File No: NA/271

Date: 6 October1995

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

PROCION BRILLIANT ORANGE H-EXL

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

PROCION BRILLIANT ORANGE H-EXL

1. APPLICANT

ICI Australia (Operations) Pty Ltd of 1 Nicholson Street, Melbourne VIC 3000 has submitted a standard notification for the assessment of Procion Brilliant Orange H-EXL.

2. IDENTITY OF THE CHEMICAL

Procion Brilliant Orange H-EXL has been classified as hazardous in accordance with Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1) due to its skin sensitisation property. However, for commercial reasons, the chemical identity has been granted exemption from publication in the Full Public Report and Summary Report. The conditions of this being permitted are:

- A descriptive generic name be used to identify the substance in public reports and the MSDS,
- The relevant employee unions shall be informed of the conditions of use of the notified chemical,
- The full chemical name shall be provided to any health professionals in the case of a legitimate need where exposure to the chemical may involve a health risk,
- The full chemical name shall be provided to those on site who are using the chemical and to those who are involved in planning for safe use, etc. in the case of a legitimate need,
- The Director of NICNAS will release the full chemical name etc in the case of a request from a medical practitioner,
- Confidentiality will expire after a 3 year period,
- The chemical be identified as a sensitiser in the Health Effects Section of the MSDS, and that reference to its assessment by NICNAS be made on the MSDS,
- These conditions shall be published in the Chemical Gazette.

Other names: Azo bis-monochlorotriazine reactive dye,
Substance S156756

Trade name: Procion Brilliant Orange H-EXL

Methods of detection and determination:

The notified chemical can be isolated by HPLC and determined by infra-red and NMR spectroscopy and quantitatively determined by UV/Visible spectral analysis.

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	Orange granular powder
Melting Point:	>300°C
Mean Relative Density:	1.72 at 20°C
Vapour Pressure:	Test not performed since high molecular weight and high melting point indicates that the vapour pressure will be low
Water Solubility:	Soluble in water (18.4% w/w at 20°C)
Partition Co-efficient (n-octanol/water) log P_{ow}:	<-3.5
Hydrolysis as a function of pH:	Less than 10% at pH 7.0 and 9.0, 13.3% hydrolysis at pH 4
Dissociation Constant:	Test not performed but is expected to be highly dissociated in dilute solution
Absorption/Desorption:	Test not performed due to high water solubility and low partition coefficient which indicates a low affinity for soil or sediment
Flash Point:	Test not performed - not applicable to solids
Flammability Limits:	Not classified as flammable.
Autoignition Temperature:	356 +/- 5°C
Explosive Properties:	Not explosive under the influence of a flame nor sensitive to shock or friction.
Reactivity/Stability:	Not an oxidiser
Surface Tension (of aqueous solution)**:**	55.4 - 68.7 Nm^{-1} at 22°C
Particle size distribution:	100% > 15 μm

4. PURITY OF THE CHEMICAL

Additives/Adjuvants: None

5. INDUSTRIAL USE

The notified chemical is used to dye yarn or fabric manufactured from cellulosic fibre or cellulosic fibre blends.

6. OCCUPATIONAL EXPOSURE

The dyestuff containing the notified chemical is expected to be imported at a rate of 1-10 tonnes per year for the first 5 years and is supplied in robust 25 kg metal drums with a metal clamp sealing the whole of the circumference of the drum lid.

The dyestuff is in a non-dusting granular form although dust generation is possible unless the granules are carefully handled, particularly during weighing out.

Weighing out is conducted under local exhaust ventilation after which the dyestuff is dissolved as a paste in cold water. Neutral pH water is then added and the solution automatically stirred at high speed following which the stirrer is removed and rinsed. Exposure time during these operations is typically 1-2 minutes.

A trolley containing the dissolved dyestuff, surfactants and common or Glauber's salt is wheeled to the dyeing machinery and the additions are made. For technical reasons particular care is taken to ensure that weighed quantities are completely transferred to the machine and that spillage and cross-contamination does not occur. Transfer time is likely to be 1 minute. Addition to the machine, including rinsing of the containers into the machine takes approximately 1-2 minutes.

