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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Z-19

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Z-19

1. APPLICANT

Lubrizol Australia, 28 River St Silverwater NSW 2141.

2. IDENTITY OF THE CHEMICAL

Based on the nature of the chemical and the data provided, the notified chemical is considered to be non-hazardous. Therefore, the chemical name, CAS number, molecular formula, structural formula, molecular weight and spectral data have been exempted from publication in the Full Public Report and the Summary Report.

Other names: Alkaryl copper complex; OS 89849

Trade name: Z-19

Method of detection and determination: No compound specific methods exist for the chemical. The substance may be quantified by the analysis of the elemental copper using atomic absorption.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	Dark semi-solid
Boiling Point:	Decomposes at 200°C before boiling
Pour Point:	51-54°C
Relative Density:	1090 kg/m^3 at 20°C
Vapour Pressure:	<1- 4 x 10^{-4} Pa at 22°C
Water Solubility:	1.05 ppm (<0.001 g/L) at 20°C
Partition Co-efficient (n-octanol/water) log P_{OW}**:**	>3.0
Hydrolysis as a function of pH:	$t_{1/2}$ = 45 h at pH 4 and 55°C $t_{1/2}$ = 21 h at pH 4 and 65°C $t_{1/2}$ = 118 h at pH 7 and 35°C
Flash Point:	144°C (closed cup)
Auto-Flammability:	360°C
Explosive Properties:	Based on its structure the chemical is not expected to have any explosive properties

Reactivity/Stability: The chemical is stable and has no oxidising properties

Comments on physico-chemical data:

All physico-chemical testing was carried out using relevant OECD Guidelines, with the exception of the determination of the pour-point, which was tested using ASTM D97-85, and conducted at Inveresk Research, Tranent, Scotland.

A pour point, rather than a melting point was established, because the branched isomeric alkyl groups in the compound mean that it will not crystallise. Therefore, the determination of a melting point was felt to be inappropriate. This is acceptable.

Boiling points could not be accurately determined, due to the viscous nature of the substance. The substance decomposed at 200°C, prior to boiling. In addition, a thermal gravimetric curve showed a slight loss at 180°C, which suggested the loss of a volatile material (thought to be toluene), and a gradual weight loss was observed at 255°C and 400°C, suggesting further decomposition.

The vapour pressure provided is a limit value, as the compound could not be detected after passing N_2 through the test system at 4.25 and 14 ml/min for a total of 2 hours at 22°C.

The water solubility was determined by atomic absorption. The detection of the substance was based on the detection of copper, determined to be 0.1 ppm. The substance was soluble just at the limit of detection.

No hydrolysis results were presented for pH 9. Extrapolating the results to 25°C, assuming there is a drop of approximately one-third in half-life for each 10°C drop in temperature, gives an approximate half-life of 400 hours (ie. 16 days) for pH 4, and 250 hours (ie. 10 days) at pH 7.

The poor solubility of the substance in water also presented difficulties when conducting the partition coefficient testing. The bulk of the material dissolved in the octanol layer. Therefore, the partition coefficient was calculated as a limit value, and assumed that the concentration in the water layer was less than the limit of detection (so was therefore set at 1 ppm).

Adsorption/desorption tests were not conducted, on the grounds that there is no waste of this product lost to soils. The high log P_{ow} indicates that the substance is likely to adsorb strongly to soils.

Dissociation tests for this substance were not conducted on the grounds that such substances do not dissociate. This is acceptable.

4. PURITY OF THE CHEMICAL

Degree of purity: ~ 80% (typically 72-88%)

The notified chemical contains no hazardous impurities at levels necessary to classify it as a hazardous substance (1). Therefore, information on the purity of the polymer has been exempted from publication in the Full Public Report and the Summary Report.

5. INDUSTRIAL USE

Z-19 will be imported as a semi-solid component in fuel additive (typically 40-60% Z-19 in kerosene). Initially the product will be used only in the mining industry. The imported product will be blended with diesel fuel for use in diesel fuelled machinery in underground mines to reduce particulate emissions. Greater than 1 tonne of the notified chemical will be imported per annum over the first five years. It is likely that a blend of fuel and fuel additive may also be imported directly.

