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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Poly(oxy-1,2-ethandiyl), alpha-undecyl-omega-hydroxy-, (9CI)

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989, as amended* and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health, Housing, Local Government and Community Services.

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Director
Chemicals Notification and Assessment

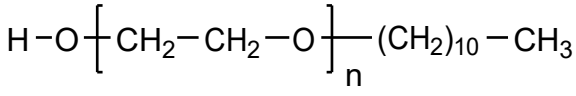
FULL PUBLIC REPORT

Poly(oxy-1,2-ethandiyl), alpha-undecyl-omega-hydroxy-, (9CI)

1. APPLICANT

Shell Chemical (Australia) Pty Ltd, 1 Spring St, Melbourne Vic 3000.

2. IDENTITY OF THE CHEMICAL

Chemical name:	Poly(oxy-1,2-ethandiyl), alpha-undecyl-omega-hydroxy-, (9CI)
Chemical Abstracts Service (CAS) Registry No.:	34398-01-1
Other names:	Polyethylene glycol monoundecyl etherundecyl ether
Trade names:	NEODOL 1-9
Molecular formula:	$C_{11}H_{23}(C_2H_4O)_nOH$
Structural formula:	 n=9
Molecular weight:	550-590

Method of detection and determination: May be detected by high-performance liquid chromatography equipped with a rotating disc flame ionization detector.

Spectral data: An Infra Red spectrum was provided with major peaks at 1200, 2900 and 3500 cm^{-1}.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	cloudy liquid to white pasty solid
Odour:	very mild, ether like
Melting Point:	-2 - +28°C
Boiling Point:	>177°C
Density:	1011 kg/m^3
Vapour Pressure:	<0.013 kPa at 38°C
Water Solubility:	completely soluble in water, may form a gel at 40% (w/v)
Dissociation Constant:	not provided as the chemical is non-ionic and stable under acidic conditions; some instability expected at high concentrations of alkali and oxidising agents
Flash Point:	176°C
Flammability Limits:	not flammable; will burn if preheated but will not readily ignite
Autoignition Temperature:	not determined, however not expected to autoignite
Explosive Properties:	not likely to exhibit any explosive properties
Reactivity/Stability:	will react with aluminium (metal) at temperatures above 50°C resulting in metal corrosion; in

	presence of strong acids may undergo acid catalysed dehydration of the alcohol to produce alkenes and cleavage of the ether bonds
Particle size distribution:	not applicable as the chemical is a liquid

Comments on physico-chemical properties:

No data were provided for hydrolysis on the grounds that, by analogy with similar ethoxylated alcohols, NEODOL 1-9 is not expected to hydrolyse to any degree in water. To do so would render the product ineffective as a surfactant. The polymer does not contain any groups that would hydrolyse under environmental conditions.

No data were provided for partition coefficient on the grounds that NEODOL 1-9 is surface active. Therefore this test is not relevant.

No data were provided for adsorption/desorption on the grounds that the product is highly soluble and transport through soils would be rapid. The high degree of biodegradation exhibited by this chemical family would mitigate against significant soil retention.

4. PURITY OF THE CHEMICAL

Degree of purity: 99.5%

Toxicor hazardous impurity/impurities:

Chemical name:	ethylene oxide
Synonyms:	dimethylene oxide; epoxyethane; 1,2-epoxyethane; ethene oxide; oxacyclopropane; oxane; oxidoethane
CAS No.:	75-21-8
Weight percentage:	0.0006%
Toxic properties:	suspected human carcinogen; experimental carcinogen, teratogen, tumorigen and neoplastogen; LD_{50} (oral, rat) 72 mg/kg; LD_{50} (subcutaneous, rat) 187 mg/kg; LC_{50} (inhalation, rat) 800 ppm/4hr; irritant of the skin, eye, mucous membranes and respiratory tract (1)
	WSA exposure standard: TWA 1ppm (2)

Non-hazardous impurity/impurities: none (> 1% by weight)

Additives/Adjuvants: none

5. INDUSTRIAL USE

The notified chemical, marketed as NEODOL 1-9, will be imported into Australia at approximately 120 tonnes per annum. NEODOL 1-9 will be used as a surfactant in a liquid dishwashing detergent for household use, with possible industrial applications. It is envisaged that approximately 500 tonnes of detergent containing 19% of the notified chemical will be manufactured per annum.

