

FLUORESCENT PENETRANT RC-65

Chemwatch Independent Material Safety Data Sheet
Issue Date: 1-Mar-2011
NC317ECP

CHEMWATCH 25-9308
Version No:2.0
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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

FLUORESCENT PENETRANT RC-65

PRODUCT USE

Penetrant for flaw detection in metals.

SUPPLIER

Company: Callington Haven Pty Ltd
Address:
30 South Street
Rydalmere
NSW, 2116
Australia
Telephone: +61 2 9898 2788
Emergency Tel: 1800 039 008 (24 hours)
Emergency Tel: +61 3 9573 3112
Fax: +61 2 9684 4215
Email: sales@calhaven.com.au

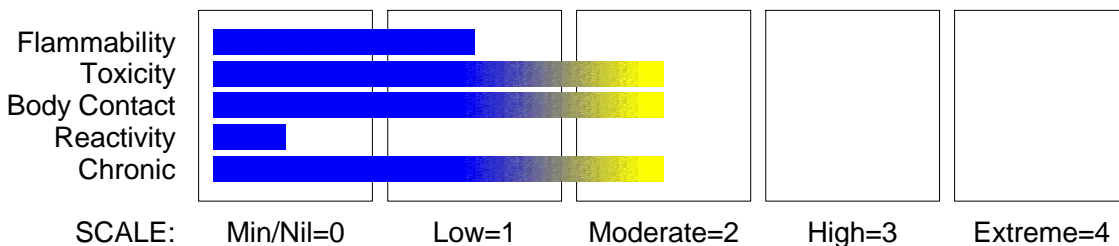
Company: Callington Haven Pty Ltd
Address:
PO Box 144
Rydalmere
NSW, 2116
Australia

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE

HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.
COMBUSTIBLE LIQUID, regulated under AS1940 for Bulk Storage purposes only.

CHEMWATCH HAZARD RATINGS



RISK

Risk Codes
R36/38

Risk Phrases
• Irritating to eyes and skin.

SAFETY

Safety Codes

S23

S24

S39

S401

S26

S46

Safety Phrases

• Do not breathe gas/ fumes/ vapour/ spray.

• Avoid contact with skin.

• Wear eye/ face protection.

• To clean the floor and all objects contaminated by this material, use water and detergent.

• In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Centre.

• If swallowed, IMMEDIATELY contact Doctor or Poisons Information Centre (show this container or label).

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Section 2 - HAZARDS IDENTIFICATION

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
isodecyl diphenyl phosphate	29761-21-5	NotSpec
dinonyl phthalate, branched and linear	68515-45-7	NotSpec
distillates, petroleum, middle, hydrotreated	64742-46-7.	NotSpec
white mineral oil (petroleum)	8042-47-5	NotSpec

Section 4 - FIRST AID MEASURES

SWALLOWED

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE

- If this product comes in contact with the eyes:
- Wash out immediately with fresh running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

- If skin contact occurs:
- Immediately remove all contaminated clothing, including footwear.
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

- Treat symptomatically.
- Heavy and persistent skin contamination over many years may lead to dysplastic changes. Pre-existing skin disorders may be aggravated by exposure to this product.
- In general, emesis induction is unnecessary with high viscosity, low volatility products, i.e. most oils and greases.
- High pressure accidental injection through the skin should be assessed for possible incision, irrigation and/or debridement.

NOTE: Injuries may not seem serious at first, but within a few hours tissue may become swollen, discoloured and extremely painful with extensive subcutaneous necrosis. Product may be forced through considerable distances along tissue planes.

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Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- Avoid spraying water onto liquid pools.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.

FIRE/EXPLOSION HAZARD

- Combustible.
 - Slight fire hazard when exposed to heat or flame.
 - Heating may cause expansion or decomposition leading to violent rupture of containers.
 - On combustion, may emit toxic fumes of carbon monoxide (CO).
 - May emit acrid smoke.
 - Mists containing combustible materials may be explosive.
- Other combustion products include: carbon dioxide (CO₂).

FIRE INCOMPATIBILITY

- Avoid contamination with strong oxidising agents as ignition may result.

HAZCHEM

None

Personal Protective Equipment

Chemical splash suit.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

- Slippery when spilt.
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable, labelled container for waste disposal.

MAJOR SPILLS

- Slippery when spilt.
- Remove all ignition sources.
- Minor hazard.
- Clear area of personnel.
 - Alert Fire Brigade and tell them location and nature of hazard.
 - Control personal contact by using protective equipment as required.

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Section 6 - ACCIDENTAL RELEASE MEASURES

- Prevent spillage from entering drains or water ways.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labelled containers for recycling.
- Absorb remaining product with sand, earth or vermiculite and place in appropriate containers for disposal.
- Wash area and prevent runoff into drains or waterways.
- If contamination of drains or waterways occurs, advise emergency services.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid smoking, naked lights or ignition sources.
- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

SUITABLE CONTAINER

- Metal can or drum
- Packaging as recommended by manufacturer.
- Check all containers are clearly labelled and free from leaks.