6. OCCUPATIONAL EXPOSURE

Fuel additive containing Z-19 will be imported in 205 L drums and transported by road or rail to fuel refineries or directly to user's fleet sites. The number of potential customers (refineries or diesel refuelling stations/fleet operators) has not been established. Initially all imported product will be transported to Lubrizol Australia, Silverwater NSW.

At Lubrizol the imported fuel additive will be blended further with diesel fuel and stored in 205 L drums. The blending operation will be conducted in enclosed blend tanks, each with a capacity for 25 to 125 drums. The blended fuel additive will be transferred from the blending vessel to 205 L drums via positive displacement pipes. Positive ventilation will be in place over the blend tanks. Exhaust will be vented to high stacks and released to the atmosphere. Approximately 2-3 workers will be involved in the blending operation. They will wear nitrile rubber gloves and safety glasses.

Blended fuel additive in 205 L drums will be transported to an oil company who will then, either onsell the blend to refuelling stations/fleet operators, or blend it further. It is expected that one worker will handle the blended fuel additive at each site.

Information on refuelling was provided for one mining site. At this site the blend will be pumped from the drums to a holding tank (1100 - 1400 L). From the holding tank the additive blend will be dispensed automatically into the diesel fuel by a metering device mounted on the fuel pump. Transferring the contents of the drums to the holding tank will be expected to take one person 2 hours and should involve small losses (10 kg). It is usual practice for transfer personnel to wear overalls and gloves.

Diesel machinery operators may be exposed to Z-19 or its degradation products in the exhaust. However, as the fuel contains ~750 to 1000 ppm of Z-19, exposures should be low. Additionally, 90% of the metal copper should remain in the exhaust trap.

Mechanics servicing diesel machinery may also come into contact with Z-19.

7. PUBLIC EXPOSURE

Z-19 will be imported in drums and blended with diesel fuel at a number of sites (Lubrizol, oil companies and/or diesel fuelling stations/diesel fleet operators). The Lubrizol blending operation will be conducted in enclosed tanks, with positive ventilation and exhaust vented to the atmosphere via high stacks. The public should not be exposed to Z-19 during these operations.

On-site, the fuel additive would typically be transferred to a holding tank, and automatically dispensed into the fuel at a final concentration of 1500-2000 ppm. The additive lost during this transfer, estimated to be about 10 kg, would be retained by a catch pan, and eventually incinerated. The additive will undergo combustion with the fuel in diesel engines. The heavy machinery will be equipped with exhaust traps which catalyse the burning of the soot in the exhaust. Over 90% of the copper is estimated to be retained in the traps. The traps are not washed, but are discarded after several thousand hours of

use. Since the chemical is mixed with fuel at a relatively low concentration, and undergoes combustion, the public will be exposed to negligible amounts of Z-19, and its combustion products.

8. ENVIRONMENTAL EXPOSURE

. Release

The notified substance is used as a diesel fuel additive to catalyse the burning of soot in an exhaust trap. As the notified substance is a semi-solid, it is usually sold as a mixture with a solvent such as kerosene. Typically, the mixture contains between 40-60% of the notified substance. Discussions between the EPA and various State transport and mining authorities have revealed that ceramic soot filters are not widely used in mining vehicles (usually restricted to metalliferous mining operations), and that they are not used at all in standard diesel vehicles.

There will be no formulation of the product as such within Australia. However, the fuel additive product containing Z-19 will be mixed into fuel holding tanks. Fuel holding tanks are estimated to contain between 1100 - 1400 L. As machinery is refuelled, the fuel additive containing Z-19 will be automatically dispensed into the diesel fuel by a metering device mounted on the fuel pump. The final concentration in the fuel will be 1500 - 2000 ppm. The applicant states that in their experience, losses of about 10 kg are expected during transfers between drums and tanks. They state that such losses are caught in pans and incinerated.

The notifier claims that “fugitive” leaks from draining fuel tanks will not form a major type of release, and they do not give any estimates of losses expected through this source. In the case of large fuel spills, it is expected that the spill will be contained through dykes or similar, pumped up or adsorbed and then sent for incineration.