6. OCCUPATIONAL EXPOSURE

Bulk shipments of NEODOL 1-9 will be transported to the client, Colgate-Palmolive Pty Ltd, in 20 tonne isotankers. Each isotanker will be decanted into 20 individual palecons (1 tonne flexible containers on pallets) outside the factory, which will then be stored in remote sites within the factory. Currently this operation involves 6 storepersons (4h/day, 2 days/year), 4

supervisors (1h/day, 2 days/year) and 1 tanker driver (4h/day, 5 days/year).

Samples of NEODOL 1-9 will be taken from the palecons (by manually instilling a lance and pumping equipment) for laboratory analysis prior to use in the factory (4 laboratory analysts, 5 min/day, 2 days/year). It is proposed that decanting into palecons will be replaced with a new procedure involving the offloading of NEODOL 1-9 from the isotanker directly into one heated storage tank, again outside factory. This procedure will decrease the tanker driver exposure to 1 1/2h/day, and also reduce the sample volume required for laboratory analysis.

Approximately 3 liquid plant operators will be involved in transferring NEODOL 1-9 to mechanically ventilated liquid mixers from each palecon. This procedure will result in exposure for 3 hours/day, 12 days/year, but will also be reduced when the direct feed is introduced.

Dishwashing liquid containing NEODOL 1-9 will be transferred via automated pumping equipment into 500 ml bottles and storepersons will place the finished product onto pallets for loading onto transport vehicles. Packaging machine operators (4 in total) may be required from time to time to manually clean up liquid spills during packaging. Other personnel likely to be exposed during packaging are supervisors (eight) and storepersons (sixteen). Workers will be exposed for approximately 8 hours/day, 36 days/year, however the volumes will be small (6 litres/8 hour shift) and the concentration of NEODOL 1-9 will be reduced (19%). The notifier states that no workers will be exposed during cleaning of the mixing vessel or product transfer lines as these operations are carried out in a closed system.

The packaged product will be transported to storage/distribution warehouses by shuttle drivers, unloaded and later dispatched to various retail and wholesale outlets by storepersons. Approximately 12 drivers and 23 storepersons will handle the product, however exposure will be minimal as the goods will be sealed. In addition, 2 supervisors will be employed at the warehouse although they will not directly handle the product. The finished product will ultimately be used by the public, as well as cleaning workers in institutions and industry. It is difficult to estimate worker exposure in these situations as the extent and duration will vary with the type of product application (eg, hand washing or use in washing machines).

7. PUBLIC EXPOSURE

The majority of detergent containing Neodol 1-9 will be for household use, however it may also have institutional and industrial applications.

Based on the proposed use pattern of the notified chemical, public exposure to Neodol 1-9 will be extensive, predominantly via dermal contact during dishwashing. The notifier states that the concentration of Neodol 1-9 in dishwashing water is approximately 0.05%. Low quantities of the notified chemical may also be ingested or inhaled.

8. ENVIRONMENTAL EXPOSURE

The total quantity of the notified substance used in household and commercial dishwashing liquid will go to waste water. The major volume of this waste water will be treated by municipal sewerage treatment plants.

. Release

The current process is to decant from 20 tonne isotankers, in which the polymer will be imported, into 1000 L palecons for transport to the processor. As there is a potential for spillage during the transfer to the palecons, this process occurs in a bunded and contained drainage area to preclude release to the environment.

Releases into the factory environment during detergent formulation will be contained by clean-up techniques involving adsorbent materials with disposal of the adsorbed material to landfill. Waste discharges from plant clean-up would total around 100 kg per month and some unspecified quantity of the notified substance would be included. The discharge is mainly to sewer under a current Trade Waste Agreement with the local authorities.

The release of the product containing the notified substance in the transport and retail chain again are likely to be minimal because of the small package size. Clean-up with adsorbent substances followed by wash down with water are the recommended methods.

. **Fate**

The importer states that the notified substance is of low toxicity and high biodegradability. The proposed use would see all of the product containing the notified substance delivered to the waste stream. At peak market penetration the notifier calculates up to 323 tonnes per annum of product from household use would be delivered in a highly diluted form to Sewage treatment plants throughout Australia.