Following even distribution of the various additions, the dissolved dyestuff is added, mixed evenly and the temperature is raised to 80°C to allow exhaustion of the dyestuff from the liquour onto the fabric. Fixation is initiated with various addenda and continued for 45-60 minutes at the completion of which two 70°C rinses and a treatment at the boil is done. The process is completed by a further hot rinse and cold rinses.

During the dyeing the liquor is sampled to check pH and exhaustion levels. Discharge of spent liquors and washing-off baths is done directly to the sewer or to specialised trade waste treatment plants.

Minor quantities (1 kg/yr) are used for development, shade matching and sampling at the notifier's premises involving up to 3 persons for 1/2 hour per day.

Up to 25 customers are expected to use the notified chemical and 90-100 persons would be exposed.

7. PUBLIC EXPOSURE

On the basis of the available information, public exposure to the notified chemical would not be expected to occur during colour kitchen and dyehouse processes. Technical requirements for the dyeing process (in effect, quality control procedures) require the minimisation of spillage, and the need to prevent loss and /or cross-contamination. Safety procedures adopted during these processes include the wearing of protective clothing and minimisation of generation and inhalation of dust. These requirements and procedures, together with standard engineering controls on manufacturing processes, such as filtered exhaust ventilation systems, should minimise escape of this substance to the general environment. It is expected that here would be no release of the product to ambient air under normal operating conditions.

Following acidification to pH 6-7, addition of surfactants, inorganic salts and dye, immersion of the fibre in the warmed solution, and fixing in alkaline solution, 82% of Procion Brilliant Orange H-EXL will eventually be permanently fixed to cellulosic fibre or yarn. Of the 18% of dyestuff not covalently fixed to the fibre, 10% will be in solution in a hydrolysed form, with the other 8% attached to the fibre in a hydrolysed form by hydrogen bonds. This will later be removed by hot rinsing and 'soap-off' stages to ensure
fastness (permanence) on the treated fabric. The remainder will be discharged to trade waste sewers typically at concentrations below 100 ppm (estimated to be in the range 24-87 ppm depending on use). Dilution with other waste streams and removal during treatment are likely to reduce concentrations to much lower levels before discharge to the environment. This low-level release of Procion Brilliant Orange H-EXL residues to the sewer or to specialised trade waste treatment plants is not expected to have a significant public health impact.

Significant accidental spillages of granules will be collected and disposed of to approved land disposal sites. Minor spillages and dissolved dyestuff spills can be washed to sewered discharge points. Neither technique should have any significant public health impact.

The public may come in contact with yarn or fibre products dyed with the notified chemical. However, as the dye stuff is chemically fixed to the fibre, public exposure is expected to be negligible.

8. ENVIRONMENTAL EXPOSURE

. Release

Release to the environment is from the spent dye liquors and the washing baths. There shouldn't be any release to the environment during transport, use in the colour kitchens or during dying.

. Fate

The dye is stable and unlikely to hydrolyse at environmental pHs. Once released to the environment the dye is expected to partition to the sediments, as do other dyes of this type (2). In the sediments the dye is likely to be reduced by anaerobic bacteria (3) and therefore will be unlikely to accumulate in the environment.

9. EVALUATION OF TOXICOLOGICAL DATA

All testing was performed by the ICI Central Toxicology Laboratory in accordance with ICI QA Standard Operating procedures and is claimed to be compatible with OECD 1982 guidelines (4). The test samples contained 66.9% (w/w) substance and 10.5% (w/w) water.

9.1 Acute Toxicity

Table 1 Summary of the acute toxicity of Procion Brilliant Orange H-EXL

Test	Species	Outcome	Reference
Acute oral toxicity	Rat	LD_{50} >2000 mg/kg	(5)
Acute dermal toxicity	Rat	LD_{50} >2000 mg/kg	(6)
Skin Irritation	Rabbit	Slight Irritant	(7)
Eye irritation	Rabbit	Moderate Irritant	(8)
Skin sensitisation	Mouse (local lymph node assay)	Sensitiser	(9)

9.1.1 Oral Toxicity (5)

Procion Brilliant Orange H-EXL (purity 66.9%) was administered to a group of SPF Wistar-derived albino rats (5/sex/group) by gavage at a single oral dose of 2000 mg/kg. Clinical observations were made over 15 days. Necropsies were conducted at the end of the study.

