File No: NA/744

April 2000

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Crodakyd E-906X

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Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 9577-9514 FAX (61) (02) 9577-9465

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

Crodakyd E-906X

1. APPLICANT

Nuplex Resins (Australia) Pty Ltd of 49 – 61 Stephen Road BOTANY NSW 2019 and PPG Industries Australia Pty Ltd of McNaughton Road CLAYTON VIC 3168 have submitted a limited notification statement in support of the joint application for an assessment certificate for Crodakyd E-906X.

2. IDENTITY OF THE CHEMICAL

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

Marketing Name: Crodakyd E-906X

3. PHYSICAL AND CHEMICAL PROPERTIES

The notified polymer is manufactured as a polymer solution in xylene. The properties listed below are those of the polymer unless otherwise stated.

Appearance:	Amber viscous liquid with aromatic hydrocarbon odour (polymer solution in xylene)
Melting Point:	138-142°C (xylene)
Density:	1 060 kg/m^3 970 kg/m^3 (polymer solution in xylene)
Vapour Pressure:	Not determined 0.933 kPa (xylene)
Water Solubility:	Not determined (see comments below)
Hydrolysis as a Function of pH:	Not determined (see comments below)
Partition Co-efficient:	Not determined (see comments below)

Adsorption/Desorption:	Not determined (see comments below)
Dissociation Constant:	Not determined (see comments below)
Particle Size:	Not available; Manufactured in solvent solution
Flash Point:	Not available
Flammability Limits:	Lower Explosive Limit = 1 % (xylene)
Autoignition Temperature:	500°C (xylene)
Explosive Properties:	The polymer is not expected to be explosive
Reactivity/Stability:	The polymer is expected to be stable

Comments on Physico-Chemical Properties

Water solubility was not determined, however, the complex structure and high molecular weight suggests that the polymer will have low water solubility. The notified polymer is composed mainly of hydrophobic functionalities.

The predicted low water solubility of the polymer suggests that it is unlikely to hydrolyse in the environmental pH range (4-9) despite the presence of ester linkages.

Determination of partition coefficient was not attempted due to the predicted low water solubility. Due to the complex polymer structure, partition coefficient would be difficult to measure but it is expected to follow the octanol phase.

Adsorption/desorption was not determined but it is predicted that the polymer will associate with soil and sediments.

Dissociation constant was not determined. However, the apparent absence of acidic hydrogen suggests the notified polymer will not dissociate in water.

4. PURITY OF THE CHEMICAL

Degree of Purity:	high
Non-hazardous Impurities (> 1% by weight):	Except for residual monomers, none
Maximum Content of Residual Monomers:	Each present at <2%.
Additives/Adjuvants:	The notified polymer will be imported in pre-prepared primers, and containing adjuvants, pigments and solvents.

5. USE, VOLUME AND FORMULATION

The notified polymer will not be manufactured in Australia. It will be imported as a component of a pre-prepared primer for automotive refinish use, at a concentration of approximately 10%. Import volumes for the notified polymer in solution (Crodakyd E-906X) are expected to be 5 tonnes for the first five years and increasing to 50 tonnes per annum after five years. Crodakyd E-906X itself is not expected to be imported for reformulation in the near future.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
Pre-prepared primer (paint) containing the notified polymer will be imported in a 20L Dangerous Goods approved tinplate paint cans. The notifiers have provided no detail on the type of packaging for the overall shipment of imported individual containers for dispatch to the customer sites. Individual product containers are not opened before arrival at the customer site so the likelihood of a spill is low. Transportation throughout Australia will be via rail. The primer will be supplied initially to one customer. Three workers (forklift drivers at dispatch and delivery points, and a truck driver) will be handling the sealed tin cans when delivering the paint. Two workers (a forklift driver and a storeman) will be involved when storage is required prior to delivery. Waterfront, transport and warehouse workers are not expected to be exposed to the notified polymer except in the case of an accident involving spillage of the paint.