Biodegradation

Results of a test on the biodegradation, carried out according to the "Standard Methods for the Examination of Water and Wastewater" 16th ed 1985, of two compounds NEODOL 25-7 and NEODOL 1-5 are given. These compounds, of the same class as the notified substance, show relative biodegradability of between 80 -100 % after 30 day exposure to activated sludge bacteria. The result for this class of compound shows an extensive breakdown and little likelihood of adversely affecting wastewater treatment plants.

Studies on biodegradation in soil by Knaebel et al (3) show that the class of compound to which the notified substance belongs is rapidly mineralised, (DT_{50} mean 2 days) on contact with a wide range of soil types. This is important as some waste waters are run to household leachpits in rural and non sewered areas of Australia.

Bioaccumulation

The notified substance has high water solubility and ready biodegradability and as such is expected to have low potential to bioaccumulate.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity of NEODOL 1-9

Test	Species	Outcome	Reference
Oral	Rat	LD_{50}: 1710 mg/kg (male) LD_{50}: <888 mg/kg (female)	4
Dermal	Rat	LD_{50}: >2000 mg/kg	5
Skin irritation	Rabbit	slight irritant	6
Skin sensitisation	Guinea Pig	non-sensitising	7

9.1.1 Oral Toxicity (4)

This study was carried out in accordance with the OECD Guidelines for Testing of Chemicals No: 401 (8).

NEODOL 1-9 (25% in deionised water) was administered orally by gastric intubation to groups of 10 albino rats (5 male, 5 female) at 888, 1500, and 1950 mg/kg. Clinical observations were made over a 14 day period. Necropsy was performed on animals that were found dead, and on surviving animals at the termination of the study.

Doses of 888, 1500 and 1950 mg/kg resulted in 4/5, 5/5 and 5/5 deaths in female rats and 0/5, 1/5 and 4/5 deaths in male rats, respectively. All deaths occurred within 2 days of dosing. Clinical findings were observed in all dose groups. Most of the rats (25/30) were hypoactive after dosing, 14 of these were also ataxic. Twelve of the 19 rats that had died showed evidence of hypothermia (body cool to touch), prostration and/or laboured breathing; nine had yellow urogenital staining; nine showed abnormal defecation with six of these showing yellow urogenital staining; and six showed evidence of salivation.

At necropsy, macroscopic investigations on the animals that were found dead revealed gastrointestinal abnormalities (2/4 females, 888mg/kg; 4/5 females and all males, 1950 mg/kg), lung abnormalities (3/4 females, 888mg/kg; 4/5 females and 3/4 males,

1950 mg/kg), white foamy tracheal contents (2/4 females, 888mg/kg; 1/5 females and 1/4 males, 1950 mg/kg), kidney changes (1/4 females, 888mg/kg; 2/4 males, 1950 mg/kg), dark red adrenal glands (1/5 females, 1950 mg/kg) and red fluid contents in the urinary bladder (1/4 females, 888mg). Various external surface mattings were observed at all doses (total 16 rats). Terminally necropsied animals revealed no treatment-related organ toxicity.

Under the experimental conditions used, the oral LD_{50} for NEODOL 1-9 was found to be 1710 mg/kg for male rats and 780 mg/kg for female rats. However, as the LD_{50} for females is lower than the lowest dose of NEODOL 1-9 tested (888 mg/kg), a better reflection of the LD_{50} for female rats would therefore be <888 mg/kg.

9.1.2 Dermal Toxicity (5)

This study was carried out in accordance with the OECD Guidelines for Testing of Chemicals No: 402 (9).

Undiluted NEODOL 1-9 was applied to the clipped backs of albino rats of both sexes (5 male, 5 female) at a dose of 2000 mg/kg under a semi-occlusive dressing for 24 hours. Clinical and dermal observations were made on the treated animals over the following 14 days.

No mortality was observed during the study. Clinical findings were noted on days one and two post-treatment only. Yellow urogenital staining was present in seven animals, red material around the eyes was noted in two animals, and red material around the nose in one of these two animals. The latter observations are thought to be related to the bandage and plastic restraint collars rather than the test material. Very slight erythema and desquamation was observed at the application site in all treated animals. The erythema subsided by day six, while desquamation persisted in four animals until the termination of the study. Necropsy revealed no treatment-related organ toxicity.