The other major form of release resulting from use of the substance is when the ceramic soot traps are disposed of after use. The traps are composed of a metal container enclosing a ceramic honeycomb that traps soot, ash and copper oxide. The ceramic material is composed of aluminium, magnesium and silicate.

Disposal of traps follow similar procedures as catalytic converters, in that the metal container is recycled, and the ceramic honeycomb is first extracted for any recyclable metals and then crushed and placed into landfills or used as a base for road construction material. The notifier does not state how much of the expected 90% copper retained in the filters is able to be extracted before disposal.

The substance and degradation products will be present in small amounts in the exhaust fumes of the diesel vehicles. The notifier claims that the notified substance will be present in “sufficiently small” concentrations that the effects of the substance or its combustion products will be indistinguishable from those of the fuel (except for the metal copper, which will be trapped mostly in the soot filter).

Finally, residues remaining in drums following the addition of the additive to fuel tanks are to rinsed out with a solvent or emulsifying solution, with the solution to later be incinerated. Drums are then sent to drum recyclers/refurbishers for later processing.

. Fate

The relatively low solubility of the substance should ensure that any of the material placed in landfill sites should not readily leach. Hydrolysis results indicate that the substance has a half life of approximately 10 days at neutral pH and 25^{O}C.

The high log P_{OW} suggests that should a spill occur to water, it is likely that the substance will bind onto the sediments.

· Biodegradation

Biodegradability testing was carried out using OECD Guideline 301B. This modified Sturm test showed that the substance was not inhibitory to the bacteria in the test media at 10 and 20 mg/L. A maximum of 2.02% of the theoretical carbon dioxide evolution was noted for the test substance during the test period of 28 days, compared to 88.9% evolved from the reference substance, sodium benzoate. Therefore, the notified substance is not readily biodegradable. The inherent biodegradation potential remains unclear.

· Bioaccumulation

As the substance has a partition coefficient in the 3-6 range, is quite fat soluble (at 286.2 mg/L), does not biodegrade and is fairly insoluble (at 1.05 ppm) the notified substance may be seen to be a potential bioaccumulator. The company states that bioaccumulation tests were not done because the substance is not expected to reach the aquatic environment in large quantities. This is acceptable, as long as soot traps pass through the recycling procedures mentioned above.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity of Z-19

Test	*Species*	*Outcome*	*Reference*
Oral	Rat	LD_{50} > 5000 mg/kg	2
Dermal	Rabbit	LD_{50} > 2000 mg/kg	3
Skin irritation	Rabbit	slight irritant	4
Eye irritation	Rabbit	slight irritant	5
Skin sensitisation	Guinea pig	non-sensitising	6

9.1.1 Oral Toxicity (2)

This study was conducted in accordance with OECD guideline No: 401 (7).

The notified chemical was administered to 10 Crl:CD®BR rats (5/sex) by gavage, at a single dose of 5000 mg/kg in corn oil (10 ml/kg). Clinical observations were made over a 14-day period. No deaths occurred during the observation period. All rats were sacrificed on day 15 and necropsy performed.

Bodyweight gains of the treated animals were unaffected by treatment in all but one animal. The body weight of this animal (female) returned to pre-treatment value by day 7. Clinical signs included abnormal defecation (9/10); wet or dry, yellow or brown urogenital

staining (10/10); and dried red material around the nose (5/10), mouth (4/10), eyes (3/10) and forepaws (2/10). All clinical effects had subsided by day 9. Necropsy on sacrificed animals revealed a swollen median lobe of the liver in one male rat. No significant macroscopic changes were observed in the remaining animals.

Results of this study indicate an acute oral LD_{50} of >5000 kg/mg in rats of both sexes for Z-19.

9.1.2 Dermal Toxicity (3)

This study was conducted in accordance with OECD guideline No: 402 (8).

