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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

CIN 10092964

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

CIN 10092964

1. APPLICANT

Kodak Australasia Pty Ltd of 173 Elizabeth St COBURG VIC 3058 has submitted a standard notification statement in support of their application for an assessment certificate for CIN 10092964.

2. IDENTITY OF THE CHEMICAL

The chemical name, CAS number, molecular and structural formulae, molecular weight, spectral data, details of non-hazardous impurities and details of formulation of the notified chemical have been exempted from publication in the Full Public Report and the Summary Report.

Marketing Name:	CIN 10092964
Method of Detection and Determination:	can be detected by HPLC and characterised by UV/visible, infrared (IR) and ^{1}H nmr spectroscopy (1D and 2D)

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	off white to yellow solid
Melting Point:	160.5 – 170.5°C (OECD TG 102)
Boiling Point:	decomposes above 227°C at 6.7 kPa (OECD TG 103)
Specific Gravity:	1.2947 at 20°C (OECD TG 109)
Vapour Pressure:	$< 5.4 \times 10^{-8}$ kPa at 25°C (OECD TG 104)
Water Solubility:	< 0.0095 mg/L at 25°C (OECD TG 105) (see comments below)

Particle Size:	Size Range (μm)	Mass %

	< 38	0.448
	38 - 53	0.0
Inspirable range:	53 - 75	0.0
	75 - 106	0.022
	106 – 150	0.090
	150 - 212	0.291
	212 - 300	2.017
	300 - 420	12.032
	420 - 595	20.905
	595 - 850	23.101
	850 - 1190	15.438
	1190 - 1680	12.951
	1680 - 2360	9.119
	> 2360	4.033
	median size 746.9 μm	

Partition Co-efficient (n-octanol/water):	log P_{ow} > 5.00 (OECD TG 107) (see comments below)
Hydrolysis as a Function of pH:	not determined (see comments below)
Adsorption/Desorption:	Koc range 1724-12578 (see comments below) (OECD TG 106)
Dissociation Constant:	not determined (see comments below)
Flash Point:	not applicable for solids of low vapour pressure
Flammability Limits:	not highly flammable; combustible (84/449 EEC, A.10)
Autoignition Temperature:	no self-ignition to 400°C (84/449 EEC, A.16)
Explosive Properties:	not explosive (84/449 EEC, A.14)
Reactivity/Stability:	not oxidising (84/449 EEC, A.17); not expected to be highly reactive under normal environmental conditions

Comments on Physico-Chemical Properties

Water solubility was determined by the column elution method and using High Performance Liquid Chromatography (HPLC) for detection. However, it was found that while possible to determine the presence of the compound in water, the size of the peak in the chromatogram was small, and below the quantitative detection limit of the equipment used (<0.0095 mg/L).

The potential of the notified chemical to undergo hydrolytic degradation in an aquatic environment could not be determined in laboratory tests due to the limited solubility of the chemical in a preliminary test in pH 4, 7 and 9 buffers. However, the compound contains no

bonds which are susceptible to hydrolysis under the environmental pH region where 4 < pH < 9, and it is expected to be stable.

Experimental determination of the n-octanol/water partition coefficient was made by the shake-flask method. Using this technique, test systems were prepared by diluting a stock solution of the notified chemical in n-octanol and distilled water. The test tubes were shaken for 30 minutes, centrifuged and aliquots of the water and n-octanol layers removed for analysis by HPLC/UV. Due to the limitations of this method it could only be determined that Log K_{oc} was >5.0 for this very water insoluble chemical. Use of the HPLC method (OECD TG 107) may have provided a more accurate estimate, which in turn could have allowed a better calculation of water solubility.

Adsorption/desorption data was derived (North, 1999) using both the preliminary and screening parts of OECD TG 106. The three soil types were mixed with the test solution (5.1 mg/L notified chemical in 5% DMF in 0.01 M NH_4OAc), mixed for 18 hours at 23.5°C, centrifuged and analyzed using HPLC/UV. Results are as follows:

Soil Type	pH	Organic Carbon %	Mean % Adsorbed	Mean K	Mean K_{oc}
Spodosol	4.7	2.4	87.2	41.4	1724
Alfisol	6.5	3.0	>96.1	151	5039
Entisol	7.5	1.2	>96.1	151	12578

Less than 10.1% desorbed, in line with the strong adsorption.

