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**NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION
AND ASSESSMENT SCHEME**

FULL PUBLIC REPORT

Polyolefin Polymer

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Director
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FULL PUBLIC REPORT**Polyolefin Polymer****1. APPLICANT**

Dow Chemical (Australia) Limited of 541-583 Kororoit Creek Road, Altona, Victoria 3018 (ACN 000 264 979) has submitted a notification statement in support of their application for an assessment certificate for the synthetic polymer of low concern (PLC) Polyolefin Polymer.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data and details of the polymer composition have been exempted from publication in the Full Public Report.

Marketing name: Polyolefin Polymer

3. POLYMER COMPOSITION AND PURITY

Details of the polymer composition have been exempted from publication in the Full Public Report.

Purity (%): 60 - 98 %

4. PLC JUSTIFICATION

The notified polymer meets the PLC criteria.

5. PHYSICAL AND CHEMICAL PROPERTIES

Property	Result	Comments
Appearance	translucent white pellets or granules	
Melting point	170 - 190°C	
Density	940 - 1030 kg/m ³	the notified polymer is expected to float in water; MSDS gives specific gravity of 0.9 – 1.2

Water solubility	not soluble	the notified polymer contains no hydrophilic functional groups
Particle size	< 1 % fine particles (< 200 µm)	
Flammability	not flammable	
Autoignition temperature	> 300°C	
Explosive properties	not explosive	
Stability/reactivity	stable under normal environmental conditions; decomposes at 410°C	surface photodegradation is expected on exposure to sunlight
Hydrolysis as function of pH	no hydrolysable groups are present	
Dissociation constant	no dissociable groups are present	

6. USE, VOLUME AND FORMULATION

Use:

The notified polymer will be used as a structural polymer which may potentially replace other common thermoplastic materials. A wide variety of end uses is possible.

The end uses which are anticipated for the notified polymer are in plastic film and sheet manufacture, paving and roofing compounds and moulded and extruded parts.

Manufacture/Import volume:

Up to 1000 tonnes per annum notified polymer may be imported during the first five years of importation.

Formulation details:

The notified polymer may be made in a variety of compositions and blended with other polymers, and compounded with fillers, plasticisers or other additives to produce the desired properties. For paving and roofing applications, the notified polymer will be blended with asphalt, and will comprise less than 10 % of the final modified asphalt.

The notified polymer will be imported as granules or pellets of 3 - 4 mm diameter, in 25 kg polyethylene bags or 740 kg plastic lined cardboard octabins. The material is not dusty, but may contain a small percentage of “floss”; long fluffy strings of polymer.

7. OCCUPATIONAL EXPOSURE

Few details of the number of workers or anticipated exposure times were provided by the notifier. The notified polymer will be used under a wide variety of conditions in both large and small facilities.

Exposure route	Exposure details	Controls indicated by notifier
<i>Paving and Roofing</i>		
<i>Blending</i>		
dermal, inhalation	the notified polymer will be manually or automatically loaded into a high speed mixer where it will be blended with molten bitumen at 175 - 235°C; the bitumen will either be mixed with aggregate (up to 95 %) to produce hot mix for paving purposes, applied to a roofing membrane by dipping in an enclosed system, or used as is for mopping application for roofing	safety glasses, long sleeves and trousers, safety boots, heat resistant gloves and hearing protection will be used
<i>Paving and Roofing Application</i>		
dermal	asphalt hot mix containing the notified polymer will be handled by bitumen terminal employees and truck drivers during loading and unloading of hot mix trucks, and by road making crews who will use brooms to spread the hot mix prior to finishing by road rollers; an automated laying system may also be used modified asphalt will be applied to roofing by spreading from pails onto the roof by mop, prior to the application of roofing membrane sheet during the above applications, the primary hazard will be due to the elevated temperatures used	safety glasses, long sleeves and trousers, safety boots and heat resistant gloves will be used

Manufacture of Articles

Continuous Film, Pipe and Sheet Manufacture (8-12 hr/day, daily)

dermal, inhalation	the notified polymer will be manually or automatically loaded into a feed hopper, blended with additives and extruded through a die at 180 - 330°C; little dust exposure is expected due to the form of the notified polymer; dermal contact may occur during manual loading and handling the extruded articles	enclosed system due to the high temperatures used; local exhaust ventilation at the die head cotton gloves, safety glasses, body covering clothing and hearing protection will be used
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Moulded and Extruded Part Manufacture (8-12 hr/day, daily)