STORAGE INCOMPATIBILITY

- Avoid storage with oxidisers.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.
- No smoking, naked lights or ignition sources.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA mg/m ³
Australia Exposure Standards	distillates, petroleum, middle, hydrotreated (Oil mist, refined mineral)	5

The following materials had no OELs on our records

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

- isodecyl diphenyl phosphate: CAS:29761- 21- 5
- dinonyl phthalate, branched and linear: CAS:68515- 45- 7

MATERIAL DATA

DINONYL PHTHALATE, BRANCHED AND LINEAR:

DISTILLATES, PETROLEUM, MIDDLE, HYDROTREATED:

■ Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

DISTILLATES, PETROLEUM, MIDDLE, HYDROTREATED:

WHITE MINERAL OIL (PETROLEUM):

■ for mineral oils (excluding metal working fluids), pure, highly and severely refined:

Human exposure to oil mist alone has not been demonstrated to cause health effects except at levels above 5 mg/m³ (this applies to particulates sampled by a method that does not collect vapour). It is not advisable to apply this standard to oils containing unknown concentrations and types of additive.

FLUORESCENT PENETRANT RC-65:

■ None assigned. Refer to individual constituents.

ISODECYL DIPHENYL PHOSPHATE:

■ No exposure limits set by NOHSC or ACGIH.

DINONYL PHTHALATE, BRANCHED AND LINEAR:

CEL TWA: 5 mg/m³; STEL: 10 mg/m³ [compare TLV-TWA: diisooctyl phthalate]

DISTILLATES, PETROLEUM, MIDDLE, HYDROTREATED:

■ Toxicity and Irritation data for petroleum-based mineral oils are related to chemical components and vary as does the composition and source of the original crude.

A small but definite risk of occupational skin cancer occurs in workers exposed to persistent skin contamination by oils over a period of years. This risk has been attributed to the presence of certain polycyclic aromatic hydrocarbons (PAH) (typified by benz[a]pyrene).

Petroleum oils which are solvent refined/extracted or severely hydrotreated, contain very low concentrations of both.

PERSONAL PROTECTION

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION



EYE

- Safety glasses with side shields; or as required,
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber.

OTHER

- Overalls.
- Eyewash unit.

RESPIRATOR

- Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half- face Respirator	Full- Face Respirator
1000	10	A- AUS P	-
1000	50	-	A- AUS P
5000	50	Airline *	-
5000	100	-	A- 2 P
10000	100	-	A- 3 P
	100+		Airline**

* - Continuous Flow

** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

- General exhaust is adequate under normal operating conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection. Provide adequate ventilation in warehouse or closed storage areas.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

Yellow-green liquid with petroleum odour; dispersible in water.

PHYSICAL PROPERTIES

Liquid.

State	Liquid	Molecular Weight	Not applicable
Melting Range (°C)	Not available	Viscosity	Not Available
Boiling Range (°C)	227	Solubility in water (g/L)	Partly Misc ible
Flash Point (°C)	93.3	pH (1% solution)	Not available
Decomposition Temp (°C)	Not available	pH (as supplied)	Not a plicable
Autoignition Temp (°C)	Not available	Vapour Pressure (kPa)	Not available
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	0.90
Lower Explosive Limit (%)	Not available	Relative Vapour Density (air=1)	Not available
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

Section 10 - STABILITY AND REACTIVITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual. Ingestion may result in nausea, abdominal irritation, pain and vomiting.

EYE

- This material can cause eye irritation and damage in some persons.

SKIN

- This material can cause inflammation of the skin oncontact in some persons. Toxic effects may result from skin absorption. The material may accentuate any pre-existing skin condition.

INHALED

- Not normally a hazard due to non-volatile nature of product. Inhalation of oil droplets or aerosols may cause discomfort and may produce chemical inflammation of the lungs.

CHRONIC HEALTH EFFECTS

- Oil may contact the skin or be inhaled. Extended exposure can lead to eczema, inflammation of hair follicles, pigmentation of the face and warts on the soles of the feet. There are few systemic effects, but prolonged exposure may lead to a higher incidence of lung scarring.

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Section 11 - TOXICOLOGICAL INFORMATION

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

FLUORESCENT PENETRANT RC-65:

■ Not available. Refer to individual constituents.

ISODECYL DIPHENYL PHOSPHATE:

TOXICITY

Oral (rat) LD50: 15800 mg/kg

IRRITATION

Nil Reported [OHS CD]

DINONYL PHTHALATE, BRANCHED AND LINEAR:

TOXICITY

Oral (rat) LD50: 30000 mg/kg

Oral (human) TDL₀: 143 mg/kg

Oral (mouse) LD50: 1500 mg/kg

Oral (rabbit) LD50: 34000 mg/kg

Dermal (rabbit) LD50: 25000 mg/kg

Oral (guinea pig) LD50: 26000 mg/kg

Dermal (g.pig) LD50: 10000 mg/kg

IRRITATION

Skin (rabbit): 500 mg/24h Mild

Eye (rabbit): 500 mg/24h Mild

■ The material may produce peroxisome proliferation. Peroxisomes are single, membrane limited organelles in the cytoplasm that are found in the cells of animals, plants, fungi, and protozoa. Peroxisome proliferators include certain hypolipidaemic drugs, phthalate ester plasticisers, industrial solvents, herbicides, food flavours, leukotriene D4 antagonists and hormones. Animal studies have shown that peroxisome proliferators clearly cause cancer, especially of the liver.