No signs of systemic toxicity were observed and there were no mortalities during the study. All animals lost weight initially, due to the pre-dose fast, and all had exceeded their initial (day 1) bodyweight by day 3 and continued to gain weight until the end of the study. The faeces, urine, coat and tail of the animals were stained red/orange by the test sample but this was considered not to be of toxicological significance.

Post mortem examination revealed discolouration of a number of tissues in one of the female animals. In the absence of any overt clinical signs of toxicity or significant increases in bodyweight, this discolouration was considered not to be toxicologically significant. Red spots were also seen on the lungs of 2 males; this is a common spontaneous finding in this age and strain of rat and was considered to be unrelated to treatment.

The study indicated that Procion Brilliant Orange H-EXL had an oral LD_{50} > 2000 mg/kg for both male and female rats.

9.1.2 Dermal Toxicity (6)

Procion Brilliant Orange H-EXL (purity 66.9%) was applied as an aqueous paste to the clipped backs of SPF Wistar-derived albino rats (5/sex/group) at a single dose of 2000 mg/kg, covered with a gauze patch, and kept in contact with the skin using

occlusive dressings for 24 hours, after which the dressings were removed and the application site cleaned. Clinical observations were made over 15 days.

No mortalities occurred during the study. All animals had exceeded their initial (day 1) bodyweight by the end of the study.

Orange/red staining of the application site by the test material varied from animal to animal, but in some cases it did prevent a full assessment of erythema for up to 5 days following dosing. On the basis of the available skin readings the test material caused only slight dermal irritation.

At the end of the study the animals were killed and subjected to a macroscopic *post mortem* examination. *Post mortem* examination revealed a variety of spontaneous findings seen commonly in this age and strain of rat. These included pelvic dilation, accentuated lobular pattern in the liver, discolouration of the lungs and decrease in size and flaccidity of the testes. These findings were considered to be unrelated to treatment. No other findings were seen at *post mortem* examination.

The study indicated that Procion Brilliant Orange H-EXL had a dermal LD_{50} >2000 mg/kg.

9.1.3 Inhalation Toxicity

This test was not performed.

9.1.4 Skin Irritation (7)

Procion Brilliant Orange H-EXL (purity 66.9%) was applied to the clipped right flank of a group of three young adult female New Zealand White albino rabbits. A test sample (approximately 500 mg) was moistened with a small amount (0.5 mL) of deionised water and applied to the test site (approximately 2.5 cm x 2.5 cm) on the left flank of each animal. The treated area was covered with surgical gauze and secured by tape, then covered by an impermeable dressing. The dressings were left in place for approximately four hours, then removed, and the application site cleaned. Clinical observations were made over 3 days.

No mortalities occurred during the study. Following application, the application sites of all three animals were stained red; this staining prevented assessment of erythema; however, no other visible signs of irritation were seen. The histopathological findings on skin of sacrificed animals indicate slight inflammatory reaction, including minimal diffuse acanthosis and slight cell infiltration in 2 test sections examined. Minimal diffuse acanthosis was only observed in the third. Minimal acanthosis and/or inflammatory cell infiltration was observed in 2 control sites but considered not to be significant.

The results of the study indicate that Procion Brilliant Orange H-EXL is a slight skin irritant in rabbits.

9.1.5 Eye Irritation (8)

Procion Brilliant Orange H-EXL (100 mg) (purity 66.9%) was instilled into the conjunctival sac of the left eye of one of three young adult female New Zealand

White albino rabbits. The right eye served as the untreated control. The test sample was then applied in the same way into the test eye of the remaining two animals. The Draize scale was used to assess the grade of ocular reaction. Fluorescein was used as an aid in the assessment of corneal damage.

Approximately one quarter of the test material was displaced from the eye of two animals immediately after application. Application of the test sample into the conjunctival sac caused slight to moderate initial pain in all three rabbits. The test sample stained the tissues of the eye red, and prevented a complete assessment of ocular irritation. During the first 10 days after application, corneal effects could only be assessed in one animal, partially assessed in another, and in the third animal no assessment was possible. In the animal where full assessment was possible no corneal effects were seen. In the other animal (where corneal assessment was partially obscured by staining from the test material) 'slight to mild' corneal opacity was recorded affecting up to half of the cornea, which persisted up to and including day 4. No corneal effects were seen after this time. Iridial effects could not be assessed in all animals approximately 1 hour after dosing. One day after application a full assessment of the iris could be made in 2 animals, and no effects were seen. In the third animal the iris could not be assessed until day 7, at which time no effects were seen.

