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

FULL PUBLIC REPORT

**Polymer in FLO XLe and
FLO MXP Pipeline Booster**

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Director

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TABLE OF CONTENTS

FULL PUBLIC REPORT	3
1. APPLICANT AND NOTIFICATION DETAILS	3
3. PLC CRITERIA JUSTIFICATION	3
4. INTRODUCTION AND USE INFORMATION	3
5. PROCESS AND RELEASE INFORMATION	4
5.1. Operation Description	4
6. EXPOSURE INFORMATION	4
6.1. Summary of Occupational Exposure	4
6.2. Summary of Public Exposure	4
6.3. Summary of Environmental Exposure	4
6.3.1. Environmental Release	4
6.3.2. Environmental Fate	5
7. PHYSICAL AND CHEMICAL PROPERTIES	5
8. HUMAN HEALTH IMPLICATIONS	5
8.1. Toxicology	5
8.2. Human Health Hazard Assessment	5
9. ENVIRONMENTAL HAZARDS	5
9.1. Ecotoxicology	5
9.2. Environmental Hazard Assessment	6
10. RISK ASSESSMENT	6
10.1. Environment	6
10.2. Occupational Health and Safety	7
10.3. Public Health	7
11. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS	7
11.1. Environmental Risk Assessment	7
11.2. Human Health Risk Assessment	7
11.2.1. Occupational health and safety	7
11.2.2. Public health	7
12. MATERIAL SAFETY DATA SHEET	7
12.1. Material Safety Data Sheet	7
13. RECOMMENDATIONS	7
13.1. Secondary Notification	8

FULL PUBLIC REPORT**Polymer in FLO XLe and
FLO MXP Pipeline Booster****1. APPLICANT AND NOTIFICATION DETAILS**

APPLICANT(S)

Baker Petrolite, a Division of Baker Hughes Australia Pty Ltd (ABN 20 004 752007) of 5 Walker Street Braeside Victoria 3195

NOTIFICATION CATEGORY

Polymer of Low Concern

EXEMPT INFORMATION (SECTION 75 OF THE ACT)

Data items and details claimed exempt from publication:

Chemical Name, CAS Number, Molecular and Structural Formulae, Molecular Weight, Polymer Constituents Residual Monomers/Impurities and means of identification.

VARIATION OF DATA REQUIREMENTS (SECTION 24 OF THE ACT)

No variation to the schedule of data requirements is claimed.

PREVIOUS NOTIFICATION IN AUSTRALIA BY APPLICANT(S)

Yes, CEC 639 (Baker Petrolite)

NOTIFICATION IN OTHER COUNTRIES

USA and Canada.

3. PLC CRITERIA JUSTIFICATION

<i>Criterion</i>	<i>Criterion met (yes/no/not applicable)</i>
Molecular Weight Requirements	Yes
Functional Group Equivalent Weight (FGEW) Requirements	Yes
Low Charge Density	Yes
Approved Elements Only	Yes
Stable Under Normal Conditions of Use	Yes
Not Water Absorbing	Yes
Not a Hazard Substance or Dangerous Good	Yes

4. INTRODUCTION AND USE INFORMATION

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

The notified polymer will be imported as an ingredient of a finished product at a maximum concentration of 25%.

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>	50	50	50	50	50

USE

The polymer is designed to improve hydrocarbon fluid flow through pipelines by reducing the frictional pressure loss.

5. PROCESS AND RELEASE INFORMATION

5.1. Operation Description

The notified polymer will be imported as an ingredient of a finished product in 55 gallon drums or totes tanks at a maximum concentration of 25%. No reformulation will be done in Australia. The drums/totes will be taken to the customer site where they will be placed and stored on metal bulki bunds which are contained within a bunded area on a platform.

At the customer's site products containing the notified polymer will be transferred by means of gravity, using quick-connect fittings and valves to prevent potential exposure to the product. The product is injected directly from the totes into pipelines via an injection skid, which contains an air driven, high pressure adjustable rate pump, flow meter, and other instrumentation. Typical treatment rates are generally between 2 and 20 ppm (0.38 to 3.8 litres per 1000 barrels of oil). Specific treatment rate is dependent on throughput requirements, fluid properties and pipeline hydraulics.

6. EXPOSURE INFORMATION

6.1. Summary of Occupational Exposure

During transport and storage, workers are unlikely to be exposed to the notified polymer except when packaging is accidentally breached.

At the customer site, worker exposure to the notified polymer is possible during opening and closing of drums, fitting to the hose, mixing and pumping operations. The possible routes of exposures are via dermal, inhalation and accidental eye contact.

However, exposure to significant amounts of the notified polymer is limited because of the engineering controls and personal protective equipment worn by workers.

6.2. Summary of Public Exposure

The imported products containing the notified polymer will not be sold to the public and, therefore, the sole opportunity for public exposure may be a transport accident where containers are ruptured.

As there will be no expected exposure of the public to the notified polymer, the health risk to the public from exposure to the notified polymer is considered negligible.