The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

High Molecular Weight Phthalate Esters (HMWPEs) Category as defined by the Phthalate Esters Panel HPV Testing Group (2001) and OECD (2004). The HMWPE group includes chemically similar substances produced from alcohols having backbone carbon lengths of ≥ 7 . Due to their similar chemical structure, category members are generally similar with respect to physicochemical, biological and toxicological properties or display an expected trend. Thus, read-across for toxicity endpoints is an appropriate approach to characterise selected endpoints for members of this category.

In some cases the substances have ester side group constituents that span two subcategories (i.e., transitional and high molecular weight constituents). If the level of C4 to C6 constituents in the substance exceeded 10%, the substance was conservatively placed in the transitional subcategory.

High molecular weight phthalates are used nearly exclusively as plasticisers of PVC.

They are very poorly soluble in water, and have very low vapor pressure. The extant database demonstrates that these substances have few biological effects. A notable exception to this generalisation is that hepatocarcinogenicity has been observed for diisononyl phthalate (DINP). The hepatocarcinogenicity effects of DINP are by a mechanism (peroxisomal proliferation) to which rodents are particularly sensitive. However, it does not appear to be relevant to humans.

The high molecular weight phthalates all demonstrate minimal acute toxicity, are not genotoxic, exhibit some liver and kidney effects at high doses, and are negative for reproductive and developmental effects. Further, the available data indicate that the toxicological activity of these molecules diminishes with increasing molecular weight.

Studies on HMWPEs indicate that they are rapidly metabolised in the gastrointestinal tract to the corresponding monoester, absorbed and excreted primarily in the urine.

Acute toxicity: The available data on phthalates spanning the carbon range from C8-C13 indicate that phthalate esters in the high molecular weight subcategory are not toxic by acute oral and dermal administration; LD50 values of all substances tested exceed the maximum amounts which can be administered to the animals. There are fewer data available on inhalation toxicity; only di-iso-nonyl phthalate (DINP) and di-iso-decyl phthalate (DIDP) have been tested. However, the phthalates in the high molecular weight subcategory have extremely low vapor pressures, and exposure by inhalation at potentially hazardous levels is not anticipated.

Repeat dose toxicity. Several substances ranging from C8-C11 have been tested for repeated dose toxicity in

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Section 11 - TOXICOLOGICAL INFORMATION

studies ranging from 21 days to two years. Ditridecyl phthalate (CAS 119-06-2) has been studied by the Japan Ministry of Health and Welfare (unpublished report) and data for this substance is used as read-across data for DTDP*. In addition results from repeat dose studies examining DINP (CAS 685 15-48-0) and DIDP (68515-49-1) are used as read across for the di C9-C11 phthalates (CAS 68515-43-5). The principal effects found are those associated with peroxisomal proliferation, including liver enlargement and induction of peroxisomal enzymes. As shown for example in a comparative study of liver effects, the strongest inducers of peroxisomal proliferation were DEHP, DINP, and DIDP with substances of shorter and longer ester side chains (e.g., 610P*, 711P*, and diundecyl phthalate - DUP) showing less pronounced effects. Thus, it is reasonable to conclude that other members of this subcategory would show effects similar to but not more pronounced than those associated with DINP and DIDP. It should also be noted that the relevance of these findings to human health is, at best, questionable. It has been shown that these effects are mediated through the peroxisome proliferation-activated receptor alpha (PPAR α), and that levels of PPAR α are much higher in rodents than humans. Thus, one would expect humans to be substantially less responsive than rodents to peroxisome proliferating agents. Empirical evidence supporting this postulation is provided by studies in primates in which repeated administration of DEHP and DINP had no effects on liver, kidney or testicular parameters. In this regard it should also be noted that kidney enlargement is also commonly observed but normally without any pathological changes. There is a component of the kidney changes which is also PPAR α -related. It has also been shown that in male rats, DINP induces an alpha 2u-globulin nephropathy which is male rat- specific but without relevance to humans. Thus, as was true for the liver changes, the relevance of the kidney changes to human health is also questionable

Finally, some of the lower molecular weight phthalates can induce testicular atrophy when administered to juvenile rats at high levels. However, the higher molecular weight phthalates including di-n-octyl phthalate (DnOP), DINP, DIDP, 610P, and 71 1P do not induce testicular atrophy. Further, the testis was not a target organ for DINP in either marmosets or cynomolgus monkeys. Thus, testicular atrophy is not an effect associated with phthalates in the high molecular weight subcategory

Reproductive toxicity: Reproductive toxicity tests in rats have been carried out with DINP, DIDP C9 phthalate (CAS 68515-41-3), a linear C9-C11 phthalate, and ditridecyl phthalate (Japan Ministry of Health and Welfare, unpublished report). None of these affected fertility or profoundly affected male reproductive development. A slight decrease in offspring viability was reported for both DIDP and ditridecyl phthalate at levels associated with maternal effects. DnOP was tested for effects on fertility in a continuous breeding protocol in mice, and, like the other members of this subcategory, did not reduce fertility. Thus, it can be concluded that the subcategory of high molecular weight phthalates do not affect fertility.