Conjunctival redness could not be assessed in any of the animals for the whole of the study. 'Slight to mild' chemosis was seen for up to and including 1 hour, 2 days or 7 days. No chemosis was seen after this time. Slight to severe discharge was seen in all animals for up to and including 1 hour, 2 days or 7 days. Conjunctival discharge had completely cleared after this time. Additional observations included dried secretions on the eyelids in one animal.

The results of the study indicate that Procion Brilliant Orange H-EXL is a moderate irritant to the rabbit eye.

9.1.6 Skin Sensitisation (9)

The skin sensitisation potential of Procion Brilliant Orange H-EXL (purity 66.9%) was studied in mice using the Local Lymph Node Assay, which determines the level of T lymphocyte proliferation in the lymph node draining the site of chemical application, by measuring the amount of radiolabelled thymidine incorporated into the dividing cells.

Four groups of young adult male CBA/Ca mice (CBA/Ca/Ola/Hsd strain) were used for this study. Approximately 25 mL of a 1, 3 or 10% w/v preparation of the test sample in DMF was applied, using a positive displacement pipette, to the dorsum of each ear. The procedure was repeated daily for 3 consecutive days. A vehicle control group was similarly treated using DMF alone. 2-mercaptobenzo-thiazole was used for a positive control study. Three days after the third application, all the animals were injected, via the tail vein, with approximately 250 mL of phosphate buffered saline containing approximately 20 mCi of a 2.0 Ci/mmol specific activity ^{3}H-methyl thymidine 3H. After sacrifice, approximately 5 hours later, the draining auricular lymph nodes were removed from each animal and, together with the nodes from the other animals in the group, were placed in a container of phosphate buffered saline.

A single cell suspension of lymph nodes was prepared. The cell suspension were washed by centrifugation with phosphate buffered saline. Approximately 3 mL of 5%

w/v trichloroacetic acid was added. After overnight precipitation at 4°C the samples were pelleted by centrifugation and resuspended in approximately 1 mL of trichloroacetic acid. One day later the suspensions were transferred to scintillation vials and 10 mL of scintillant was added. The contents of each vial were thoroughly mixed prior to b-scintillation counting on the next day. The sensitisation potential of 2-mercaptobenzothiazole was assessed using the same method, except that the vials were counted one day after removal of the lymph nodes.

The criteria for positivity are that, firstly, the increase in isotope incorporation for at least one concentration tested must be 3-fold or more compared with the vehicle control, and secondly, that the data generated must be compatible with a biological dose-response.

On the basis of this test, Procion Brilliant Orange H-EXL should be considered as having the capacity to cause contact sensitisation. The positive control confirmed the sensitivity of the assay.

9.2 Repeated Dose Toxicity

9.2.1 28 Day Oral Toxicity Study in Rats (10)

Testing was performed by the Zeneca Central Toxicology Laboratory in accordance with Zeneca QA Standard Operating procedures and is claimed to be compatible with OECD Good Laboratory Practice guidelines.

Groups of five male and five female Wistar-derived rats were dosed orally, by gavage, with Procion Brilliant Orange H-EXL (purity 66.9 % w/v) at dose levels of 0, 20, 150 or 1000 mg/kg/day for 28 consecutive days. Additional groups at 0 and 1000 mg/kg/day were allowed a 14 day non-dosing recovery period prior to scheduled kill. All surviving animals were killed on day 29 or 43. Haematological and clinical chemical analyses were conducted on samples obtained at sacrifice, and urinalysis was conducted with all groups approximately 7 days prior. Gross and histological examination was performed on tissues obtained at recovery and terminal kills.

There were no treatment-related deaths or toxicologically significant effects on clinical condition, or food consumption. There were small statistically significant increases in the mean bodyweight of main study males dosed with 1000 mg/kg/day of test substance and there was evidence of a slight increase in bodyweight of main study females dosed with 1000 mg/kg/day of test substance. These increases were not evident after a 14-day recovery period. A statistically significant increase in lymphocytes was observed in main study group males dosed with 1000 mg/kg/day test substance and in recovery group males dosed with 1000 mg/kg/day test substance when compared with the concurrent control groups. There was a small statistically significant decrease in haemoglobin in recovery group females dosed with 1000 mg/kg/day of test substance but in the absence of a similar change in the main study group this was considered not to be treatment-related. Other statistically significant differences in haematological parameters were small and in the absence of a coherent dose-response were considered incidental to treatment.