Primer Manufacture
In the event that Crodakyd E-906X will be imported, primer will be manufactured by one of the notifiers who provided a description of processes to be used. The manufacturing process is automated and enclosed. The polymer solution will be transferred into a mixing tank where other ingredients are added under agitation, to form paint. The mixing process is fitted with local exhaust ventilation to capture volatiles generated during this process. The notifier did not provide information on the size of primer batches made. The concentration of the notified polymer in the primer is 10%. The properties of the primer are tested by collecting a small sample from the mixing tank. Finally, the primer is filtered and filled into 20L containers. Filled containers are lidded and warehoused for distribution to customers.

The number and categories of workers with potential exposure were not provided. However, there is a potential for dermal and eye contact, and inhalation of vapour during addition of ingredients for primer manufacture and during quality control testing. Workers exposure to drips and spills could also occur in drumming or filling activities. Exposure controls include exhaust ventilation, and use of personal protective equipment such as impervious gloves, coveralls and goggles.

Primer Application
At the customer site, the primer will be applied to vehicle bodies by high volume low pressure (HVLP) spray with transfer efficiency of approximately 65%. The notifier (customer) indicated that auto-refinishers have the necessary equipment for spray painting of vehicles but did not describe specific details of the work process or control measures. For the purpose of this assessment, the following is a precis of a spray painting process in work

places that implement good hygiene practices and precautionary measures to control exposure to hazardous substances.

Typically the spray painter will weigh and mix the appropriate amounts of the different components required in a particular formulation, including the pre-prepared primer containing the notified polymer, into an open container, dilute the mixture and pour into a spray gun. The spraying of the automobile will be carried out in a laminar flow downdraft spray booth, which is designed to rapidly remove aerosol particles and solvent vapour from the atmosphere. Several possible booth designs may be used. In a dry floor booth, overspray will be collected in filters contained in the floor of the booth; any unremoved particulates will reach the exhaust stack with the solvent vapours. In a wet floor booth, overspray will collect in a pool of water below the grill floor or in a wet scrubber in the exhaust and will be removed with a filter. The residual solids will be disposed of to secure landfill.

Dermal and eye contact, and inhalation of vapour or spray mist are possible during primer application and cleaning the spray equipment. The notifier estimates that up to six spray painters may be exposed to the primer at approximately 4 hours/day, 220 days/year. Spray painters will wear anti-static flame retardant overalls, anti-static footwear, impervious gloves, eye protection and cartridge type respirators.

The primer is subsequently top coated and heat cured at a typical temperature of 60°C. During the process the polymer cross links to form an inert durable coating. In this form, the notified polymer will not be bioavailable.

7. PUBLIC EXPOSURE

There is little potential for public exposure to the notified polymer arising from manufacture, transport, occupational use and disposal. In the event of an accidental spill, the polymer will remain part of the primer, which the notifier states should be scraped up and placed in suitable containers for disposal. The polymer would not be expected to partition into the aqueous compartment, but rather to associate with the sediments, as detailed below. Waste from the industrial use of the polymer will be disposed of through a licensed waste disposal contractor in approved landfill. The polymer in the form of uncured primer will therefore remain within the industrial domain, and public exposure due to the environmental spread of the polymer is unlikely.

The notified polymer will enter the public domain only in the form of cured paint films on automobiles. This paint film will contain the polymer in a crosslinked unreactive form which will not be bioavailable. In addition, as the notified polymer is part of a primer coating, it is likely to be covered by a topcoat of paint.

8. ENVIRONMENTAL EXPOSURE

Release

In the event that the primer will be manufactured in Australia, there is potential for additional spillage of approximately 1%. Based on the maximum import level of 50 000 kg, this equates to approximately 500 kg per annum. Should spills occur, the product will be contained within the plant through bunding and wastes will be collected by a licensed waste contractor.