dermal,	as for Continuous Film, Pipe and Sheet	as for Continuous Film, Pipe
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inhalation	Manufacture	and Sheet Manufacture
<i>Recycling of Scrap Polymer</i>		
dermal, inhalation	rejects from the article manufacture processes will be recycled by granulation and recycling; some dust may be formed if manual feeding of a recycling granulator occurs	an air purifying respirator will be used during manual feeding and unloading of granulators
<i>Maintenance</i>		
dermal, inhalation	dust buildup and floss will be removed as required; extruders and dies will be cleaned by warming in an oven to 150 - 200°C and removing the softened polymer	respirators may be used if high levels of dust buildup have occurred
<hr/> <i>Transport and storage</i>		
none	no exposure is expected except in case of an accident where pellets are spilt	none
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8. PUBLIC EXPOSURE

Given the range of products likely to include the notified polymer, public contact with the notified polymer is likely to be frequent and widespread.

The notified polymer has a high molecular weight and low water solubility, and is therefore unlikely to cross biological membranes. It will be bound in the matrix of products containing it, and therefore systemic exposure in members of the public coming in contact with the notified polymer is likely to be negligible.

9. ENVIRONMENTAL EXPOSURE

9.1. Release

A small amount of pellets may be spilt during transfer to hoppers or silos, but most of this material will be swept up and returned to the process.

While most of the waste polymer generated during processing, including off-cuts from the manufacturing process, will be recycled or reprocessed, the notifier estimates that processing waste will account for a maximum of 2 % of the imported polymer, or < 20 tonnes per annum, that will be disposed of to land-fill.

The notifier states that it is unlikely that there will be any release of the polymer from processing equipment, as the equipment will normally be fully enclosed, up to and including extrusion, moulding or casting of the finished product. For all applications, once the final product containing the polymer is no longer required by the end-user, the vast majority will end up in a landfill. Polymer in plastic film and sheeting used for packaging industrial products may end up in land-fill sooner than other more durable products, which could generally be assumed to have a lifespan of ten years. Polymer in finished products is suitable for recycling and could be recast in mixed forms with other plastics and materials or used in

paving and roofing material. However, initially there will be limited opportunity for recycling as the polymer does not fall into any of the commonly recycled plastics categories. The notifier suggests that the amount of final product that will be released to land-fill, could be reduced from 95 % in the first year to lower levels in subsequent years, but it would be dependent on local collection and recycling schemes and the availability of reprocessing facilities.

9.2. Fate

Spillage of the notified polymer, during transport, storage and processing is expected to be minimal and mostly in the case of accidents. The notified polymer is not expected to be soluble in water, and to float in the aquatic environment. After processing, the notified polymer will be firmly bound in an inert, thermoplastic matrix. Ultimately all of the imported polymer will end up in landfill when the final products are discarded. In landfill, the polymer should not leach into the aquatic compartment as it will be contained within an inert matrix. Although the polymer is said to be susceptible to photo-degradation, it is likely to persist in land-fill for a considerable period of time.

In the event of fire, the notified polymer is combustible at temperatures greater than 300°C, and complete combustion would yield carbon dioxide and water.

10. EVALUATION OF HEALTH EFFECTS DATA

No toxicological data were submitted.

The health hazards of the constituents and hazardous impurities, additives and adjuvants are tabulated below.

Chemical	Health hazards	Regulatory controls
Constituents	no residual monomers are present at or above the relevant cutoffs for the notified polymer to be classified as a hazardous substance	
Hazardous impurities		
talc	subject to debate; talc is a respiratory hazard although it has been concluded that in the absence of asbestos, it should not be considered a human carcinogen (American Conference of Government Industrial Hygienists, 1998)	national exposure standard 2.5 mg/m ³ (inspirable dust) (NOHSC, 1995)
Additives/adjuvants	none present	

11. EVALUATION OF ENVIRONMENTAL EFFECTS DATA

No ecotoxicological data were submitted.

12. ENVIRONMENTAL RISK ASSESSMENT

The majority of the notified polymer, in its various product forms, will end up in landfill with little loss attributed to product manufacture. The notified polymer is not expected to pose a hazard to the environment, because once it has been thermally treated and incorporated into final products, it will be bound in an inert matrix. The polymer is likely to persist in the environment, even though it is said to be susceptible to photo-degradation. However, the products themselves may cause a physical problem due to their durability and tendency to be disposed of inappropriately (Bartha, 1997).

The notified polymer is not likely to present a hazard to the environment when it is stored, transported and used in the proposed manner.