All clinical chemistry effects were confined to animals dosed with 1000 mg/kg/day test substance. The plasma of all of the 1000 mg/kg/day group animals in week 5 was coloured orange, which was attributed to the highly coloured nature of the test product. Plasma creatinine levels were raised in main study males in the 1000 mg/kg/day group, and minimally increased in 1000 mg/kg/day females. Plasma glucose was statistically significantly raised in main study males dosed with 1000 mg/kg/day, and is largely a consequence of one very high individual value. Plasma total protein values were statistically significantly elevated in main study 1000 mg/kg/day group females. Plasma cholesterol and triglyceride levels were statistically significantly raised in both sexes from the 1000 mg/kg/day group in both the main study and the recovery group. Plasma bilirubin levels were statistically significantly raised in both sexes from the 1000 mg/kg/day group in both the main study and the recovery group. Plasma gamma-glutamyl transferase activity was statistically significantly higher in the 1000 mg/kg/day group in both main study males and recovery group males when compared with the concurrent control group. This difference is largely as a consequence of one very high individual value. Plasma alanine transferase activity was reduced in main study females dosed with 1000 mg/kg/day or 20 mg/kg/day/kg/day of test substance; in the absence of a similar change in animals dosed with 150 mg/kg/day of test substance, this difference was considered to be incidental to treatment. Plasma potassium, calcium and phosphorus were all elevated in main study males in the 1000 mg/kg/day group; these results were due to unusually high values for one animal.

Urine samples in all animals dosed with 1000 mg/kg/day test substance were stained orange, which was attributed to colouration by the test substance. There was an increased presence of blood in the urine of the main study and recovery group males dosed with 1000 mg/kg/day of test substance. In most cases these were only trace amounts, and other qualitative tests showed no effects or trends. Urinary protein levels were increased in recovery group females dosed with 1000 mg/kg/day test substance. Increases in urinary protein values in females dosed with 20 mg/kg/day of test substance was due to one animal which had an elevated value caused by the presence of blood. Tubular epithelial casts were observed in the urine sediments of the majority of the recovery group animals dosed with 1000 mg/kg/day of test substance. There were no compound-related effects during week 4.

Adrenal gland weight was increased before and after adjustment for bodyweight in main study animals dosed with 1000 mg/kg/day of test substance. Kidney weight was increased before and after adjustment for bodyweight in main study females dosed with 1000 mg/kg/day of test substance. Liver weights (adjusted for bodyweight) in recovery group females dosed with 1000 mg/kg/day of test substance were slightly increased when compared with controls, but in the absence of a quantitatively similar change at this dose in the main group, this difference from the control was considered to be incidental to treatment. There was no evidence of any other organ weight effects.

A *post mortem* examination was performed on one male animal from the 150 mg/kg/day group, found dead on day 5. Findings consisted of soft deposits in the bladder, excess watery fluid in the thoracic cavity and firmness of the heart. No pathological changes were observed in the kidneys. These findings were considered not to be treatment-related. None of these findings was observed in any other treated animals. In all treated animals surviving to termination, discolouration of a variety of organs, particularly abdominal and subcutaneous fat, was observed; this was attributed to colouration by the test substance. Compound-related findings in animals surviving to termination were restricted to the kidneys of the 1000 mg/kg/day groups

from the main study group and recovery group. They consisted of a slight or moderate deposit of pigment within proximal renal tubules and were associated with a variable vacuolation of cells.

There were no effects following daily oral administration to male and female rats for 28 days at a dose of 150 mg/kg/day.

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* and *Escherichia coli* Bacterial Mutagenicity Assays (11)

The mutagenicity assays were conducted using the S*almonella* bacterial mutation assay described by Maron and Ames (1983) , updated by the United Kingdom Mutagen Society's sub-committee on Guidelines for Mutagenicity Testing (Gatehouse, *et al,* 1990). The protocols also complied with OECD Guideline Numbers 471 and 472 (12,13).