No data on the dissociation constant could be submitted as the pK_a of the notified chemical could not be determined. The compound does not contain any highly acidic or basic groups capable of dissociating in water, so dissociation constant data is not considered necessary.

4. PURITY OF THE CHEMICAL

Degree of Purity: 98.5 - 100 %

Hazardous Impurities: none identified

Non-hazardous Impurities (> 1% by weight): none identified

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified chemical will be used in the manufacture of photographic film and paper.

The notified chemical will not be manufactured in Australia. It will be imported as a powder in plastic bags inside cardboard cartons, each containing 4.45 kg of notified chemical. The import volume for the notified chemical is estimated to be approximately 31.5 tonnes per annum during the first five years of importation.

6. OCCUPATIONAL EXPOSURE

Transport and Storage
Transport and storage workers are not likely to be exposed to the notified chemical except in the case of an accident involving damage to the packaging. No details of occupational exposure were provided by the notifier.

Formulation
The appropriate amount of the notified chemical, in solid form, will be weighed and added to mix tanks with other substances to form gelatin dispersions (< 10 % notified chemical) in multi-batch runs, once per week. Weighing and addition to the mix tanks will be performed manually. The approximate volumes of the batches in mix tanks were not provided. The addition of the notified chemical will take approximately 5 minutes per batch. Dermal contact would be the main route of exposure for workers at the mix tank site. However, inhalation and eye exposure to the solid form of the notified chemical may also occur because weighing and adding to the mix tank is an open process.

Weighing of the notified chemical and addition to the mix tank will be conducted under local exhaust ventilation. Workers handling the dry powder are to wear company provided overalls, safety glasses, disposable vinyl gloves, and a half face respirator with particle filter.

The notifier indicates that 12 operators will be involved in producing the gelatin dispersions.

The gelatin dispersion will be bagged and stored in a cold room up to several weeks prior to use. At the melt tank site, the gelatin dispersion and other ingredients will be added to melt tanks, further diluting the notified chemical. A sample of the melt will be taken for laboratory testing. The occupational exposure would predominantly be by dermal contact during the addition of gelatin dispersion into the melt tanks. Workers are to wear overalls, safety glasses and gloves (as described above) during this process. The melt dispersion will then be pumped to automated processing equipment, where the notified chemical will be incorporated into photographic films and paper. Intermittent dermal exposure to the notified chemical is also possible during cleaning of automated processing equipment.

The notifier indicates that 16 operators and 4 technicians will be involved in handling the gelatin dispersions.

End Use
The notifier indicates that the notified chemical will be under overcoat layers in the finished articles, and no exposure of end users such as photographers and minilab operators is likely.

7. PUBLIC EXPOSURE

The notified chemical will be used only within an industrial environment prior to incorporation in photographic film and paper. These will be sold to the public and therefore there will be widespread availability of the notified chemical in the public domain in these forms. However, once incorporated onto photographic film or paper, the gelatin dispersion containing the notified chemical will reside beneath several overcoat layers, which limits the possibility of dermal contact.

8. ENVIRONMENTAL EXPOSURE

Release

Some chemical is likely to remain in the empty bags. The company estimates that 1 kg per year of the chemical will be left as residues when the import containers are emptied and 0.5 kg per year will be trapped in the filters used in the dust extraction equipment. These residues will be disposed to landfill as will any reject gelatin dispersion (< 0.1 % of import volume). The notifier also indicated that the notified chemical may be released in various process liquors, and that this would be released to the sewer system, and discharged to the sea after treatment. The release in all forms is expected to total around 600 kg each year.

The notifier states that rejected finished articles coated with the melt containing the notified chemical will be sent to the United States for smelting to recover the silver.

Most of the chemical is expected to be retained in the photographic emulsion, and would consequently be dispersed widely throughout Australia. Eventual disposal of photographs and negatives is likely to be through deposition into landfill where very slow release could be expected as the old photographs and the emulsion become degraded. Some photographs and negatives may be incinerated, which would destroy the chemical, producing water vapour and oxides of nitrogen and sulphur, and hydrogen chloride.