Developmental toxicity: Developmental toxicity tests in rats have been carried out with DINP; DIDP; C7-9 phthalate (CAS 68515-41-3); C9-11 phthalate (CAS 68515-43-5); and ditridecyl phthalate (CAS 119-06-2). None of the substances tested affected litter size, foetal survival or bodyweight, and none produced teratogenic effects. Increased frequencies of developmental variants including dilated renal pelvis, and supernumerary lumbar and cervical ribs were found at levels associated with maternal effects. The toxicological significance of these developmental variants is unclear. DnOP was not teratogenic in mice when tested at very high levels. Thus, it can be concluded that this subcategory of high molecular weight phthalates do not produce profound developmental effects in rodents

Genotoxicity: The majority of the substances in the subcategory of high molecular weight phthalates have been tested for genetic activity in the Salmonella assay, and all were inactive. One large program covering many of these substances was carried out by the National Institute of Environmental Health Sciences. Similarly, a range of substances covering the majority of the carbon numbers in this subcategory were found to be inactive in mouse lymphoma tests

Chromosomal Aberrations. Two representative members of the subcategory of high molecular weight phthalates (DINP and DIDP) have been tested for chromosomal mutation in the mouse micronucleus test, and both were inactive. Ditridecyl phthalate (CAS 119-06-2) induced neither structural chromosomal aberrations nor polyploidy in CHL cells up to the limit concentration of 4.75 mg/ ml, in the absence or presence of an exogenous metabolic activation system (Japan Ministry of Health and Welfare, unpublished report). Further, all of the low molecular weight and transitional phthalates that have been tested were inactive.

*610P - mixed decyl, hexyl and octyl esters (CAS Rn: 68648-93-1)

*711P - C7,C11, branched and linear esters (CAS Rn: 111381-90-9)

* DTDP - di-C11-14, C13 rich ester (CAS 68515-47-9).

for di-sec-octyl phthalate

Gastrointestinal changes, respiratory system changes, somnolence, haemorrhage, necrotic changes in GI tract, lowered blood pressure, liver, endocrine tumours, foetotoxicity, paternal effects, maternal effects, specific developmental abnormalities (hepatobiliary system, musculoskeletal system, cardiovascular system, urogenital

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Section 11 - TOXICOLOGICAL INFORMATION

system, central nervous system, eye/ear), foetolethality recorded.

DISTILLATES, PETROLEUM, MIDDLE, HYDROTREATED:
TOXICITY

IRRITATION

Inhalation (rat) LC50: 3400 ppm/4H None reported [EXXON]

Oral (rat) LD50: >8000 mg/kg [CCINFO- Shell]

Dermal (rat) LD50: >4000 mg/kg

typical for isoparaffinic hydrocarbons:

isoparaffinic hydrocarbon:

WHITE MINERAL OIL (PETROLEUM):

■ The substance is classified by IARC as Group 3:

NOT classifiable as to its carcinogenicity to humans.

Evidence of carcinogenicity may be inadequate or limited in animal testing.

Oral (rat) TClO: 92000 mg/kg/92D-Cont.

Generally the toxicity and irritation is of low order.

White oils and highly/solvent refined oils have not shown the long term risk of skin cancer that follows persistent skin contamination with some other mineral oils, due in all probability to refining that produces low content of both polyaromatics (PAH) and benz-alpha-pyrenes (BaP)

Section 12 - ECOLOGICAL INFORMATION

DISTILLATES, PETROLEUM, MIDDLE, HYDROTREATED:

WHITE MINERAL OIL (PETROLEUM):

DINONYL PHTHALATE, BRANCHED AND LINEAR:

■ DO NOT discharge into sewer or waterways.

ISODECYL DIPHENYL PHOSPHATE:

■ The material is classified as an ecotoxin* because the Daphnia EC50 (48 hours) is less than or equal to 0.1 mg/l

* Classification of Substances as Ecotoxic (Dangerous to the Environment)

Appendix 8, Table 1

Compiler's Guide for the Preparation of International Chemical Safety Cards: 1993 Commission of the European Communities.

Effects on algae and plankton: tox to algae 345mg/L

DINONYL PHTHALATE, BRANCHED AND LINEAR:

■ On the basis of available evidence concerning either toxicity, persistence, potential to accumulate and or observed environmental fate and behaviour, the material may present a danger, immediate or long-term and /or delayed, to the structure and/ or functioning of natural ecosystems.

For high molecular weight phthalate esters:

Environmental fate:

Hydrolysis half lives and atmospheric photodegradation rates are calculated by EPI Suite (2000). Phthalate ester hydrolysis rates are quite low and not a significant fate route.

Ecotoxicity:

Ecotoxicity test data in fish, invertebrates, and algae are available for most of the members of this subcategory and reference compounds. These phthalates all contain side groups in the range of C7 to C13. All of the measured data for these higher phthalates show no effects from acute or chronic exposure to aquatic organisms. the higher molecular weight phthalates are too insoluble to exhibit acute or chronic toxicity.

For di(heptyl, nonyl, undecyl)phthalate (DHNUP)

Environmental fate:

DHNUP is characterised by very low water solubility (2.1×10^{-3} mg/L), low vapour pressure (9.2×10^{-5} Pa), very high log Koc (5.2) and low Henry's Law Constant (0.86-1.2 Pa.m³/mol). This suggests that partitioning will be mainly to soil and sediment.

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Section 12 - ECOLOGICAL INFORMATION

The results of the Level III Fugacity modelling indicate that if DHNUP is released equally to the three major environmental compartments (air, water, and soil), it will mainly partition into sediment and soil. DHNUP has not been indicated to persist.

If released to air, the Level III-fugacity model indicates a low amount of the substance will remain in air.