A single dose of Z-19 (2000 mg/kg) was applied by glass rod to the clipped backs of 10 albino rabbits (5/sex) and covered with a semi-occlusive dressing. Twenty-four hours later the dressing was removed and the test site wiped with acetone. Clinical observations were made at 1, 3 and 4 hours after patch removal then once daily for 14 days. All rats were sacrificed after the last observation and necropsy performed.

No deaths occurred during the observation period. Bodyweight gains were unaffected by treatment. Necropsy on sacrificed animals revealed no treatment-related macroscopic legions.

Skin effects included slight erythema (10/10 subsiding by day 9), slight oedema (5/10 subsiding by day 9), fissuring (1/10 day 1 only) and desquamation (9/10 appearing on days 4-7 and lasting through to day 14 in one animal).

The results of this study indicate an acute dermal LD_{50} of >2000 kg/mg in rats of both sexes for Z-19.

9.1.3 Inhalation Toxicity

Inhalation toxicity data were not submitted as the chemical is imported in liquid form.

9.1.4 Skin Irritation (4)

A single dose of 0.5 ml Z-19 was applied by semi-occlusive application to the shaved intact skin of 6 New Zealand white rabbits (2 male, 4 female). Four hours later the dressings were removed and the test site wiped paper towelling soaked with acetone. Skin reactions were assessed 24 and 72 hours after dressing removal.

No mortality or body weight effects were observed in the animals during the observation period. Erythema was observed at 24 hours (5 very slight, 1 slight or well defined) and 48 hours (all very slight). No oedema was observed at either observation time.

The results of this study indicate that Z-19 is a slight skin irritant in rabbits.

9.1.5 Eye Irritation (5)

A single dose of 0.1 ml of Z-19 was instilled in the conjuctival sac of the right eye of each of 6 New Zealand white rabbits (4 male, 2 female). The left eye served as the control. The eyes were examined 24, 48 and 72 hours after treatment. This study deviated from the protocol of OECD guideline No: 405 (9) in that no 1 hour observation was recorded.

Slight conjunctival redness and chemosis were observed in all animals at 24, 48 and 72 hours. These effects were only considered positive in 2 animals at 24 hours (one animal showing diffuse crimson colour and another with obvious swelling). There were no corneal or iridal reactions at any observation point. There were no bodyweight effects during the study.

The results of this study suggest that Z-19 is a slight eye irritant in rabbits.

9.1.6 Skin Sensitisation (6)

This study was conducted largely in accordance with OECD guideline No: 406 (10) using the Modified Bueler method. The experimental animals were Hartley albino guinea pigs. The protocol utilised 12 animals/test and 6 animals/control group instead of the recommended 20/test and 10/control (OECD guideline No: 406). Equal numbers of male and female animals were used in each group.

Pretest

Z-19 was tested for primary irritation at concentrations ranging of 5, 10, 15, 25, 50 and 100%. Topical applications of 0.4 ml of each dose were occluded for 6 hours and skin reactions assessed 24 and 48 hours later. Undiluted Z-19 was found to produce very slight erythema in 3/8 animals at 24 hours and 1/8 animals at 48 hours.

Induction and challenge

Test animals were exposed once a week for 3 weeks with topical applications of 0.4 ml undiluted Z-19 (occluded for 6 hours). Two weeks after the last induction dose, test and control group I animals were challenged with a topical application of 0.4 ml undiluted Z-19 to previously untreated skin. Eight days later similar topical applications were made to the test and control group II animals. Positive control animals (3/sex) were treated in the same way as test animals substituting dinitrochlorobenzene (DNCB) in 80% alcohol (0.25% at induction and 0.1% at first challenge) for Z-19. The test application sites were wiped clean with paper towelling soaked with acetone. Positive control application sites were wiped with paper towelling soaked with tepid tap water. Skin reactions were assessed at 24 and 48 hours after induction, challenge and rechallenge exposures.

Results

There were no mortalities, clinical findings or bodyweight effects during the study. Very slight erythema was observed in most test animals after the third induction, challenge and rechallenge exposures (11/12, 11/12 and 12/12 animals respectively after 24 hours). Control group I showed similar reactions after challenge (5/6, 24 hours) and control group II after rechallenge (6/6, 24 hours). All positive control animals showed positive sensitisation reactions after challenge.