Fate

The notifier included reports on a Biochemical Oxygen Demand (BOD) (Foley, 1999a) and a Chemical Oxygen Demand (COD) (Foley, 1999b) determination. The BOD of the chemical could not be determined due to the insolubility of the chemical in water. The COD was measured in compliance with “OECD Principles of Good Laboratory Practice”, [C(97) 186(Final)], Annex 2 and found to be 1.78 g COD/g test substance.

The substance was examined for biodegradation potential (Berlinger, 1998) using EEC Directive 92/69, Part C.4-C (Modified Sturm Test), and OECD Test Guideline 301B (substance added directly to test carboys due to sparing solubility). Over the 28 day test, biodegradation reached 5 % and 0 % in the two replicates, indicating that the notified chemical is not readily biodegradable under the conditions of the test, the control solution reached 69 % biodegradation over the 28 day test period.

The very low water solubility and high value for the n-octanol/water partition coefficient indicate that once released to the water compartment, the compound would very likely become strongly associated with aquatic sediments. While the compound is not biodegradable under aerobic conditions, once adsorbed into aquatic sediments in anaerobic

environments it may be slowly degraded through various biological and abiotic processes. The degradation products are likely to be water, methane and oxides of carbon. Any material disposed of into landfill (eg residues in empty bags) is also expected to become associated with the organic component of soils, and may also be slowly degraded over time.

In the absence of additional test data on biodegradation rates under both aerobic and anaerobic conditions, the available data indicates that once released the compound is likely to be persistent in the environment. This may have implications for bioaccumulation potential (see further below).

Discarded photographs and film negatives would most probably be placed into landfill where the chemical is expected to be slowly released as the film and emulsion are degraded. It is expected that released compound would become associated with the organic component of the soil, and would be slowly destroyed as indicated above. Some photographs and negatives may be incinerated which would result in complete destruction of the compound with formation of oxides of nitrogen and sulphur and hydrogen chloride.

The compound has very low water solubility, a large value for the n-octanol/water partition coefficient, and is not susceptible to rapid biodegradation. Connell (Connell, 1990) indicates that this combination of physico-chemical attributes gives chemicals a high potential for bioaccumulation. Connell also points out molecular weight is important, and that compounds having molecular weights in excess of 600 g/mol have attenuated potential for bioaccumulation. The present compound has a molecular weight of greater than 600 g/mol, and this presumably mitigates the potential for bioaccumulation.

The chemical will largely be confined to the sewer system, with very little released to natural waters. Most of the chemical released to the sewer system would be expected to stay in the sewer lines or adsorb to pasture/soil when land farmed at the treatment works.

9. EVALUATION OF TOXICOLOGICAL DATA

All toxicity studies were performed using the pure notified chemical, identified as 76APZ.

9.1 Acute Toxicity

Summary of the acute toxicity of CIN 10092964

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50}>2000 mg/kg	(Shepard, 1999c)
acute dermal toxicity	rat	LD_{50}>2000 mg/kg	(Jessup, 1999)
skin irritation	rabbit	non-irritating	(Shepard, 1999a)
eye irritation	rabbit	slight irritant	(Shepard, 1999b)

skin sensitisation	guinea pig	non-sensitising	(Shepard, 1999d)

9.1.1 Oral Toxicity (Shepard, 1999c)

Species/strain:	rat/Sprague Dawley
Number/sex of animals:	5/sex
Observation period:	14 days
Method of administration:	gavage; single dose of 2000 mg/kg of test substance as a 10 % (w/v) suspension in 0.5% carboxymethylcellulose vehicle
Test method:	OECD TG 401
Mortality:	no deaths were recorded during the study period
Clinical observations:	these were limited to discoloured (light brown) faeces from all animals the day following dosing
Morphological findings:	no treatment-related changes were observed at necropsy
Comment:	body weight gain was not adversely affected over the observation period
LD_{50}:	> 2000 mg/kg
Result:	the notified chemical was of very low acute oral toxicity in rats