There is potential for release during mixing, transfer and application of the primer, during cleaning of spray painting and mixing equipment, and from residues remaining in empty primer cans. All release figures are based on a maximum import volume of 50 000 kg per annum.

Release as a result of mixing and transfer (spillage) is expected to be in the vicinity of 3 % (1 500 kg) per annum.

During spray application, overspray of approximately 35% will occur. This equates to a maximum of approximately 16 500 kg of waste polymer being released per annum. Overspray is captured in spray booth filtering systems. Dry non-leachable solid polymer is disposed of to landfill.

Approximately 1.5% (750 kg) of waste will be generated during cleaning of spray and mixing equipment. Paint and solvent residues removed from spray equipment would be collected and reprocessed by a solvent reclamation company. Entrained polymer solids in the solvent would be recovered during this process and sent to landfill or incinerated. Waste generated as a result of cleaning activities will be collected by licensed waste contractors and either disposed of to landfill or incinerated.

Residues will also remain in the 'empty' containers after use. It is estimated that up to 2% (1 000 kg) of the notified polymer will remain as residue in the containers which will be disposed of to landfill as a dry solid.

Further release of the polymer may occur in the form of either inert flakes of cross-linked paint or on objects painted with the new polymer when panels are consigned to metal reclamation or landfill.

Fate

Container residues and solid waste generated in the application of the coating will be disposed of to landfill. Leaching of the polymer from landfill sites is unlikely, given the predicted low water solubility of the substance. The polymer is expected to degrade slowly through abiotic and biotic processes.

Once applied to the metal panels of vehicles the notified polymer will be incorporated in a hard, durable, inert film. Fragments, chips and flakes of the primer will be of minor concern as they are expected to be inert. Metal panels coated with the polymer are likely to be either recycled for steel reclamation or be placed into landfill at the end of their useful life. During steel reclamation the polymer would be incinerated, producing water vapour and oxides of carbon and nitrogen.

The polymer is not expected to cross biological membranes, due to the predicted low solubility and high molecular weight, and is not expected to bioaccumulate (Connell, 1990).

9. EVALUATION OF TOXICOLOGICAL DATA

No toxicology data were submitted for the notified polymer.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

No ecotoxicological data were submitted for the notified polymer.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The majority of notified polymer associated with waste from the application of the coating to the automotive surface will not enter the environment until it is disposed of to landfill. Approximately 20 tonnes of the notified polymer per annum will be disposed of as waste to landfill. The majority of this waste (35% of maximum import volume) will originate from overspray while the remainder will come from spillage, solvent recycling and container residues. Movement of the polymer by leaching from landfill sites is not expected due to predicted low water solubility and cross-linking in the cured coating.

Polymer, as part of surface coating of the vehicle panels, will share the same fate as the panel. When the vehicle panel is recycled for steel reclamation, the polymer will be destroyed through incineration.

The main environmental hazard would arise through spillage in transport accidents where quantities of the polymer may enter drains or waterways. Accidental releases of the polymer resin or uncured primer to the sewer are expected to become incorporated with sewerage treatment plant sludge which will eventually be either incinerated or placed into landfill. It is anticipated that if the polymer is released to soil or natural waterways, it will become immobile on association with soil or aquatic sediments.

The low environmental exposure of the polymer, as a result of the proposed use, indicates the overall environmental hazard should be low.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

No toxicological data have been provided, therefore a hazard classification of the notified polymer cannot be made against the NOHSC *Approved Criteria for Classifying Hazardous Substances* (National Occupational Health and Safety Commission (NOHSC), 1999b). However, the notified polymer is not expected to cause systemic or acute toxicity because of the high molecular weight and low monomer content (<3%). According to the notifiers, no adverse health effects have been characterised following human exposure to similar polymers in use overseas.