The results of this study indicate that Z-19 is not a skin sensitiser in guinea pigs under the conditions of this test.

9.2 Repeated Dose Toxicity (11)

A 28-day combined oral toxicity and neurotoxicity study was conducted using Z-19. The study was conducted in accordance with OECD guideline No: 407 (12).

Sprague-Dawley Crl:CD®BR rats (10/sex/group) were administered with Z-19 by gavage at dose levels of 0 (control), 100 (low dose), 300 (mid dose) or 900 mg/kg/day (high dose) for a period of 28 days. The dosing volume was 5 ml/kg and the vehicle was corn oil. All animals were necropsied at the termination of the study, 5/sex/dose (randomly selected) underwent tissue perfusion and neuropathological evaluation, the remaining were used for clinical and anatomic pathology.

All animals survived to scheduled necropsy. Decreases in body weight (mean weekly and cumulative mean) and food consumption were seen in mid and high dose males throughout the study. Female rats showed a decrease in food consumption (week 1) and body weight gain (weeks 1 to 4) after treatment with the high dose.

Clinical signs included staining on various body surfaces, mucoid faeces, soft stool, diarrhoea and anal swelling. These effects were most prevalent in animals treated with the high dose.

Haematology revealed decreases in mean haemoglobin (males: mid and high doses), mean corpuscular volume (females: mid and high doses) and mean corpuscular haemoglobin (females: high dose). Changes in serum biochemistries were seen in high dose animals only, and included increased levels of alanine aminotransferase (both sexes), decreased cholesterol (both sexes), decreased albumin/globulin ratio (males only), increased globulin (males only) and increased total serum protein (females only).

Pathology of the non-perfused animals revealed an increase in mean adrenal gland weights (males: absolute and relative weights, mid and high doses; females: relative weight only, high dose only). Males showed a decrease in mean absolute and relative testicular weight, while females showed decreased mean absolute and relative ovarian weights at the same doses. Mean relative liver weight was also increased in mid and high dose males (mean absolute remained unchanged). Macroscopic examination showed enlarged adrenal glands (both sexes: mid and high doses) and atrophied seminal vesicles and testes (males: mid and high doses).

Neuropathological examination revealed digestion chambers in the sciatic nerve in males only (3/5) after treatment with the high dose.

Under the conditions of this study Z-19 was found to exhibit low toxicity in the rat after 28-day oral administration. Based on organ weight changes the target organs for toxicity were the adrenal glands and testes in males, and the adrenal glands and ovaries in females.

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* and *Escherichia coli* Reverse Mutation Assays (13)

This study was conducted in accordance with OECD guideline Nos: 471 (14) and 472 (15).

Z-19 was tested in the *Salmonella typhimurium* test strains TA 98, TA 100, TA 1535 and TA 1537, and *Escherichia coli* strain WP2 uvrA, with or without metabolic activation. Two separate experiments were conducted, each in triplicate. Z-19 was tested at 9 doses between 0.5 and 5000 µg/plate.

Doses used in experiment 1 were:

15 to 5000 µg/plate	all strains + S9 WP2 uvrA - S9
0.5 to 150 µg/plate	all *S. typhimurium* strains - S9.

Experiment 2 differed only for TA 100 + S9 which was tested with a dose range of 0.5 to 150 µg/plate.

The negative control was DMSO. The positive controls employed were 2-aminoanthracene (all strains; + S9), 2-nitrofluorene (TA 98; - S9), N-ethyl-N'nitro-N-nitrosoquanidine (TA 100, WP2 uvrA; - S9), sodium azide (TA 1535; - S9) and 9-aminoacridine (TA 1537; - S9).

A small increase in the number of revertant colonies in WP2 uvrA, in the presence of biological activation, was observed in experiment 1 at a dose of 5000 µg/plate (79 revertants versus 47 for control). This increase was not significant and was not

reproduced in experiment 2. No other effects were seen in plates treated with Z-19. The positive controls produced the expected increases in the number of revertants.

Z-19 is not mutagenic under the conditions of this study.