6.3. Summary of Environmental Exposure

6.3.1. Environmental Release

Since the notified polymer will not be manufactured locally, there will be no environmental exposure associated with this process in Australia. Environmental release of the notified substance is considered to be negligible during transport and storage of the imported product. Any release due to accidental spills and leaks will be minimal due to the packaging design and established emergency procedures (containment, soaked up with inert absorbent material (sand, soil or vermiculite) and placed in a sealable labelled container for appropriate disposal).

Release of the notified polymer to the atmosphere is unlikely to occur as the relative vapour pressure is expected to be low.

Addition of the product to the pipeline will be done by specially designed equipment with injection directly from the totes. Therefore, release during blending procedures is unlikely. Any spills or releases will be minimised and contained by engineering, institutional controls and procedures.

Within components of the pipeline the notified polymer will breakdown due to the shear pressure, thus by the time the crude oil is refined or the hydrocarbon fuel is used it is stated that only the degradation products will be present. These will be destroyed during refining or as the fuel is used (eg burnt, together with the fuel, during the internal combustion process) and would not be released to the environment. Therefore the notified polymer will not be released to the environment during its use.

The amount of residue in import drums was estimated to be less than 1% per annum (ie up to 500 kg of the notified polymer annually). The import containers and any residual product will be sent to a reconditioning facility, where they are to be cleaned and the residues are expected to be disposed of by incineration.

6.3.2. Environmental Fate

The notified polymer's poor water solubility and likely hydrophobic nature are indicative of partitioning into the octanol phase and immobility in soil. It has no hydrolysable groups or dissociable groups.

7. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa	The polymer is sold as an off-white slurry of polymer particules suspended in a solvent system.
Melting Point	The polymer itself exists in a highly amorphous state and therefore no detectable melting point.
Specific Gravity	0.64 to 0.89 (marketed product).
Water Solubility	The polymer is a non-polar hydrocarbon and not water soluble.
Particle Size	240–500 microns in suspended in an alcohol/glycol ether mixture. This is not a solid material. This is only sold as a dispersion.
Reactivity	The polymer is not reactive. Shear reduces molecular weight.
Degradation Products	The polymer will decompose at very high temperature.

8. HUMAN HEALTH IMPLICATIONS

8.1. Toxicology

No toxicological data were submitted.

8.2. Human Health Hazard Assessment

The notified polymer meets the PLC criteria and can therefore be considered to be of low hazard.

9. ENVIRONMENTAL HAZARDS

9.1. Ecotoxicology

A summary table of results of range finding studies for FLO XL, using a water soluble fraction, was submitted. It is unclear as to how much of the notified polymer dissolved. The values could not be confirmed as no study reports were submitted and appear to be generated by non-standard methods. However, two brief ecotoxicity studies and a biodegradation study reports for related formulations containing 5-26% of the notified polymer, that are not proposed for use in Australia, were provided and are discussed below.

<i>Endpoint</i>	<i>Result and Conclusion</i>
<u>Ecotoxicity Data For Flow-XI</u>	
Fish Toxicity –Silverside minnow	48 h EC50 >1053 mg/L
Aquatic Invertebrate Toxicity – Mysid shrimp	48 h EC50 >1013 mg/L
<u>Related formulations</u>	
Fish Toxicity –Silverside minnow	48 h EC50 >1040 mg/L
	48 h EC50 >1160 mg/L
	48 h EC50 >1200 mg/L (see comments below)

	48 h EC50 >1113 mg/L
Aquatic Invertebrate Toxicity	48 h EC50 >1013 mg/L
– Mysid shrimp	48 h EC50 >1087 mg/L
	48 h EC50 >1420 mg/L
	48 h EC50 >1127 mg/L (see comments below)
	48 h EC50 >1113 mg/L
28 day biodegradation	1.0 mg O ₂ /g (see comments below)

Forty-eight hour range finding studies using the water soluble fraction of FLO 1020 (a related formulation) were undertaken for toxicity to Mysid shrimp (*Mysidopsis bahia*) and Inland Silverside (*Menidia beryllina*). In both studies the test medium was prepared by the addition of a measured amount of test substance to 1.5 L of saltwater, the solution was stirred for 24 hours and then allowed to stand for several hours. After this the liquid proportion was removed ready for use in the study. The temperature was maintained at 20±2°C, there was no aeration during the study and a photoperiod of 16 hours light and 8 hours dark was maintained in both studies. In the both studies there were 10 organisms per replicate concentration.

The 48 hour timeframe used in the fish or mysid studies is not standard. Under OECD or US EPA guidelines it is usually 96 hours. These results indicate that the notified polymer is not toxic to aquatic organisms up to the limit of its water solubility.

The study report of the biodegradability of FLO 1020 in seawater was submitted. The method used was not based on OECD guidelines but on Norwegian methods. A measured amount of the test substance was continuously shaken with saltwater, from which the suspended solids had been removed, at 20°C for 28 days. The dissolved oxygen (DO) was measured at the beginning, then on days 7, 14, 21 and 28 with a dissolved oxygen meter. After day 28 DO reading the test bottles were aerated for 15 minutes and the subsequent DO measured. The test was conducted in triplicate with a reference chemical, sodium acetate. The reference substance reached 58.45% degradation on day 7 and 74.75% on day 28, while for the test substance it was 13.7% and then 1.0% respectively. Therefore the study conditions were validated by the reference substance's degradation, but it can be seen that the test substance did not biodegrade.