13. HEALTH AND SAFETY RISK ASSESSMENT

13.1. Hazard assessment

No toxicological information has been provided for the notified polymer. Therefore the substance cannot be assessed against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999). The polymer is not reactive, and because of the high molecular weight is not expected to cross biological membranes. The polymer and modified bitumen containing the polymer will be solid at room temperature, and the notified polymer is therefore expected to be unavailable for exposure.

13.2. Occupational health and safety

The major occupational hazard associated with the use of the polymer is the use of elevated temperatures in all of the processing steps above. Worker protection against the hot molten polymer or polymer modified bitumen is required. On cooling, drips and spills of polymer or bitumen will harden and encapsulate the polymer.

Care should be taken while working with molten polymer to ensure that the temperature does not rise above 410°C, to avoid the formation of fumes from polymer decomposition. Should this occur, respiratory protection will be required. The Material Safety Data Sheet (MSDS) indicates that toluene and styrene, both of which have NOHSC exposure standards (NOHSC, 1995), may be released on heating.

Under normal conditions of use of the notified polymer, little occupational exposure is expected as the polymer is in a physical form (large granules) which precludes inhalation exposure and skin absorption. Once processed, eg by extrusion or injection moulding, the polymer is in solid form and unavailable for exposure. Workers should be protected from contact with the molten polymer because of the high temperatures involved.

Talc is present in the notified polymer as a filler, at less than 2 %. There is a national exposure standard of 2.5 mg/m³ for talc (inspirable dust) (NOHSC, 1995). The notifier has indicated that there is also an internal company exposure guideline of 0.5 mg/m³ for respirable talc dust. The talc is bound within the polymer matrix and is reportedly not a dust source under normal conditions of use. The polymer also contains a very small proportion of

hazardous residual monomer, which will normally be bound within the matrix and unavailable for exposure.

Conclusion

Due to its high molecular weight, low reactivity and low potential for exposure, the notified polymer is not likely to pose a significant occupational health hazard.

13.3. Public health

The notified polymer will not be sold to the general public except in the form of finished articles. There is potential for extensive public exposure to articles comprised wholly or partly of the notified polymer. Given that the notified polymer is chemically stable and resistant to biological or other forms of degradation, and is firmly bound within the thermoplastic matrix, and the finished articles will not be used for food contact applications, the risk to public health resulting from use of articles containing the notified polymer will be low.

The notified polymer contains small levels of residual hazardous monomer, well below the level where the notified polymer would be classified as hazardous. The preclusion of the use of the notified polymer for applications where it is in direct contact with food, or in applications where chewing on the product by small children is likely, is nonetheless appropriate as these applications may lead to some exposure to residual monomer.

14. MSDS AND LABEL ASSESSMENT

14.1. MSDS

The MSDS of the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994a). It is published here as part of the assessment report. The accuracy of the information on the MSDS remains the responsibility of the applicant.

14.2. Label

The label for the notified polymer provided by the notifier was in accordance with the NOHSC *National Code of Practice for the Labelling of Workplace Substances* (NOHSC, 1994b). The accuracy of the information on the label remains the responsibility of the applicant.

15. RECOMMENDATIONS

To minimise occupational exposure to Polyolefin Polymer, the following guidelines and precautions should be observed:

- Employers should ensure that NOHSC exposure standards for toluene and styrene are not exceeded in the workplace; where engineering controls and work practices do not reduce vapour exposure to safe levels, an air fed respirator should also be used;
- Protective eyewear, industrial clothing and footwear should be used during occupational handling of the notified polymer;
- Spillage of the notified chemical should be avoided. Spillages should be swept up promptly and put into containers for disposal;
- A copy of the MSDS should be easily accessible to employees.

If products containing the notified polymer are hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999b), workplace practices and control procedures consistent with State and Territory hazardous substances regulations must be in operation.

Guidance in selection of protective eyewear may be obtained from Australian Standard (AS) 1336 (Standards Australia, 1994) and Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); for industrial clothing, guidance may be found in AS 3765.2 (Standards Australia, 1990); for occupational footwear, in AS/NZS 2210 (Standards Australia/ Standards New Zealand, 1994a); for respirators, in AS/NZS 1715 (Standards Australia/ Standards New Zealand, 1994b) and AS/NZS 1716 (Standards Australia/ Standards New Zealand, 1994c).

16. REQUIREMENTS FOR SECONDARY NOTIFICATION

Secondary notification may be required if:

- any of the circumstances stipulated under subsection 64(2) of the Act arise. If any importer or manufacturer of the notified polymer becomes aware of any of these circumstances, they must notify the Director within 28 days; or
- the notified polymer is introduced in a chemical form that does not meet the PLC criteria.

17. REFERENCES

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