A low modelled vapour pressure of 9.2×10^{-5} Pa and Henry's Law constant of 0.86-1.2 Pa.m³/mol indicate that DHNUP has low volatility. Therefore, if released solely to air, it will partition mostly into soil and sediment.

If released into water, DHNUP is expected to strongly adsorb to suspended solids and sediment based upon the very high value of estimated K_{oc} . Volatilization from water surfaces is expected to be an unimportant fate process based upon this compound's estimated Henry's Law constant. Thus, if water is the receiving medium DHNUP is expected to mainly partition into sediment, with a small amount remaining in water.

If released to soil, DHNUP is expected to have very high adsorptivity to soil (i.e. is expected to be immobile) based upon an estimated log K_{oc} of 5.2. Volatilisation from moist or dry soil surfaces seems to be an unimportant fate process based upon the low estimated Henry's Law constant and vapour pressure. Therefore, if released to soil, DHNUP will mainly remain in this environmental compartment, which is illustrated by the results of the Level III-fugacity modelling.

for phthalate esters:

Environmental fate;

Under aerobic and anaerobic conditions, studies reveal that many phthalate esters are degraded by a wide range of bacteria and actinomycetes. Standardized aerobic biodegradation tests with sewage sludge inocula show that within 28 days approximately 50% ultimate degradation occurs. Biodegradation is, therefore, expected to be the dominant pathway in surface soils and sediments. In the atmosphere, photodegradation via free radical attack is the anticipated dominant pathway. The half-life of many phthalate esters is ca. 1 day in the air, from < 1 day to 2 weeks in surface and marine waters, and from < 1 week to several months in soils.

Phthalates are high molecular weight chemicals, and are not expected to partition significantly to air. However for the minor amount that may partition to air, modelled predictions indicate that they would be rapidly oxidised: with a predicted atmospheric oxidation half-life of around 0.52 days. They are expected to react appreciably with other photo oxidative species in the atmosphere, such as O₃. Therefore, it is expected that reactions with hydroxyl radicals will be the most important fate process in the atmosphere for phthalates.

Bioaccumulation of phthalate esters in the aquatic and terrestrial food chain is limited by biotransformation. Most phthalates have experimental bioaccumulation factor (BCFs) and bioconcentration factor (BAFs) below 5000 L/kg, as they are readily metabolised by fish.

A study of 18 commercial phthalate esters with alkyl chains ranging from one to 13 carbons found an eight order of magnitude increase in octanol-water coefficients (K_{ow}) and a four order of magnitude decrease in vapor pressure with increasing length. This increase in K_{ow} and decrease in vapor pressure results in increased partitioning of the phthalate esters to suspended solids, soils, sediments, and aerosols.

The phthalate esters are distributed throughout the environment ubiquitously. They are found complexed with fulvic acid components of the humic substances in soil and marine and estuarine waters. Fulvic acid appears to act as a solubiliser for the otherwise insoluble ester and serves to mediate its transport and mobilisation in water or immobilisation in soil. Phthalate esters have been found in open ocean environments, in deep sea jelly fish, Atlantic herring and in mackerel. Phthalic ester plasticisers are clearly recognised as general contaminants of almost every soil and water ecosystem. In general they have low acute toxicity but the weight of evidence supporting their carcinogenicity is substantial. Other subtle chronic effects have also been reported. As little as 4 µg/ml in culture medium is lethal to chick embryo heart cells. This concentration is similar to that reached in human blood stored in vinyl plastic bags for as little as one day. As phthalates are present in drinking water and food, concerns have been raised about their long term effects on humans.

Ecotoxicity:

Some phthalates (notably di-2-ethylhexyl phthalate and dibutyl phthalate) may be detrimental to the reproduction of the water flea (*Daphnia magna*), zebra fish and guppies.

While phthalates may have very low true water solubilities, they possess the ability to form suspensions which may cause adverse effects through physical contact with *Daphnia* at very low concentrations.

Available toxicity and water solubility information suggest that the high molecular weight phthalates, form these suspensions and are able to elicit chronic toxic effects at concentrations of approximately 0.05 mg/L. Therefore, these substances are considered to have the potential to harm aquatic organisms at relatively low concentrations.

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Section 12 - ECOLOGICAL INFORMATION

DISTILLATES, PETROLEUM, MIDDLE, HYDROTREATED:

■ For hydrocarbons:

Environmental fate:

The lower molecular weight hydrocarbons are expected to form a "slick" on the surface of waters after release in calm sea conditions. This is expected to evaporate and enter the atmosphere where it will be degraded through reaction with hydroxy radicals.

Some hydrocarbon will become associated with benthic sediments, and it is likely to be spread over a fairly wide area of sea floor. Marine sediments may be either aerobic or anaerobic. The material, in probability, is biodegradable, under aerobic conditions (isomerised olefins and alkenes show variable results). Evidence also suggests that the hydrocarbons may be degradable under anaerobic conditions although such degradation in benthic sediments may be a relatively slow process.

Under aerobic conditions hydrocarbons degrade to water and carbon dioxide, while under anaerobic processes they produce water, methane and carbon dioxide.

