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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME (NICNAS)

PUBLIC REPORT

Chemical in Bayhydrol A 2542 & Bayhydrol A 2646

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.

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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/1918	Covestro Pty Ltd	Chemical in Bayhydrol A 2542 & Bayhydrol A 2646	ND*	≤ 1 tonne per annum	Component of coatings

*ND = not determined

CONCLUSIONS AND REGULATORY OBLIGATIONS

Hazard classification
As no toxicity data were provided, the notified chemical cannot be classified according to the *Globally Harmonised System of Classification and Labelling of Chemicals* (GHS), as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

Human health risk assessment
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 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 low import volume and the reported use pattern, the notified chemical is not considered to pose an unreasonable risk to the environment.

Recommendations

CONTROL MEASURES

Occupational Health and Safety

- No specific engineering controls, work practices or personal protective equipment are required for the safe use of the notified chemical itself. However, these should be selected on the basis of all ingredients in the formulation.

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

- Spray applications should be carried out in accordance with the Safe Work Australia Code of Practice for *Spray Painting and Powder Coating* (SWA, 2015) or relevant State or Territory Code of Practice.

- A copy of the (M)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.

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.

Emergency procedures

- Spills or accidental release of the notified chemical should be handled by containment, physical collection and subsequent safe disposal.

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;

or

(2) Under Section 64(2) of the Act; if
  - the function or use of the chemical has changed from a component of a coatings, 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.

(Material) Safety Data Sheet
The (M)SDS of the product containing the notified chemical provided by the notifier was reviewed by NICNAS. The accuracy of the information on the (M)SDS remains the responsibility of the applicant.

ASSESSMENT DETAILS

1. APPLICANT AND NOTIFICATION DETAILS

APPLICANT(S)
Covestro Pty Ltd (ABN: 18 086 237 765)
17 - 19 Wangara Road
CHELTENHAM VIC 3192

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 claimed exempt from publication: chemical name, other names, CAS number, molecular and structural formulae, molecular weight, analytical data, degree of purity, import volume, and site of reformulation.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)
Variation to the schedule of data requirements is claimed for all physico-chemical endpoints (except partition co-efficient).

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)
None

NOTIFICATION IN OTHER COUNTRIES
None

2. IDENTITY OF CHEMICAL

MARKETING NAME(S)
Bayhydrol A 2542 (containing notified chemical at up to 2.5%)
Bayhydrol A 2646 (containing notified chemical at up to 2.5%)

MOLECULAR WEIGHT
> 500 Da

ANALYTICAL DATA
Reference IR spectra was provided.

3. COMPOSITION

DEGREE OF PURITY
> 75%

HAZARDOUS IMPURITIES/RESIDUAL MONOMERS
None

NON HAZARDOUS IMPURITIES/RESIDUAL MONOMERS (> 1% BY WEIGHT)
None

ADDITIVES/ADJUVANTS
None

4. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AT 20 °C AND 101.3 kPa: Colourless viscous liquid (Notified chemical at 100% concentration)

Property	Value	Data Source/Justification
Melting Point/Freezing Point	Not determined	Estimated (expected to be < 0 °C)*
Boiling Point	603.82 °C	Calculated (using MPBPWIN vl.43)

Density	Not determined	Estimated (expected to be >1000 kg/m^3)*
Vapour Pressure	1.15×10^{-17} kPa at 25 °C	Calculated using MPBPWIN vl.43 (US EPA, 2011)
Water Solubility	2.543×10^{-6} g/L at 25 °C	Calculated using WSKOW v1.43 (US EPA, 2011)
Hydrolysis as a Function of pH	Not determined	Contains hydrolysable functionalities; however, not expected to rapidly hydrolyse under environmental conditions (pH 4-9) based on low predicted water solubility
Partition Coefficient (n-octanol/water)	log Pow = 5.6 at 20 °C	Measured
Adsorption/Desorption	log K_{oc} = 3.069	Calculated using KOCWIN v2.00 (US EPA, 2011)
Dissociation Constant	Not determined	Contains no dissociable functionalities
Flash Point	Not determined	Not expected to be flammable*
Flammability	Not determined	Not expected to be flammable (low Vapour pressure)*
Autoignition Temperature	Not determined	Not expected to undergo autoignition*
Explosive Properties	Not determined	The notified chemical contains no functional groups that would imply explosive properties.
Oxidising Properties	Not determined	The notified chemical contains no functional groups that would imply oxidising properties.