9.2. Environmental Hazard Assessment

The ecotoxicity data provided indicate that the notified polymer is not toxic to aquatic organisms up to the limit of its water solubility. Nonionic polymers which have MW > 1000 are generally of low concern.

10. RISK ASSESSMENT

10.1. Environment

The intended use pattern of the polymer as a pipeline additive is not expected to result in a significant release to the environment. When the oil or fuel in which the polymer has been used is refined or consumed in the engine/internal combustion process, the combustion of the degraded polymer will result in water and oxides of carbon. In the event of spills and minor releases during transfer operations, the MSDS of the additive package containing the polymer contains information on procedures to reduce release to the environment. Small amounts of the notified polymer that are disposed of to landfill, either from drum residues or spill clean-ups, will be expected to be strongly bound to the soils and sediments and be unlikely to enter the water compartment due to its very low solubility and anticipated high partition coefficient. In landfill the notified polymer is not expected to hydrolyse but will slowly biodegrade.

There is no direct data to support the claim of degradation due to shear in the pipeline or complete combustion of the degraded polymer to oxides of carbon and hydrogen when the fuel is burnt. However, it is evident that the polymer which is made up of hydrocarbon and oxygen, as are the constituents of the petrol of which it will be a minute part, is not expected to survive the temperatures at which the fuel is exploded within the internal combustion engine. During the refining process, which consists of distillation and then chemical processing (cracking) to produce finished petroleum products, the notified polymer will be degraded.

The ecotoxicity data provided and likely low release to water indicate that there is unlikely to be an environmental risk in the aquatic compartment under the proposed use pattern. Given the above, environmental exposure and the overall environmental hazard is expected to be low.

10.2. Occupational Health and Safety

The notified polymer is of very high molecular weight with low volatility. Worker exposure to the notified polymer is limited because of the engineering controls and personal protective equipment worn by workers. The notified polymer will be present in the product at a low concentration. The notifier states that the polymer is being used internationally for the last 12 years and there is no reported incidence of adverse health effects from the use of the notified polymer. Therefore, based on the information provided by the notifier and the use of PPE, occupational risk is considered to be low.

The notified polymer may be present in formulations containing hazardous ingredients. If these formulations are classified as hazardous to health in accordance with the NOHSC Approved Criteria for Classifying Hazardous Substances, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

10.3. Public Health

As there will be no exposure of the public to the products containing the notified polymer the risk to the public from exposure to the notified polymer is considered low.

11. CONCLUSIONS – ASSESSMENT LEVEL OF CONCERN FOR THE ENVIRONMENT AND HUMANS

11.1. Environmental Risk Assessment

The polymer is not considered to pose a risk to the environment based on its reported use pattern.

11.2. Human Health Risk Assessment

11.2.1. Occupational health and safety

There is Low Concern to occupational health and safety under the conditions of the occupational settings described.

11.2.2. Public health

There is No Significant Concern to public health when used in the proposed manner.

12. MATERIAL SAFETY DATA SHEET

12.1. Material Safety Data Sheet

The notifier has provided product MSDS containing notified polymer, as part of the notification statement. The accuracy of the information on the MSDS remains the responsibility of the applicant.

13. 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 polymer 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.
- A copy of the MSDS should be easily accessible to employees.

- If products and mixtures containing the notified polymer are classified as hazardous to health in accordance with the NOHSC *Approved Criteria for Classifying Hazardous Substances*, workplace practices and control procedures consistent with provisions of State and Territory hazardous substances legislation must be in operation.

Environment

- The following control measures should be implemented by the importer and user to minimise environmental exposure during (manufacture, formulation, use) of the notified polymer:
 - All areas in which the formulation is used or stored must be bunded with no access to storm drains. If drains are present then these must be diverted to on-site collection pits or treatment plants.

Disposal

- The notified polymer should be disposed of to secure landfill or by incineration.

Emergency procedures

- Land spill
If the notified polymer is spilled outside the workplace, the liquid should be prevented from entering sewers, watercourses or low areas. The liquid should be contained with sand or earth and recovered by pumping or by absorption into sand or earth before being disposed in an approved manner
- Water spill
The spill should be removed from the surface of the water by skimming or with suitable absorbent. If appropriate, sinking and/or dispersants may be used in non-confined waters.

13.1. Secondary Notification

The Director of Chemicals Notification and Assessment must be notified in writing within 28 days by the notifier, other importer or manufacturer:

- (1) Under subsection 64(1) of the Act; if
 - the notified polymer is introduced in a chemical form that does not meet the PLC criteria.or
- (2) Under subsection 64(2) of the Act:
 - if any of the circumstances listed in the subsection arise.

The Director will then decide whether secondary notification is required.