The test sample was initially assayed using the standard plate incorporation protocol over a dose range of 7500-200 mg per plate, in the presence or absence of a liver S9 mix prepared from phenobarbital/b-naphthoflavone-induced Alderly Park rats. Four *Salmonella* tester strains were used (TA1535, TA1537, TA98 and TA100) and two *E. coli* strains (WP2P and WP2P *uvrA*). The compound was subsequently re-tested in all six strains over the dose range 7467-200 mg per plate. The +S9 phase of this second assay was conducted using a defined pre-incubation protocol. The incubation period for each experiment was 3 days (at 37°C). For each experiment, positive control compounds were tested to validate the bacterial strains and to confirm the activity of each batch of S9-mix used.

In each experiment, the positive controls confirmed the sensitivity of the assay.

In these two separate experiments the substance did not induce any significant, reproducible increases in the observed number of revertant colonies in *Salmonella typhimurium* or *Escherichia coli* strains either in the presence or the absence of the S9 metabolising system.

9.3.2 *In vitro* Cytogenetic Assay in Human Lymphocytes (14)

An evaluation of the clastogenic potential of Procion Brilliant Orange H-EXL was conducted in human lymphocytes from two donors (one male, one female), treated *in vitro* with a range of concentrations of test material in the presence or absence of a rat liver metabolic activation system (S9-mix). Cultures were harvested at 72 hours after culture initiation (cultures from both donors) and 96 hours (cultures from male donor) after culture initiation.

Two independent cytogenetic studies were conducted using a range of concentrations of the test substance, from 100-7474 μg/mL (in presence or absence of S9-mix) from the male donor, and from 100-2000 or 4000 μg/mL (in absence or presence of S9-mix, respectively) from the female donor. Cultures from the male donor, treated at 100, 2000 and 3000 μg/mL (in the presence of S9-mix) and 100, 1000 and 2000 μg/mL (in the absence of S9-mix) were selected for analysis at 68 hours. Cultures from the female donor, treated at 100, 500 and 1000 μg/mL in the presence or absence, respectively, of S9-mix were selected for

analysis at the 68 hour sampling time. In addition, cultures from the female donor, treated at 1000 μg/mL in the absence of S9-mix and 2000 μg/mL in the presence of S9-mix were selected for analysis at the 92 hour sampling time.

No statistically or biologically significant increases in percentage of aberrant cells, compared to the medium control values, were seen at any of the test substance concentrations tested, in the presence or absence of S9-mix, at either of the sampling times investigated.

The sensitivity of the test system, and the metabolic activity of the S9-mix employed, were confirmed by the positive control agents (mitomycin C and cyclophosphamide).

In conclusion, under the conditions of this assay, Procion Brilliant Orange H-EXL is not clastogenic to cultured human lymphocytes *in vitro.*

9.4 Overall Assessment of Toxicological Data

Animal studies indicated that Procion Brilliant Orange H-EXL had low acute oral and dermal toxicity in the rat (LD_{50} >2000 mg/kg). It was a slight skin irritant and a moderate eye irritant in rabbits. Skin sensitisation potential was identified in a mouse local lymph node assay.

In a 28 day repeat-dose study (20, 150 or 1000 mg/kg/day) in rats by gavage, Procion Brilliant Orange H-EXL exhibited low systemic toxicity. Lymphocytes were increased in males dosed with 1000 mg/kg/day and this effect was still present following a 14 day recovery period. Histopathological examination of the kidneys of animals dosed with 1000 mg/kg/day showed deposition of pigment within proximal tubules and associated variable cell vacuolation. These effects were still evident in concurrent recovery animals. No adverse effects were seen at 150 mg/kg/day.

Procion Brilliant Orange H-EXL was not mutagenic in bacterial reverse mutation assays *in vitro*, and was not clastogenic in cultured human lymphocytes *in vitro*.

In accordance with Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1), the notified chemical would be classified as hazardous with respect to Sensitising effects (skin). However, the notified chemical would not be classified as hazardous with respect to Acute lethal effects (oral, dermal), Irritant effects (skin, eye) or Serious effects after repeated or prolonged exposure.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The following ecotoxicity studies have been provided by the notifier.