Under the experimental conditions used, the dermal LD_{50} was found to be greater than 2000 mg/kg for NEODOL 1-9. The presence of urogenital staining suggests that some skin absorption of the test material had occurred.

9.1.3 Inhalation Toxicity

Acute inhalational studies have not been conducted for NEODOL 1-9. A related linear alcohol ethoxylate surfactant, NEODOL 91-5 (C_{9-11} primary alcohol ~5-mole ethoxylate), was reported in a review to show no lethalities or appreciable signs of toxicity following this route of exposure (10).

9.1.4 Skin Irritation (6)

This study was carried out in accordance with the OECD Guidelines for Testing of Chemicals No: 404 (11).

Single doses of 0.5 ml of 1, 10, 25 and 100% NEODOL 1-9 (v/w in deionised water) were applied by occlusive patch for 4 hours to the shaved backs of 3 male and 3 female albino New Zealand White rabbits. Skin reactions were assessed and scored using the system described in (11) at 1, 24, 48, and 72 hours after patch removal and daily to day six if irritation was present at 72 hours.

There were no significant body weight changes during the duration of the study. The 1% NEODOL 1-9 concentration resulted in very slight erythema in all animals at the 1 hour observation point only. The 10% concentration induced very slight to slight erythema in all animals after 1 hour with very slight erythema persisting in one animal to 24 hours. Desquamation was noted on one site at 72 hours at the 10% concentration. Twenty-five percent NEODOL 1-9 induced very slight to slight erythema in all animals which persisted until day four in two animals. Oedema was not observed with diluted NEODOL 1-9. Undiluted NEODOL 1-9 induced very slight to slight erythema in all animals which persisted in four animals through day four, as well as desquamation in one animal after 72 hours through to day five. Very slight oedema was noted on all sites treated with undiluted NEODOL 1-9, however, this effect had subsided by 48 hours.

The results of this study suggest that NEODOL 1-9 is slightly irritating to the skin in rabbits at the doses tested.

9.1.5 Eye Irritation

Eye irritation tests have not been conducted for NEODOL 1-9. However, other linear alcohol ethoxylates have been reported in a review (10) to range in irritancy from slight-moderate (NEODOL 45-18; C_{4-5} primary alcohol ~18-mole ethoxylate) to severe-extreme (NEODOL 25-9; C_{2-5} primary alcohol ~9-mole ethoxylate) in rabbits. Based on its structure similarity to NEODOL 25-9, NEODOL 1-9 may be a severe to extreme eye irritant in the undiluted form.

9.1.6 Skin Sensitisation (8)

This study was carried out in accordance with the OECD Guidelines for Testing of Chemicals No: 406 (13) using a modified Buehler Method.

Induction

The sensitisation potential of NEODOL 1-9 was studied at concentrations of 5, 17.5, 35 and 100% w/v in deionised water. Occluded topical applications of 0.4 ml of each concentration were made to the shaved backs of Hartley albino guinea pigs once per week for 6 hours for a total of 3 weeks. For each concentration, ten animals (five male and five female) were used. Twenty other animals were not treated and these served as naive controls, while 10 animals were induced with 0.4 ml of 0.25 w/v dinitrochlorobenzene (DNCB) in 80% ethanol and served as the positive controls.

Twenty-four and 48 hours after each exposure, skin effects were scored according to the scoring system described in OECD Guideline 404 (11). Undiluted test material induced very slight erythema in 5 of the test animals following the first induction dose, 3 after the second induction dose and 6 after the final induction dose. There were no other dermal findings in test animals during the induction phase. The majority of DNCB-induced animals showed very slight erythema and oedema formation after the first and second doses (and all after the third), however severe erythema, moderate oedema and eschar were noted in one animal 48 hours after the second dose.

Challenge

Two weeks after induction, test animals and half of the naive control animals were challenged with a dose of 0.4 ml of undiluted NEODOL 1-9 to a previously untreated area of the skin. Positive controls were challenged with 0.4 ml of 1% w/v DNCB in 80% ethanol.

Skin reactions were scored 24 and 48 hours after challenge. After twenty-four hours, one slight/moderate erythema score observed in the NEODOL 1-9 treated group, while two naive controls had slight erythema at this observation point.