Alkenes have low log octanol/water partition coefficients (K_{ow}) of about 1 and estimated bioconcentration factors (BCF) of about 10; aromatics have intermediate values (log K_{ow} values of 2-3 and BCF values of 20-200), while C5 and greater alkanes have fairly high values (log K_{ow} values of about 3-4.5 and BCF values of 100-1,500)

The estimated volatilisation half-lives for alkanes and benzene, toluene, ethylbenzene, xylene (BTEX) components were predicted as 7 days in ponds, 1.5 days in rivers, and 6 days in lakes. The volatilisation rate of naphthalene and its substituted derivatives were estimated to be slower.

Indigenous microbes found in many natural settings (e.g., soils, groundwater, ponds) have been shown to be capable of degrading organic compounds. Unlike other fate processes that disperse contaminants in the environment, biodegradation can eliminate the contaminants without transferring them across media.

The final products of microbial degradation are carbon dioxide, water, and microbial biomass. The rate of hydrocarbon degradation depends on the chemical composition of the product released to the environment as well as site-specific environmental factors. Generally the straight chain hydrocarbons and the aromatics are degraded more readily than the highly branched aliphatic compounds. The n-alkanes, n-alkyl aromatics, and the aromatics in the C10-C22 range are the most readily biodegradable; n-alkanes, n-alkyl aromatics, and aromatics in the C5-C9 range are biodegradable at low concentrations by some microorganisms, but are generally preferentially removed by volatilisation and thus are unavailable in most environments; n-alkanes in the C1-C4 ranges are biodegradable only by a narrow range of specialised hydrocarbon degraders; and n-alkanes, n-alkyl aromatics, and aromatics above C22 are generally not available to degrading microorganisms. Hydrocarbons with condensed ring structures, such as PAHs with four or more rings, have been shown to be relatively resistant to biodegradation. PAHs with only 2 or 3 rings (e.g., naphthalene, anthracene) are more easily biodegraded. In almost all cases, the presence of oxygen is essential for effective biodegradation of oil. The ideal pH range to promote biodegradation is close to neutral (6-8). For most species, the optimal pH is slightly alkaline, that is, greater than 7.

All biological transformations are affected by temperature. Generally, as the temperature increases, biological activity tends to increase up to a temperature where enzyme denaturation occurs.

Atmospheric fate: Alkanes, isoalkanes, and cycloalkanes have half-lives on the order of 1-10 days, whereas alkenes, cycloalkenes, and substituted benzenes have half-lives of 1 day or less. Photochemical oxidation products include aldehydes, hydroxy compounds, nitro compounds, and peroxyacyl nitrates. Alkenes, certain substituted aromatics, and naphthalene are potentially susceptible to direct photolysis.

Ecotoxicity:

Hydrocarbons are hydrophobic (high log K_{ow} and low water solubility). Such substances produce toxicity in aquatic organisms by a mechanism referred to as "non-polar narcosis" or "baseline" toxicity. The hydrophobicity increases and water solubility decreases with increasing carbon number for a particular class of hydrocarbon. Substances with the same carbon number show increased hydrophobicity and decreased solubility with increasing saturation. Quantitative structure activity relationships (QSAR), relating both solubility and toxicity to K_{ow} predict that the water solubility of single chemical substances decreases more rapidly with increasing K_{ow} than does the acute toxicity.

Based on test results, as well as theoretical considerations, the potential for bioaccumulation may be high. Toxic effects are often observed in species such as blue mussel, daphnia, freshwater green algae, marine copepods and amphipods.

The values of log K_{ow} for individual hydrocarbons increase with increasing carbon number within homologous series of generic types. Quantitative structure activity relationships (QSAR), relating log K_{ow} values of single hydrocarbons to toxicity, show that water solubility decreases more rapidly with increasing K_{ow} than does the concentration causing effects. This relationship varies somewhat with species of hydrocarbon, but it follows that there is a log K_{ow} limit for hydrocarbons, above which, they will not exhibit acute toxicity;

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this limit is at a log Kow value of about 4 to 5. It has been confirmed experimentally that for fish and invertebrates, paraffinic hydrocarbons with a carbon number of 10 or higher (log Kow >5) show no acute toxicity and that alkylbenzenes with a carbon number of 14 or greater (log Kow >5) similarly show no acute toxicity.

QSAR equations for chronic toxicity also suggest that there should be a point where hydrocarbons with high log Kow values become so insoluble in water that they will not cause chronic toxicity, that is, that there is also a solubility cut-off for chronic toxicity. Thus, paraffinic hydrocarbons with carbon numbers of greater than 14 (log Kow >7.3) should show no measurable chronic toxicity. Experimental support for this cut-off is demonstrated by chronic toxicity studies on lubricant base oils and one "heavy" solvent grade (substances composed of paraffins of C20 and greater) which show no effects after exposures to concentrations well above solubility.

The initial criteria for classification of substances as dangerous to the aquatic environment are based upon acute toxicity data in fish, daphnids and algae. However, for substances that have low solubility and show no acute toxicity, the possibility of a long-term or chronic hazard to the environment is recognised in the R53 phrase or so-called "safety net". The R53 assignment for possible long-term harm is a surrogate for chronic toxicity test results and is triggered by substances that are both bioaccumulative and persistent. The indicators of bioaccumulation and persistence are taken as a BCF > 100 (or log Kow > 3 if no BCF data) and lack of ready biodegradability. For low solubility substances which have direct chronic toxicity data demonstrating no chronic toxicity at 1 mg/L or higher, these data take precedence such that no classification for long term toxicity is required.