The polymer solution is classified as a hazardous substance according to the NOHSC *List of Designated Hazardous Substances* (NOHSC, 1999a) due to the presence of xylene (>20%). The overall classification is harmful and risks phrases, R20/21 – Harmful by inhalation and in contact with skin and R38 – Irritating to skin, are assigned. Employers need to ensure that the exposure standard for xylene of 80 ppm time weighted average (TWA) and 150 ppm short term exposure limit (STEL) (NOHSC, 1995) is not exceeded during primer manufacture.

The toxicity of the primer containing the notified polymer relates to the presence of solvents, resins and other additives present in the primer. The material safety data sheet (MSDS) for the pre-prepared primer lists a number of potential health effects namely nausea, vomiting and central nervous system depression by all routes of exposure, eye and skin irritation or contact dermatitis, irritation of mucous membranes and respiratory tract.

Occupational Health and Safety

Transport and Storage
Exposure to the notified polymer is not expected during transport or storage as long as the packaging remains intact. Exposure after a spill would be controlled by use of the recommended practices for spillage clean up given in the MSDS supplied by the notifier. The risk of adverse health effects for transport and storage workers is considered low.

In accordance with the Australian Code for the Transport of Dangerous Goods by Road and Rail (Federal Office of Road Safety, 1992), the polymer solution and the primer containing it are classified as Dangerous Goods (Class 3) because of the solvent content. The required precautions should be taken during transport, storage and handling.

Primer Manufacture (Future)
Workers may be exposed to the (approximately 60%) polymer via dermal, ocular and inhalation routes during addition of ingredients, quality control testing and filtering and filling of primer containing the notified polymer. Exhaust ventilation and the use of personal protective equipment are the mechanisms usually employed to control exposure. When handling the polymer solution and primer, the minimum protection requires impervious gloves, overalls and goggles to be worn.

Primer Application
Exposure to the notified polymer may occur during the application and disposal of the primer containing approximately 10% notified polymer. There exists potential exposure to the notified polymer by skin and eye contact and/or inhalation of vapour and spray mist during

spray application and cleaning of spray equipment. Spray painters will wear anti-static, flame retardant overalls; anti-static footwear; impervious gloves; eye protection and cartridge type respirators. Similar protective equipment is required when cleaning spray equipment. The notifier indicated that auto-refinishers have dedicated primer application facilities equipped with extraction systems. The high transfer efficiency (approximately 65%) of application by HVLP spray and the presence of filtering system to capture overspray (approximately 35% overspray captured) render minimal exposure to the notified polymer.

The use of the primer containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999c). The level of protection from exposure afforded by the standard protective measures will provide adequate protection from the notified polymer, which is likely to be less intrinsically toxic than most of the solvents, pigments and other primer resins.

The primer containing the notified polymer is flammable because of the solvents. Precautions must be taken to avoid sources of ignition, e.g. use of earthing leads. Workers handling the notified polymer should wear anti-static overalls and footwear.

Similar considerations apply in the disposal of the polymer and uncured primer. The wastes containing the notified polymer may be hazardous substances on the basis of the solvent and other resin content, and the precautions used on the basis of these additional materials should be adequate for protection from the notified polymer. In addition, much of the polymer will be crosslinked, hardened and immobilised by the time of disposal.

The risk of adverse health effects arising from exposure to the notified polymer during primer application and disposal is low because of the low concentration of the notified polymer in the primer and the control measures provided to minimise exposure.

Due to the presence of solvents, methyl ethyl ketone (MEK), xylene, n-propyl alcohol and ethyl alcohol, in the primer, employers must ensure that the NOHSC exposure standard for the individual solvents are not exceeded in the workplace (NOHSC, 1995). N-propyl alcohol has been assigned with skin notation (NOHSC, 1995) indicating that skin absorption could occur. The required control measures should be taken to prevent absorption through the skin.

Curing Process
During the curing process the notified polymer reacts with other components in the primer formulation to form an integral part of the paint film. Once curing is complete, the notified chemical is not bioavailable.