Rechallenge

One week after the challenge dose, the test animals were rechallenged with 0.4 ml 25% NEODOL 1-9 in deionised water, to previously untreated test sites. The remaining unchallenged naive controls were also challenged with this dose of NEODOL 1-9.

Skin reactions were scored 24 and 48 hours after rechallenge. There were no sensitisation responses in either test or naive control groups following rechallenge. Positive erythema reactions were observed in all DNCB-treated animals at both 24 and 48 hours.

Body weights and clinical observations were recorded just prior to study initiation and at the study termination. No deaths or significant clinical effects were observed during the study and body weights were similar for treated and control animals.

Based on the combined challenge and rechallenge data, the results of this study suggest that NEODOL 1-9 is non-sensitising in guinea pigs.

9.2 Repeated Dose Toxicity

Repeated dose toxicity tests have not been conducted for NEODOL 1-9. However, the results of two 13 week studies were submitted on related compounds.

One study tested NEODOL 91-6 (C_{9-11} primary alcohol ~6-mole ethoxylate) in rats (10/sex/dose) exposed dermally 3 times a week with 0.5 ml/kg of 0, 1, 10 or 25% w/v NEODOL 91-6 (13). At the high dose there was a significant increase in relative kidney

weights in both sexes while one animal (female) showed signs of hyperkeratosis at the application site. A number of statistically significant changes were observed in serum biochemistries. In females, increases were observed in serum calcium at the high dose, potassium at the mid and high doses, and phosphorous at all doses. Males however showed a decrease in serum calcium at the low and mid doses. Perturbations in serum biochemistries however were not accompanied by any histopathological changes in internal organs. There were no treatment-related haematological changes reported over the study period.

The other study (14) tested Linevol 911 (C_{9-11} primary alcohol, 82% linear), which was stated in (9) to be comparable to NEODOL 91-6. When given to rats at dietary concentrations of 0, 125, 500, 1000 or 3000 ppm, Linevol 911 produced no significant organ weight, pathological or haematological effects. A significant decrease in body weight in male treated rats compared to controls was observed throughout the duration of the study, however, this effect was not dose-dependent.

9.3 Genotoxicity

Genotoxicity studies have not been conducted for NEODOL 1-9. A *Salmonella typhimurium* reverse mutation assay using the related compound NEODOL 91-6 (13), revealed no evidence of a mutagenic response in the test strains TA98, TA100, TA1535, TA1537 and TA1538 in the presence or absence of metabolic activation.

9.4 Overall Assessment of Toxicological Data

The acute oral toxicity of NEODOL 1-9 appears to be sex specific, with females being more susceptible to acute oral toxicity than male rats (low acute oral toxicity in male rats, LD_{50} 1710 mg/kg; low or greater acute oral toxicity in female rats, LD_{50} <888 mg/kg). NEODOL 1-9 has a low acute dermal toxicity in rats (LD_{50} >2000 mg/kg). The occurrence of yellow urogenital staining in the dermal study suggests there may be some degree of skin absorption of the polymer. Animal tests suggest that NEODOL 1-9 may be a slight irritant to the skin and is not a skin sensitiser. Similar compounds have produced no significant animal toxicity by the acute inhalational route or in short term

repeated dose studies. NEODOL 1-9, however, may be a severe eye irritant based on the irritancy of related compounds. Genotoxicity studies using a similar compound suggest that linear alcohol ethoxylates are not mutagenic towards *Salmonella typhimurium*.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicity data has been provided for aquatic species under US EPA protocols for a closely related product NEODOL 1-5 which has the same alkyl chain length but a smaller EO chain (5 versus 9 units) which would render it more ecotoxic than the notified product NEODOL 1-9 (16). This is accepted as providing a comparison suitable for the notified product. Results below show a moderate toxicity to fish, daphnia and algae.