Drinking Water Standards: hydrocarbon total: 10 ug/l (UK max.).

for gas oils and distillate fuels:

The gas oils category includes both finished products (distillate fuels) and the refinery streams (gas oils) from which they are blended. The materials in this category, together with those in the Jet Fuel/Kerosene category, constitute a generic class of petroleum substances commonly known as middle distillates. The distillate fuels covered in this category are used in diesel engines and for both industrial and domestic heating. While within the refinery the gas oil streams exist primarily as intermediates in closed systems. Selected gas oil streams may ultimately be blended into distillate fuels, marine bunker fuels and occasionally into lubricants. At ambient temperatures, all the substances in this category are liquids. Gas oil streams and distillate fuels are complex petroleum mixtures, composed primarily of saturated (paraffinic and naphthenic) or aromatic hydrocarbons with carbon numbers ranging from C9 to C30. Gas Oils are similar from both a process and physical-chemical perspective, being differentiated from each other primarily by their aromatic and saturated hydrocarbon content. The compositions of the gas oil streams range from those that are predominantly saturated hydrocarbons to those that are predominantly aromatic hydrocarbons. Consequently, the category can be considered a continuum, bounded by materials that are compositionally either high in saturated hydrocarbons or aromatic hydrocarbons. While the ratio of the saturated and aromatic hydrocarbons may vary between category members the saturated and aromatic hydrocarbons species that make up the category members are similar. Based on the available data, the physical-chemical properties of an individual category member depend on its compositional makeup, vis a vis saturated and aromatic hydrocarbons. Therefore, gas oil streams that are predominantly saturated hydrocarbons will have similar physical-chemical properties, while those that are composed predominantly of aromatic hydrocarbons will have somewhat different properties. As products that are blended from the gas oil streams, the compositions of the distillate fuels fall within the range of the compositions shown by the gas oil streams and reflect the characteristics of the gas oils streams from which they are blended.

Boiling Point Gas oils do not have a single numerical value for boiling point, but rather a boiling or distillation range that reflects the individual components in the hydrocarbon mixture. Distillation ranges for a variety of gas oils have been reported for a number of blended gas oil products and individual production streams. Typical distillation ranges for blended fuels are 160 to 390 C for an automotive gas oil (diesel fuel), 160 to 400 C for a heating oil, and 170 to 420 C for a distillate marine fuel. Typical low end and high end distillation temperatures for gas oil production streams were 172 and 344 C for a hydrodesulfurised middle distillate (65.6% -79.4% saturated hydrocarbons), 185 and 391 C for a straight-run middle distillate (78.8 saturated hydrocarbons), and 185 and 372 C for a light catalytic cracked distillate (60.8% -79.8% aromatic hydrocarbons). No substantial differences in boiling range were apparent for gas oils with high concentrations of either aromatic or saturated hydrocarbons.

Vapor Pressure : For mixtures such as petroleum products, the vapor pressure of the mixture is the sum of the partial pressures of the individual components (Dalton's Law of Partial Pressures). Gas oils are expected to have low vapor pressure due to their boiling range (150 to 450 C) and molecular weights of the constituent hydrocarbons (C9 – 30 carbon atoms). Because the physical-chemical characteristics of distillate fuels reflect the gas oil streams from which they were produced, these vapor pressure measurements are expected to

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approximate the vapor pressures of individual gas oils. Vapour pressure estimates of low molecular weight hydrocarbons of varying isomeric structures fell within a range of 0.01-1.6 kPa, with higher molecular weight hydrocarbons showing very low vapour pressures (e.g., 10⁻⁸ to 10⁻¹⁰ kPa).

Partition Coefficient The percent distribution of the hydrocarbon groups (i.e., paraffins, olefins, naphthenes, and aromatics) and the carbon chain lengths of hydrocarbon constituents in gas oils largely determines the partitioning characteristics of the mixture. Generally, hydrocarbon chains with fewer carbon atoms tend to have lower partition coefficients than those with higher carbon numbers. Because gas complex mixtures, it is not possible to determine their log Kow values. Rather, partition coefficients have been calculated for individual component hydrocarbons from known hydrocarbon composition. Those calculated Kow values ranged from 3.9 to >6.0 for a hydrodesulfurised middle distillate ((65.6% -79.4% saturated hydrocarbons), straight-run middle distillate (78.8% saturated hydrocarbons), and a light cat-cracked distillate (60.8% -79.8% aromatic hydrocarbons). There are no apparent differences in the range of Kow values determined for gas oils with high concentrations of either aromatic or saturated hydrocarbons. A similar range of partition coefficients would be expected for component hydrocarbons in distillate fuels.

Environmental fate:

Photodegradation : The direct aqueous photolysis of an organic molecule occurs when it absorbs sufficient light energy to result in a structural transformation. Only light energy at wavelengths between 290 and 750 nm can result in photochemical transformations in the environment, although absorption is not always sufficient for a chemical to undergo photochemical degradation. Saturated and one-ring aromatic hydrocarbons do not show absorbance in the 290 to 800 nm range and would not be expected to be directly photodegraded. Polyaromatic hydrocarbons, on the other hand, have shown absorbance of the 290 to 800 nm range of light energy and could potentially undergo photolysis reactions. The degree and rate at which these compounds photodegrade depends upon whether conditions allow penetration of light with sufficient energy to effect a change.