* Imported product containing the notified chemical at up to 15% concentration in solution

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

Reactivity
The notified chemical is expected to be stable under normal conditions of use.

Physical hazard classification
Based on the submitted physico-chemical data depicted in the above table, the notified chemical is not recommended for hazard classification according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia.

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. It will be imported into Australia as a component of a formulated product at a concentration of up to 15% in 205 L drums.

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

Year	*1*	*2*	*3*	*4*	*5*
Tonnes	< 1	< 1	< 1	< 1	< 1

PORT OF ENTRY
Melbourne

IDENTITY OF MANUFACTURER/RECIPIENTS
Covestro Pty Ltd

TRANSPORTATION AND PACKAGING
The imported notified chemical will be transported by road to the notifier warehouses. It will then be transported by road to the formulation site. The notified chemical will be reformulated into two-part polyurethane coating products at up to 5% concentration and dispensed / packaged in 5 to 20 L cans. The cans containing the coatings at up to 5% notified chemical will be finally transported by road to the end-use / application sites.

USE
The notified chemical will be used as a component of two-part waterborne polyurethane construction coatings (at up to 5% concentration) for internal or external concrete floors and walls in factories, warehouses and hospitals. The final use concentration of the notified chemical after 1:1 mixing of the polyol and the isocyanate component just prior to application will be up to 2.5%. Coatings containing the notified chemical will not be available to the public.

OPERATION DESCRIPTION
Reformulation
The imported product containing the notified chemical at < 15% concentration will be transferred from the 205 L drums to the mixing vessel using metered pumps. The notified chemical will be blended with other ingredients in the sealed mixing vessel fitted with a high-speed mixer with local exhaust ventilation expected to be in place. Once mixing is complete, samples will be taken for quality control testing and the resultant coating will be automatically dispensed into 5 to 20 L cans under exhaust ventilation for supply to professional painters. The concentration of the notified chemical in the coating product will be up to 5%.

End use
At the end-use / application site, cans containing the notified chemical at 5% concentration will be opened by the professional painters and mixed in 1:1 ratio with other components to make a final coating containing the notified chemical at a concentration of 2.5%. The mixed coating will be applied by roller or brush to concrete walls and floors. In some circumstances, the coating may also be applied using airless spray.

6. HUMAN HEALTH IMPLICATIONS

6.1. Exposure Assessment

6.1.1. Occupational Exposure

CATEGORY OF WORKERS

Category of Worker	*Exposure Duration (hours/day)*	*Exposure Frequency (days/year)*
Transport and warehouse	1-2	10-20
Manufacture/blending	4-8	200
QC/testing	0.5-1	200
End use	4-8	200

EXPOSURE DETAILS
Transport and warehouse
It is anticipated that transport and warehouse/store personnel would only be exposed to the notified chemical (at a concentration of < 15%) in the event of an accident.

Reformulation
Dermal and ocular exposure to the notified chemical (at a concentration of < 15%) may occur during connection and disconnection of transfer lines and equipment cleaning/maintenance. Exposure to the notified chemical at other times is expected to be negligible given the reformulation process will be largely enclosed and automated. Exposure to the notified chemical is expected to be minimised by the use of PPE (including overalls, safety boots, safety glasses and hard hat in addition to wearing resistant gloves and a respirator during connection/disconnection of transfer lines) as stated by the notifier. Quality assurance (QA) staff may be dermally exposed to the notified chemical while taking samples for testing. The QA workers are expected to wear laboratory coats, safety boots, gloves and safety glasses when performing sampling and testing processes.

End Use
Dermal, ocular and inhalation exposure to the notified chemical (at a concentration of < 5%) may occur when applying the coating by spray (air-less), roller or brush to concrete walls and floors. Exposure is expected to be minimised by the stated use of PPE (including coveralls, boots, gloves and respiratory protection).

Once the coating has cured, the notified chemical will be incorporated into a solid, inert, solid matrix and will not be available for exposure.

6.1.2. Public Exposure

The notified chemical is intended for industrial use only, and will not be available to the public. Direct exposure would therefore not be expected. Indirect exposure from accidental spills or environmental sources may be possible, but are unlikely for the proposed use.

Members of the public may experience dermal contact with walls and floors treated with coatings containing the notified chemical. However, in such coatings the notified chemical will be bound within a solid matrix and will not be available for exposure.

6.2. Human Health Effects Assessment

No toxicity data were submitted for the notified chemical.