Test	Species	Result
Acute toxicity	Rainbow trout	96h LC_{50} > 180 mg/L
Acute toxicity	Daphnia magna	48h EC_{50} > 180 mg/L
Growth inhibition	Algae	72h EC_{50} > 128 mg/L

As the ecotoxicity studies show that the dye is practically non-toxic to aquatic organisms, the dye is not expected to have significant environmental effects when released into the environment.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The applicant has not specified the location of the dye houses in which the dye is likely to be used, but has stated that about 90% of the expected customers are located in cities. The environmental hazard can be determined for dyehouses located in two general locations, one metropolitan-based dyehouse and the other country-based. These calculations assume that no dye is removed in treatment of the waste effluents.

The notifier has provided the following information on use:

Amount of chemical used:	10 kg
Volume of wastewater from dye bath	50,000 L
Fixation to fibre	82%
Purity of chemical	66.9%
Concentration of dye in dye bath waters	24 ppm

For a country-based dyehouse the assumptions are: 3 dye baths discharging a total of 150,000 L of waste into the municipal sewer with a flow 5 ML which is then discharged to a river in drought conditions.

Concentration of dye in dyehouse effluent	8.0 ppm
Concentration in sewer outflow	0.24 ppm
Concentration in river (2:1 dilution)	0.12 ppm

For a city-based dyehouse the assumption are 10 dye baths, discharge into the municipal sewer of 250 ML flow which is discharged to the sea.

Concentration of dye in dyehouse effluent	2.4 ppm
Concentration in sewer outflow	0.005 ppm
Concentration in sea (10:1 dilution)	0.0005 ppm

The notifier has estimated the concentration of the dye to be between 24-87 ppm (from the dye bath). Using the above assumptions and the worst case as presented by the notifier, the concentration in the country scenario is 0.44 ppm (in the river) and for the city 0.0017 ppm (1.7 ppb). As this type of dye has been shown to partition to sediments (1) and it was assumed there was no dye removed in the waste treatment plants, the actual concentration in the receiving waters is likely to be lower than calculated.

From the above calculations the exposure to aquatic organisms is several orders of magnitudes below the fish, daphnia and algae EC_{50} levels. There is unlikely to be any significant effect on these organisms and on the aquatic environment from use of the dye.

The only other sources of environmental contamination is from accidental spills etc. The recommendations contained in the MSDS are adequate to limit the environmental exposure and therefore limit the environmental effects.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical is expected to exhibit low toxicity by the oral and dermal routes and is not expected to exhibit serious effects on repeated or prolonged exposure. It is likely to be a slight skin irritant and a moderate eye irritant and is unlikely to be genotoxic. However, the notified chemical is likely to exhibit skin sensitsation and respiratory sensitsation.

Exposure during weighing out of the dyestuff is expected to be low due to its non-dusty granular form and the fact that local exhaust ventilation is generally used in colour kitchens. Following dissolution of the dyestuff in water, dermal exposure is possible during addition to the dyebath, rinsing of equipment and if handling of dyed fabric is required during the dyeing process. Disposal of spent liquors and washings is expected to result in low exposure.

The risk of respiratory senstisation during weighing out of the dyestuff is expected to be low as a result of its granular form and the use of local exhaust ventilation. However, there would appear to be a high risk of dermal sensitisation with the notified chemical in other dyeing operations so that adequate personal protective equipment is required to be used.

The public may come in contact with the yarn or fibre products dyed with the notified chemical. However, as the dyestuff is chemically fixed to the fibre, public exposure is expected to be negligible. The notified chemical is therefore considered not to constitute a significant health risk when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to Procion Brilliant Orange H-EXL the following guidelines and precautions should be observed:

. local exhaust ventilation should be employed and a respirator should be worn which conforms to Australian/New Zealand Standard AS/NZS 1715 (15) during weighing out and dissolution of the dyestuff in water. During these operations care should be taken not to generate dust;

. during all operations in which contact with the dissolved dyestuff is possible, personal protective equipment which conforms to and is used in accordance with Australian Standards (AS) for eye protection (AS 1336, AS 1337) (16,17), impermeable gloves (AS 2161) (18), protective clothing (AS 2919) (19) and footwear (AS/NZS 2210) (20) should be worn;

. good work practices should be implemented to avoid spillages and splashing;

. good housekeeping and maintenance should be practised. Spillages should be cleaned up promptly with absorbents which should then be put into containers for disposal in accordance with Local or State government regulations;

. the workplace should be well ventilated;

. good personal hygiene should be observed; and

. a copy of the Material Safety Data Sheet (MSDS) should be easily accessible to employees.