Table 2 EC_{50} and LC_{50} for NEODOL 1-5 Measured Average Concentration

SPECIES	**NEODOL Solution Strength**	**Toxicity measures in $mg.L^{-1}$**	**24h**	**48h**	**72h**	**96h**
Daphnia	5%	EC_{50}	4.59	4.11		
	10%	EC_{50}		3.61		
Fathead Minnow	5%	LC_{50}	1.72	1.66	1.65	1.63
	10%	LC_{50}	2.19	2.09	2.04	2.04

Table 3 Toxicity results for *Selenastrum capricornutum* to NEODOL 1-5

Toxicity measures	**Solution Strength 5%**	**Solution Strength in mg.L^{-1} 10%**
No EC_{50}	3.00	3.4
No EC_{50}	3.95	4.4
96 hr EC_{50}	2.91	3.51

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

If the notified substance remains in solution, a predicted environmental concentration (PEC) for the notified substance in sewage inlet waters throughout Australia can be estimated from the following assumptions: 323 tonnes annual use, Australian population 17 million, per capita daily water use 150 L (ie national usage = 930.8 GL per annum). This provides a PEC of 0.06 ppm before active biodegradation in the sewage plant takes place.

In a worst case situation the concentration of the notified substance in waste water is unlikely to exist at a concentration high enough to cause ecotoxicity when dilution in the receiving waters (between 5X to 25X) is taken into account.

The spillage of the notified substance into the environment as a result of transport accident when moving the isotanker and the palecons requires quick action to block the movement of the spill to waterways.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

NEODOL 1-9 contains 0.0006% of the hazardous impurity ethylene oxide. This concentration is well below its cut off concentration (0.1%) for classification as a hazardous substance (14).

During filling and transfer operations, there is a possibility of skin and eye exposure to NEODOL 1-9. NEODOL 1-9 is slightly

irritating to the skin but may be severely irritating to the eyes. Additionally, some absorption may occur after skin contact. With adequate personal protection, however, direct skin and eye contact with the chemical should not occur. Acute animal tests suggest that females may be particularly sensitive to NEODOL 1-9 by ingestion, however this route of exposure is extremely unlikely during normal use situations.

NEODOL 1-9 is stable at ambient temperature, is non-flammable, has a high flash point and is not known to exhibit explosive properties.

Under correct handling procedures, it is unlikely that this chemical will pose a significant health or safety hazard to workers.

Widespread public contact with the notified chemical is anticipated, principally via the dermal route with minor additional oral and inhalational exposure. However, based on the anticipated exposure level and the toxicological characteristics of the notified chemical and similar surfactants, NEODOL 1-9 is considered to present a low public health hazard.

13. RECOMMENDATIONS

To minimise occupational exposure (and public/environmental if recommendations have been made by these agencies) to NEODOL 1-9, the following guidelines and precautions should be observed:

. If engineering controls and work practices are insufficient to reduce exposure to a safe level, the following personal protective equipment which comply with Australian Standards should be worn such as chemical-type goggles with face shield recommended to prevent eye contact (17), chemically resistant gloves (18) and protective clothing (19) to prevent skin contact.

. Good work practices should be implemented to avoid splashing or spillages.

. Good personal hygiene practices, such as washing of hands prior to eating food, should be observed.

. A copy of the MSDS for products containing the notified chemical should be easily accessible to all employees.

14. MATERIAL SAFETY DATA SHEET

The Material Safety Data Sheet (MSDS) for NEODOL 1-9 (Attachment 1) was provided in Worksafe Australia format (20). This MSDS was provided by Shell Chemical (Australia) Pty Ltd as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of Shell Chemical (Australia) Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989, as amended* (the Act), secondary notification of NEODOL 1-9 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

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4. *Acute oral toxicity study of NEODOL 1-9 in albino rats.* WIL Project No.: WIL-9300Research Laboratories, Inc, 1993.

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7. *Skin sensitisation study of NEODOL 1-9 in albino guinea pigs*. WIL Project No.: WIL-93075, WIL Research Laboratories, Inc, 1993.

8. OECD Guidelines for Testing of Chemicals - *Acute Oral Toxicity* No: 401, 1981.

9. OECD Guidelines for Testing of Chemicals - *Acute Dermal Toxicity* No: 402, 1987.

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18. Australian Standard 2161-1978 *Industrial Safety Gloves and Mittens (excluding Electrical and Medical Gloves)*, Standards Association of Australia Publ, Sydney, 1978.

19. Australian Standard 3765.1-1990 *Clothing for Protection against Hazardous Chemicals Part 1 Protection against General or Specific Chemicals* Standards Association of Australia Publ, Sydney, 1990.

20. National Occupational Health and Safety Commission, *Guidance Note for Completion of a Material Safety Data Sheet*, 3rd Edition, Australian Government Publishing Service Publ., Canberra, 1991.