No information on the toxicokinetics of the notified chemical was provided. For dermal absorption, molecular weights below 100 Da are favourable for absorption and molecular weights above 500 Da do not favour absorption (ECHA, 2014). Water solubility below 1 mg/L and log Pow values of greater than 4 indicate that a substance may not be sufficiently soluble in water to partition from the stratum corneum into the epidermis (ECHA, 2014). The notified chemical has a relatively high molecular weight (> 500 Da), low calculated solubility (2.543×10^{-6} g/L) and a high log Pow (5.6), and hence absorption across biological membranes is expected to be limited.

Health hazard classification

As no toxicity data were provided, the notified chemical cannot be classified according to the *Globally Harmonised System of Classification and Labelling of Chemicals (GHS),* as adopted for industrial chemicals in Australia, or the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 2004).

6.3. Human Health Risk Characterisation

6.3.1. Occupational Health and Safety

No toxicity data was provided for the notified chemical. However, the risk of local and systemic effects from exposure to the notified chemical may be limited by the high molecular weight (> 500 Da), low calculated solubility (2.543×10^{-6} g/L), high log Pow (5.6) and moderately low concentrations (< 15%) it will be introduced at. Occupational exposure to the notified chemical is expected to be reduced due to the presence of engineering controls, and the use of PPE.

Overall, under the conditions of the occupational settings described, the notified chemical is not considered to pose an unreasonable risk to occupational health.

6.3.2. Public Health

Coatings containing the notified chemical will be used in industrial settings only and will not be sold to the public. The public may come into contact with surfaces coated with products containing the notified chemical. However, once the coatings have cured, the notified chemical will be trapped within the solid matrix and will not be available for exposure. Therefore, the risk to public health 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 chemical will be imported into Australia as a component of a product for reformulation into a two-part polyurethane construction coating for industrial applications. No significant release of the notified chemical is expected from transportation and storage, except in the unlikely event of accidental spills or leaks. In the event of spills, the products containing the notified chemical are expected to be collected with adsorbents, and disposed of to landfill in accordance with local government regulations.

Local blending and repackaging of the formulation containing the notified chemical into industrial construction coatings is expected to occur within enclosed automated systems. Wastes containing the notified chemical generated during reformulation include equipment wash water, empty import containers, and spilt materials. It is estimated by the notifier that a maximum of 1% of the import volume (or up to 10 kg) of the notified chemical may be released from reformulation processes. Wastes may be collected and released to sewers in a worst case scenario, or disposed of to landfill in accordance with local government regulations.

RELEASE OF CHEMICAL FROM USE
Construction coatings containing the notified chemical will be used by professional users only. During use, construction coatings containing the notified chemical are expected to be applied to walls and floors by brush and roller. Excess coating or spills are expected to be collected on drop sheets or adsorbents, and disposed of to landfill.

During use, the notified chemical may also be released to the environment as accidental spills and container residues. It is estimated by the notifier that a maximum of 4% of the import volume (or up to 40 kg) of the notified chemical may be released from accidental spills and container residues. These releases are expected to be collected and disposed of to landfill in accordance with local government regulations.

RELEASE OF CHEMICAL FROM DISPOSAL
The notified chemical in industrial construction coatings is expected to share the fate of the substrate to which it has been applied. These are predominantly expected to be disposed to landfill at the end of their useful life.

Residues containing the notified chemical on brushes and rollers are expected to be rinsed with water, and then disposed of to sewer. It is estimated by the notifier that up to 5% of the import volume (or up to 50 kg) may be released from equipment cleaning.

7.1.2. Environmental Fate
No environmental fate data were submitted for the notified chemical. The majority of the notified chemical is expected to be cured within an inert coating matrix, and is expected to share the fate of the articles to which it has been applied. These will involve eventual disposal to landfill at the end of their useful life. The notified chemical is also expected to enter landfill as collected wastes and residues. Once cured, the notified chemical is not expected to be mobile nor bioavailable.

A biodegradability of the notified chemical has been calculated using BIOWIN v4.10 (US EPA, 2011). Based on its molecular structure, the notified chemical is expected to be readily biodegradable. The notified chemical has the potential to be bioaccumulative based on its low molecular weight, low predicted water solubility and high partition coefficient (log P_{OW} = 5.6). However, this is unlikely to occur based on its predicted ready biodegradability and low bioconcentration factor (BCF = 97.18); calculated using BCFBAF v3.01 (US EPA, 2011)). Based on its calculated adsorption coefficient (log K_{OC} = 3.069), release to surface waters is unlikely to occur as partial partitioning to sludge and sediment is expected under environmental pH. In surface waters and in landfill, the notified chemical is expected to eventually degrade via biotic and abiotic processes to form water and oxides of carbon.

