leaks during transport are unlikely. However, in the case of an accidental release, the notified chemicals are expected to be disposed of by a licensed waste contractor.

RELEASE OF CHEMICAL FROM USE

Empty containers containing residues of the notified chemicals will be exported to be cleaned, refurbished and reused. Due to their reactive nature and use in a closed system, release of the notified chemicals to the environment during use is expected to be negligible. Agglomerated product, line flushes and drainings containing the residues of the notified chemicals will be collected and disposed of by a licensed waste contractor. The majority of the imported notified chemicals will be consumed during the polymerisation process and encapsulated into the manufactured polyethylene.

RELEASE OF CHEMICAL FROM DISPOSAL

The reacted notified chemicals will share the fate of the polyethylene in which they are encapsulated and are expected to be disposed of to landfill.

7.1.2. Environmental Fate

No environmental fate data were submitted. Aquatic exposure to the notified chemicals is not expected when they are used as proposed in the industrial manufacture of polyethylene. However, if the notified chemicals are released to the aquatic environment they will rapidly react to form water, refractory insoluble metal oxides and hydroxides, oxides of carbon and nitrogen and inorganic salts. In landfill, the notified chemicals will have reacted and be encapsulated in polyethylene and therefore will not be exposed to the environment. The reacted notified chemicals in the polyethylene articles are not likely to be bioavailable nor bioaccumulative and are expected to decompose to form the same products as formed on contact with water.

7.1.3. Predicted Environmental Concentration (PEC)

PECs were not determined because very little of the notified chemicals are expected to be released to the aquatic compartment when the chemicals are used as proposed in the manufacture of polyethylene. Moreover, the notified chemicals are not expected to persist in water due to their reactivity.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted for the notified chemicals. On contact with air or water, the notified chemicals will rapidly react to form refractory insoluble metal oxides and hydroxides which will therefore be neither bioavailable nor bioaccumulative. Information submitted by the notifier and publically available data regarding the breakdown products of the notified chemicals indicates that the breakdown products are not expected to be harmful to aquatic life. The decomposition products have low solubility and are not expected to be harmful up to their limits of solubility (US EPA, 2012). Therefore, the notified chemicals and breakdown products are not formally classified under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS; United Nations 2009).

7.2.1. Predicted No-Effect Concentration

The PNECs were not calculated as no ecotoxicity data are available for the notified chemicals and there is expected to be very little exposure of the notified chemicals to the water compartment based on the proposed use pattern.

7.3. Environmental Risk Assessment

All spillages and waste containing the notified chemicals are expected to be disposed of by licensed waste contractors according to State/Territory regulations. During use, the majority of the notified chemicals will be consumed during the polymerisation process and immobilised within a cured inert polymerised polyethylene matrix, rendering them unavailable to the environment. On contact with air or water, the notified chemicals will rapidly react to form refractory insoluble metal oxides and hydroxides, and non-metal oxides. The reaction products of the notified chemicals will therefore be neither bioavailable nor bioaccumulative. Since there is expected to be very limited exposure to aquatic organisms, the notified chemicals are therefore not expected to pose an unreasonable risk to the environment based on their assessed use pattern.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES**Particle Size** STD/1439

Method Light scattering – Malvern Mastersizer

<i>Range (µm)</i>	<i>Volume (%)</i>
<1 µm	0
<10 µm	9.8
<100 µm	100

Remarks The test substance was XCAT VP-100 Catalyst. Average particle size 24.7 µm
 Test Facility Univation (2011)

Particle Size STD/1440

Method Light scattering – Malvern Mastersizer

<i>Range (µm)</i>	<i>Volume (%)</i>
<1 µm	0
<10 µm	13.4
<100 µm	98.5

Remarks The test substance was XCAT VP-110 Catalyst. Average particle size 33.1 µm
 Test Facility Univation (2011)

Flammability - Pyrophoric Solid STD/1439

Method Test was performed to section 14.5.3 - UN recommendations on the transportation of dangerous goods test method for pyrophoric solids
 Remarks Test was performed on XCAT VP-100 Catalyst. Positive results were obtained on all four samples tested, indicating that the material is classified as a pyrophoric solid of Packing Group I of Division 4.2.
 Test Facility Chilworth (2012a)

Flammability - Modified Pyrophoric/Spontaneous Combustion Assay STD/1440

Method IEC Document 31H (1993) Methods for Determining the Minimum Ignition Temperature of Dusts (Part 1: Dust Layer on a Heated Surface at Constant Temperature).
 Remarks ASTM E2021 Standard Test Method for Hot-surface Ignition Temperature of Dust Layers
 Test was performed on XCAT VP-110 Catalyst. Peak exothermic temperature of 426 °C was reached after 2 min 50 sec. Under the test criteria the notified chemical was considered pyrophoric and capable of self-ignition on short exposure to air.
 Test Facility Chilworth (2012b)

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