Public Health

Members of the public will make dermal contact with cars painted with primer containing the notified polymer. Exposure is anticipated to be minimal, as the majority of the chemical is in a polymerised form, with little remaining as unchanged monomer. Additionally, the primer is covered by a top coat, further limiting exposure.

Based on the toxicity profile and use pattern of the notified polymer, it is considered that the notified polymer will not pose a significant hazard to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to Crodakyd E-906X the following guidelines and precautions should be observed:

- Use of the paint containing the notified polymer should be in accordance with the NOHSC *National Guidance Material for Spray Painting* (NOHSC, 1999c);
- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (Standards Australia, 1994) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (Standards Australia/Standards New Zealand, 1992); industrial clothing should conform to the specifications detailed in AS 2919 (Standards Australia, 1987) and AS 3765.1 (Standards Australia, 1990); impermeable gloves should conform to AS/NZS 2161.2 (Standards Australia/Standards New Zealand, 1998);
- Spillage of the notified chemical should be avoided. Spillages should be cleaned up promptly with absorbents which should be put into containers for disposal;
- Good personal hygiene should be practised to minimise the potential for ingestion;
- A copy of the MSDS should be easily accessible to employees.

Employers should ensure that the NOHSC exposure standards for all of the components of the primer are not exceeded in the workplace.

14. MATERIAL SAFETY DATA SHEET

The MSDS for the notified chemical was provided in a format consistent with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (NOHSC, 1994).

This MSDS was provided by the applicant as part of the notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of the applicant.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the Act, secondary notification may be required if any of the circumstances stipulated in subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

Connell DW (1990) General Characteristics of Organic Compounds Which Exhibit Bioaccumulation. In: Bioaccumulation of Xenobiotic Compounds. ed. D. W. Connell CRC Press, Boca Raton.

Federal Office of Road Safety (1992) Australian Code for the Transport of Dangerous Goods by Road and Rail. Canberra, Australian Government Publishing Service.

National Occupational Health and Safety Commission (1994) National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]. Canberra, Australian Government Publishing Service.

National Occupational Health and Safety Commission (1995) Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment, [NOHSC:1003(1995)]. In: Exposure Standards for Atmospheric Contaminants in the Occupational Environment: Guidance Note and National Exposure Standards. Australian Government Publishing Service.

National Occupational Health and Safety Commission (1999a) List of Designated Hazardous Substances [NOHSC:10005(1999)]. Australian Government Publishing Service, Canberra.

National Occupational Health and Safety Commission (1999b) Approved Criteria for Classifying Hazardous Substances [NOHSC:1008(1999)]. Canberra, Australian Government Publishing Service.

National Occupational Health and Safety Commission (1999c) National Guidance Material for Spray Painting. Australian Government Publishing Service, Canberra.

Standards Australia (1987) Australian Standard 2919-1987, Industrial Clothing. Sydney, Standards Association of Australia.

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

Standards Australia (1994) Australian Standard 1336-1994, Eye protection in the Industrial Environment. Sydney, Standards Association of Australia.

Standards Australia/Standards New Zealand (1992) Australian/New Zealand Standard 1337-1992, Eye Protectors for Industrial Applications. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994a) Australian/New Zealand Standard 1715-1994, Selection, Use and Maintenance of Respiratory Protective Devices. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994b) Australian/New Zealand Standard 1716-1994, Respiratory Protective Devices. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994c) Australian/New Zealand Standard 2210-1994, Occupational Protective Footwear. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1994d) Australian/New Zealand Standard 4114.1-1994, Spray Painting Booths – Design, Construction and Testing and AS/NZS/4114.2-1994 Spray Painting Booths – Selection, Installation and Maintenance. Sydney/Wellington, Standards Association of Australia/Standards Association of New Zealand.

Standards Australia/Standards New Zealand (1998) Australian/New Zealand Standard 2161.2-1998, Occupational Protective Gloves, Part 2: General Requirements. Sydney, Standards Association of Australia.