Components in gas oils that do not directly photodegrade (e.g., paraffins, naphthenes, and one-ring aromatic compounds) may be subject to indirect photodegradation. Indirect photodegradation is the reaction with photosensitised oxygen in the atmosphere in the form of hydroxyl radicals (OH[•]).

Atmospheric oxidation rates and half-lives were calculated for the low and high end of the range of molecular weight constituents of gas oils (e.g., C9 and C30 hydrocarbon structures). Half-life estimates for these compounds ranged from 0.1 (for various C9 to C30 olefinic structures and C30 2+ring aromatic compounds) to 1.5 days (for a C9 one-ring aromatic structure). Based on the calculated half-life values calculated substantial differences in indirect photodegradation potential is expected between gas oils with high concentrations of either aromatic or saturated hydrocarbons. A similar range of water solubility values would be expected for component hydrocarbons in distillate fuels.

Water Solubility : When released to water, gas oils will float and spread at a rate that is viscosity-dependent. Component hydrocarbons in gas oils will partition to water according to their individual solubility values. For individual hydrocarbon constituents in gas oils, water solubility values vary by orders of magnitude. Molecular weight and chemical structure have a great influence on the ultimate degree of solubility. Calculated water solubility ranged from essentially insoluble (approximately 10⁻⁸ mg/L) for the higher molecular weight fractions (e.g., C30) within gas oil to approximately 52 mg/L for a C9 alkylbenzene.

Hydrolysis: The materials in the gas oils category do not contain chemical moieties that undergo hydrolysis.

Transport and Distribution in the Environment (Fugacity) Models have been used to estimate the percent distribution in environmental media (i.e., air, water, soil, sediment, and fish) of various C9 to C30 compounds representing the different classes of hydrocarbons found in gas oils (e.g., paraffins, olefins, naphthenes, and aromatics). Hydrocarbons having nine carbon atoms showed a tendency to partition to air (up to 98%). As molecular weight increases, partitioning shifts to soil, which accounts for 98% of the distribution of the C30 components. This trend was similar for saturate and aromatic structures alike.

Therefore, gas oils with high concentrations of either aromatic or saturated hydrocarbons are expected to partition in the environment in a similar manner

Biodegradation : Much of what is known is based on information gained from testing hydrocarbon mixtures of other petroleum products. Under standard biodegradability tests, hydrocarbon compounds representative of those found in gas oils typically do not pass ready biodegradability test conditions. Although those compounds are not recognized as being readily biodegradable, most hydrocarbon species present in gas oils are known to be ultimately degraded by aerobic microorganisms. Lower molecular weight compounds may be expected to be degraded relatively quickly in aerobic conditions, while higher molecular weight compounds, particularly polycyclic aromatics, will degrade slower. Much of this evidence is based on bioremediation studies of contaminated soils, which have shown that hydrocarbon components in gas oils are degraded in the presence of oxygen. Bioremediation of a diesel fuel spill has also been demonstrated under Arctic conditions. Under anaerobic conditions, such as anoxic sediments, rates of biodegradation of gas oils components are

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negligible and the gas oils may persist under those conditions for some time. Degradation then will be dependent on bioturbation or resuspension to provide microbes with access to oxygen.

Ecotoxicity:

Multiple ecotoxicological studies on heating and transportation fuels (e.g., no. 2 fuel oil and diesel fuel) have been conducted. In general, these commercial distillate fuels show moderate toxicity to aquatic life. LC50 values for fish ranged from 3.2 to 65 mg/L, while EC50 values for invertebrates ranged from 2.0 to 210 mg/L.

WHITE MINERAL OIL (PETROLEUM):

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
isodecyl diphenyl phosphate	HIGH		LOW	LOW

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION



Labels Required: COMBUSTIBLE LIQUID, regulated under AS1940 for Bulk Storage purposes only.

HAZCHEM:

None (ADG7)

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS: ADG7, UN, IATA, IMDG

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE S5

REGULATIONS

Regulations for ingredients

isodecyl diphenyl phosphate (CAS: 29761-21-5) is found on the following regulatory lists;

"Australia Inventory of Chemical Substances (AICS)", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals", "OSPAR List of Substances of Possible Concern"

dinonyl phthalate, branched and linear (CAS: 68515-45-7) is found on the following regulatory lists;

"Australia Inventory of Chemical Substances (AICS)", "OECD Representative List of High Production Volume (HPV) Chemicals"

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distillates, petroleum, middle, hydrotreated (CAS: 64742-46-7) is found on the following regulatory lists;

"Australia Hazardous Substances", "Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "International Council of Chemical Associations (ICCA) - High Production Volume List", "OECD Representative List of High Production Volume (HPV) Chemicals"

white mineral oil (petroleum) (CAS: 8042-47-5) is found on the following regulatory lists;

"Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "Australia Therapeutic Goods Administration (TGA) Substances that may be used as active ingredients in Listed medicines", "International Fragrance Association (IFRA) Survey: Transparency List", "OECD Representative List of High Production Volume (HPV) Chemicals"

No data for Fluorescent Penetrant RC-65 (CW: 25-9308)

Section 16 - OTHER INFORMATION

ND	CAS	Suggested codes
Substance		
isodecyl diphenyl phosphate	29761- 21- 5	

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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Print Date: 1-Mar-2011

This is the end of the MSDS.

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