14. MATERIAL SAFETY DATA SHEET

The attached Material Safety Data Sheet (MSDS) for Procion Brilliant Orange H-EXL was provided in Worksafe Australia format (21).

This MSDS was provided by ICI Australia (Operations) Pty Ltd as part of their notification statement. It is reproduced here as a matter of public record. The accuracy of this information remains the responsibility of ICI Australia (Operations) Pty Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989*, secondary notification of Procion Brilliant Orange H-EXL shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

1. National Occupational Health and Safety Commission, 1994, *Approved Criteria For Classifying Hazardous Substances [NOHSC:1008(1994)]*, Australian Government Publishing Service, Canberra, Australia.

2. E.J. Weber, 1991, *Environmental Toxicology & Chemistry,* **10**, 609-618.

3. K. T. Chung and S. E. Stevens Jr., 1993, *Environmental Toxicology & Chemistry,* **12**, 2121-2134.

4. OECD Good Laboratory Practice in the Testing of Chemicals - Final Report of the OECD Expert Group on Good Laboratory Practice, ISBN 9264 12367 9, 1982.

5. Robinson P, 1994, *Fixed dose acute oral toxicity to the rat*. Report No. CTL/P/4222, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. AR5638, AR5639).

6. Robinson P, 1994, *Acute dermal toxicity to the rat*, Report No. CTL/P/4223, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. CR3095).

7. Robinson P, 1994, *Skin irritation to the rabbit*, Report No. CTL/P/4224, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. EB4242).

8. Robinson P, 1994, *Eye irritation to the rabbit*, Report No. CTL/P/4225, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. FB4811).

9. Robinson P, 1994, *Local lymph node assay,* Report No. CTL/P/4226, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. GM6015).

10. Duerden L, 1994, *28 day oral dosing study in rats*, Report No. CTL/P/4315, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. KR1198).

11. Callandar R D, 1993, *An evaluation of mutagenic potential using S. typhimurium and E. coli*, Report No. CTL/P/4143, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. YV3257).

12. OECD Guidelines for the Testing of Chemicals - *Salmonella typhimurium*, Reverse Mutation Assay, No. 471, 1983.

13. OECD Guidelines for the Testing of Chemicals - *Escherichia* coli, Reverse Mutation Assay, No. 472 1983.

14. Fox D and Mackay J, 1994, *An evaluation in the in vitro cytogenetic assay in human lymphocytes*, Report No. CTL/P/4248, Zeneca Central Toxicity Laboratory, Alderley Park, Macclesfield, Cheshire, UK, (study no. SV0708).

15. Standards Australia, Standards New Zealand, 1994, *Australian/New Zealand Standard 1715 - 1994 Selection, Use and Maintenance of Respiratory Protective Devices*, Standards Association of Australia Publ., Sydney, Australia, Standards Association of New Zealand Publ., Wellington, New Zealand.

16. Standards Australia, 1994, *Australian Standard 1336-1994, Recommended Practices for Eye Protection in the Industrial Environment*, Standards Association of Australia Publ., Sydney, Australia.

17. Standards Australia, 1992, *Australian Standard 1337-1992, Eye Protectors for Industrial Applications*, Standards Association of Australia Publ., Sydney, Australia.

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

19. Standards Australia, 1987, *Australian Standard 2919 - 1987 Industrial Clothing,* Standards Association of Australia Publ., Sydney, Australia.

20. Standards Australia, 1994, *Australian Standard 2210 - 1994 Occupational Protective Footwear, Part 1: Guide to Selection, Care and Use. Part 2: Specifications,* Standards Association of Australia Publ., Sydney, Australia.

21. National Occupational Health and Safety Commission, 1990. *, Guidance Note for the Completion of a Material Safety Data Sheet*, 2nd. edition, AGPS, Canberra , Australia.[1]

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[1] This Guidance Note, to which an MSDS must conform in accordance with the *Act,* has been superseded by Worksafe Australia's National Code of Practice for the Preparation of Material Safety Data Sheets (March 1994) published by the Australian Government Publishing Service.