7.1.3. Predicted Environmental Concentration (PEC)
The calculation for the predicted environmental concentration (PEC) is summarised in the table below. Based on the reported use in industrial construction coatings for professional users and release estimate by the notifier, a conservative release of 5% to sewers on a nationwide basis over 260 working days per year is used for the notified chemical. It is also assumes a worst case scenario, where none of the notified chemical is removed during sewage treatment plant (STP) processes.

Predicted Environmental Concentration (PEC) for the Aquatic Compartment		
Total Annual Import/Manufactured Volume	1,000	kg/year
Proportion expected to be released to sewer	5%	
Annual quantity of chemical released to sewer	50	kg/year
Days per year where release occurs	260	days/year
Daily chemical release:	0.19	kg/day
Water use	200.0	L/person/day
Population of Australia (Millions)	22.613	million
Removal within STP	0%	

Daily effluent production:	4,523	ML
Dilution Factor - River	1.0	
Dilution Factor - Ocean	10.0	
PEC - River:	0.043	µg/L
PEC - Ocean:	0.004	µg/L

STP effluent re-use for irrigation occurs throughout Australia. The agricultural irrigation application rate is assumed to be 1,000 L/m^2/year (10 ML/ha/year). The notified chemical in this volume is assumed to infiltrate and accumulate in the top 10 cm of soil (density 1,500 kg/m^3). Using these assumptions, irrigation with a concentration of 0.04 µg/L may potentially result in a soil concentration of approximately 0.28 µg/kg. Assuming accumulation of the notified chemical in soil for 5 and 10 years under repeated irrigation, the concentration of the notified chemical in the applied soil in 5 and 10 years may be approximately 1.42 µg/kg and 2.84 µg/kg, respectively.

7.2. Environmental Effects Assessment

No ecotoxicity data were submitted for the notified chemical. Ecotoxicological endpoints for the notified chemical were calculated based on ecological structure active relationship (ECOSAR v1.11; US EPA, 2012) equations. The acute and chronic endpoints are summarised in the table below.

Endpoint	*Result*	*Assessment Conclusion*
Acute Toxicity		
Fish	96 h LC50 = 0.637 mg/L	Not predicted to be harmful to fish up to water solubility limit
Daphnia	48 h EC50 = 0.9 mg/L	Not predicted to be harmful to aquatic invertebrates up to water solubility limit
Algae	96 h EC50 = 0.217 mg/L	Not predicted to be harmful to algae up to water solubility limit
Chronic Toxicity		
Fish	ChV = 0.022 mg/L	Not predicted to be chronically harmful to fish up to water solubility limit
Daphnia	ChV = 0.219 mg/L	Not predicted to be chronically harmful to aquatic invertebrates up to water solubility limit
Algae	ChV = 0.179 mg/L	Not predicted to be chronically harmful to algae up to water solubility limit

The notified chemical is not predicted to be harmful to aquatic life up to the limit of its solubility in water. Therefore, the notified chemical is not formally classified under the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) (United Nations, 2009) for acute and chronic toxicities.

7.2.1. Predicted No-Effect Concentration

A predicted no-effect concentration (PNEC) for the aquatic compartment has not been calculated, since the notified chemical is not predicted to be harmful to aquatic life up to the limit of its solubility in water. It is also expected that there will be no significant release of the notified chemical to the aquatic environment.

7.3. Environmental Risk Assessment

The Risk Quotient (Q = PEC/PNEC) of the notified chemical has not been calculated, since the PNEC is not available. Based on the reported use pattern, there is low potential for release of the notified chemical to the aquatic compartment. The notified chemical is predicted to be readily biodegradable, and is not expected to be harmful to aquatic life up to the limit of its solubility in water. On the basis of the low annual importation volume and assessed use pattern in professional and consumer paints and coating formulations, the notified chemical is not expected to pose an unreasonable risk to the environment.

APPENDIX A: PHYSICAL AND CHEMICAL PROPERTIES

Partition Coefficient (n-octanol/water) log Pow = 5.6 at 20 °C

Method	OECD TG 117 Partition Coefficient (n-octanol/water). EC Council Regulation No 440/2008 A.8 Partition Coefficient.
Remarks	HPLC Method
Test Facility	Currenta (2016)

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