9.3.2 Micronucleus Assay in the Bone Marrow Cells of the Mouse (16)

This study was conducted in accordance with OECD guideline No: 474 (17).

B6C3F1 mice (5/sex/group/sacrifice time) were given Z-19 intraperitoneally at 1250, 2500 or 5000 mg/kg. Animals were also given corn oil alone (vehicle controls) or 50 mg/kg cyclophosphamide (positive controls). Dosing volumes were: 10 ml/kg for controls (24, 48 and 72 h groups), low and mid doses (all animals); 20 ml/kg for controls (24 h group), high dose and positive controls (all animals).

Bone marrow cells were collected and examined for micronuclei from each group at either 24, 48 or 72 hours after treatment. For each animal, at least 1000 polychromatic erythrocytes (PCEs) were scored and the frequency of micronucleated PCEs recorded. The frequency of micronucleated cells was expressed as percent of total PCEs. Cytotoxic effects were described by the ratio of PCE to normochromatic erythrocytes (NCEs), in a total of at least 200 cells, for each animal.

At all time points micronuclei frequency remained unchanged after exposure to Z-19. Cyclophosphamide produced a significant increase in the micronuclei frequency.

Under the conditions of this study Z-19 is not clastogenic *in vivo*.

9.4 Overall Assessment of Toxicological Data

Animal experiments show Z-19 to have low acute toxicity when administered by the oral (rat: $LD_{50} > 5000$) and dermal (rabbit: $LD_{50} > 2000$) routes. It was shown to be non or slightly irritating to rabbit skin and slightly irritating in the rabbit eye. It was non-sensitising when applied to the skin of guinea pigs.

After 28 days repeated oral administration of 100, 300 or 900 mg/kg/day to rats, Z-19 was shown to exhibit low toxicity. Effects on bodyweights, food consumption, organ weights, and haematology were seen in the mid and high dose groups. Neuropathological effects were seen in the high dose group only. The target organs for toxicity were the adrenal glands, testes and ovaries.

Z-19 was found to be negative *in vitro* in both the *S. typhimurium* and *E. coli* reverse mutation assays and *in vivo* in the mouse micronucleus assay.

On the basis of submitted data, the notified chemical would not be classsified as hazardous in accordance with Worksafe Australia's Approved Criteria for Classifying Hazardous Substances (18) in relation to Acute lethal effects (oral, dermal); Irritant effects (skin, eye); Severe effects after repeated or prolonged exposure (oral route); Sensitising effects (skin) or Mutagenic effects.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Toxicity testing was conducted for three aquatic species. All tests were conducted using relevant OECD test guidelines. Complete test reports were submitted. Results of these tests are shown in the table below.

Test Species	Test	Guideline	Result	Reference
Zebra fish *Brachydanio rerio*	Acute Toxicity, 96 hour, continuous flow, limit test *1	OECD 203	LC_{50} > 10 mg/L	19
*Daphnia magna**2	Acute toxicity, 96 hour, all at nominal concentrations	OECD 202	EC_{50} (24 hr) 93.8 ppm EC_{50} (48 hr) 45.3 ppm NOEC (48 hr) 20.0 ppm	19
Selanastrum capricornutum[3]	Algal growth inhibition, static 96 hr, nominal concentrations	OECD 201	EC_{50} : 420 ppm (WAF.L^{-1}) (96 hr) EC_{50} 2.0 ppm anal. sample (96 hr) NOEC 8.1 ppm (WAF.L^{-1}) (96 hr) 0.35 ppm anal. sample (72 hr)	20

* Test material observed on base of tanks and floating on the surface. Acetone was used as a co-solvent, to assist in dissolving test substance.

1) No mortalities or sublethal effects were noted during testing, therefore LOEC and LC_{50} exceeded the maximum solubility of the test material.

2) Measured concentrations at or below detection limit. Sublethal immobilisation was noted, and was believed to be due to the physical influence of the test material.

3) Results are all in Water Accommodated Fractions.L^{-1}. Results were considered to be algistatic, rather than algicidal.

The results indicate that the substance is slightly toxic to aquatic fish and invertebrates, and moderately toxic to algae (using the analysed sample results). On the basis of on these results, chronic effects to *Daphnia* are not expected at the estimated environmental concentrations and the lack of *Daphnia* reproduction data results are acceptable.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Of the approximate 5 tonnes of Z-19 to be imported into Australia, only small amounts are expected to be released to the environment. Most of these releases will occur as fugitive leaks from vehicles, and are likely to be dropped either on the surface of the mine or underground. Their fate is uncertain, but such accidental releases should sorb to soil and are unlikely to travel from the mine area. Any possible seepage collection will eventually be pumped from the mines, and generally such water is placed in evaporation pits. There, the Z-19 is expected to breakdown through hydrolysis, or to become part of the sludge at the bottom of the pit. Sludge from these pits is periodically removed and is normally placed into tailings dumps or to landfill sites. Leaching would not be expected from these sites.

Losses resulting from accidental spills during transfer to bulk fuel storage tanks are to be incinerated following collection from the sites of spills. The notifier estimates that up to 10 kg can be lost each time transfers occur between bulk fuel storage tanks and drums. The notifier has stated that such spills are to be trapped and incinerated, and therefore should not represent a threat to the environment.

Transport spills are possible, and should such spills reach waterways, some toxicity to aquatic invertebrates and algae could be expected. Such a hazard, although unlikely, is possible. Spills of this manner would be treated as normal fuel spills, with damming and collection of the spilt material a routine practise. Incineration is again the recommended route of disposal of such spills.

The ceramic fuel traps that collected the soot and ash produced from fuels burnt in diesel engines pass through a recycling process that should ensure that most of the material remaining in the traps is removed prior to their being crushed. Thus little hazard is represented by the disposal of the remaining parts of the filters.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The overall potential for occupational exposure to Z-19 will be small. Blending operations will be conducted in enclosed systems and the final concentration of Z-19 in diesel fuel will be between 0.075 to 0.1%. The major source of exposure will occur during transfer operations. During these, skin and eye contact will be possible. Toxicity studies show Z-19 to be a slight skin and eye irritant. However, with the use of appropriate personal protective equipment exposure by these routes should be reduced and the risks to workers should be minimal. A 28-day subacute study showed the target organs for toxicity to be the adrenal glands, testes and ovaries. Given the likely exposure levels of workers handling Z-19 or products containing Z-19, such effects should not pose a concern to workers.

Z-19 contains 20% impurities, however, these are not expected to be present at levels high enough to classify the chemical as a hazardous substance (18).

Under normal use conditions, with appropriate control measures and/or precautions to minimise contact, the notified polymer is not expected to present any significant health or safety risk to workers.

The public is unlikely to be exposed to the chemical during its importation, distribution and use. Therefore, Z-19 should not pose a significant risk to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Z-19 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 should be used:

  . chemical-type goggles conforming to Australian Standards 1336 (21) and 1337 (22);

  . impervious nitrile gloves conforming to Australian Standard 2161 (23); and

  . protective clothing conforming to Australian Standard 2919 (24).

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

. Spills should be cleaned up promptly.

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

. A copy of the Material Safety Data Sheet (MSDS) for products containing the notified chemical should be easily accessible to all employees.

14. MATERIAL SAFETY DATA SHEET

The MSDS for Z-19 (Attachment 1) was provided in Worksafe Australia format (25). The MSDS was provided by Lubrizol Australia 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 Lubrizol Australia.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Z-19 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. **Should use be extended to other diesel vehicles, secondary notification would be required, as it is likely that such vehicles will not be fitted with the ceramic soot filters.** No other specific conditions are prescribed.

16. REFERENCES

1. Sax N. I. and Lewis R. J. *Dangerous Properties of Industrial Materials*, Van Nostrand Reinhold, New York, 1989.

2. WIL Project No.: WIL-168027. *Acute Oral Toxicity Study in Albino Rats with [Z-19]*. WIL Research Laboratories, 1992.

3. WIL Project No.: WIL-168028. *Acute Dermal Toxicity Study in Albino Rabbits with [Z-19]*. WIL Research Laboratories, 1992.

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