9.1.2 Dermal Toxicity (Jessup, 1999)

Species/strain:	rat/Sprague Dawley
Number/sex of animals:	5/sex
Observation period:	14 days
Method of administration:	single dose of 2000 mg/kg test substance, moistened in water, was administered under occlusive conditions on the dorsal skin for 24 hours
Test method:	OECD TG 402
Mortality:	no deaths were recorded during the study period
Clinical observations:	reduced amounts of faeces during days 4 - 7; minor porphyrin discharge during days 4 - 13; weight loss during

	the first week of the study; each for a single male
Morphological findings:	no treatment-related changes were observed
Comment:	all animals gained weight by the end of the 14 day observation period.
LD_{50}*:*	> 2000 mg/kg
Result:	the notified chemical was of low dermal toxicity in rats

9.1.3 Inhalation Toxicity

No inhalation study was provided by the notifier, due to the physical form of the chemical (large particles with a very low respirable fraction) and its mode of use. As the notified chemical has a very low inspirable fraction (< 0.6 %), the argument was accepted for the purposes of the assessment.

9.1.4 Skin Irritation (Shepard, 1999a)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	3 (sex unspecified)
Observation period:	3 days
Method of administration:	single dose of 0.5 g test substance, moistened in water, was administered under occlusive conditions on the dorsal skin for 4 hours
Test method:	OECD TG 404
Comment:	no irritant skin lesions were noted during the 72-hour observation period; all individual dermal reaction scores were zero
Result:	the notified chemical was non-irritating to the skin of rabbits

9.1.5 Eye Irritation (Shepard, 1999b)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	6 (sex unspecified)
Observation period:	3 days
Method of administration:	a single dose of 0.1 gm of test substance was placed in the conjunctival sac of the left eye of all animals; the substance

was immediately washed from the eyes of three of the animals, while the eyes of the other three treated animals remained unirrigated; the untreated eye was used as control

Test method: OECD TG 405

Comment: at the one-hour examination, redness of the conjunctiva (grade 1; some blood vessels clearly affected) was noted for all treated (washed and unwashed) eyes; at the 24 hour observation, the treated eyes of all animals appeared normal; all individual reaction scores at 24, 48 and 72 hours were zero

Result: the notified chemical was very slightly irritating to the eyes of rabbits

9.1.6 Skin Sensitisation (Shepard, 1999d)

Species/strain: guinea pig/Crl:(HA)BR VAF/Plus

Number of animals: 20 test animals; 10 control animals

Induction procedure: day 0
for the test group, three pairs of intradermal injections were made to each animal, flanking the midline:

1. 0.1 mL of Freund's Complete Adjuvant (FCA) emulsion with distilled water (1:1)
2. 0.1 mL of 5 % test substance in corn oil
3. 0.1 mL of 5 % test substance in FCA emulsion with distilled water (1:1)

for control animals, the test substance was replaced with corn oil

day 7
irritation was induced at the injection site for both the test and control group by application of 0.5 mL sodium lauryl sulphate in petrolatum

day 8
for the test group, a patch with 0.5 gm of neat test substance moistened in water was applied to the injection site, secured with a bandage, and left in place for 48 hours

for the control group, distilled water only was used in this induction phase

Challenge procedure: day 21
a patch with 0.25 gm of neat test substance, moistened with

	water, was applied to the left flank of all animals, secured with bandage, and left in place for 24 hours; vehicle only (distilled water) was applied to the right flank; dermal reactions were scored at 24 and 48 hours after challenge exposure
Test method:	OECD TG 406; Magnusson & Kligman Maximisation Test
Comment:	no dermal responses were noted after the challenge dose for either the control or test animals
Result:	the notified chemical was non-sensitising to the skin of guinea pigs

9.2 Repeated Dose Toxicity (Gearhart, 1999)

Species/strain:	rat/Sprague Dawley
Number/sex of animals:	5/sex/group
Method of administration:	diet *ad libitum*
Dose/Study duration:	15.0, 4.5, 1.5 or 0.0 mg/g, 28 days males 0, 116.2, 357.9,1176.4 mg/kg/day females 0, 124.5, 389.2, 1284.5 mg/kg/day
Test method:	OECD TG 407

Clinical observations:
No deaths were recorded during the study.

One female rat from each of the 1.5 and 0.0 mg/g groups had minimal to minor reductions in amount of faeces on day 1. In the functional observational battery, lower hindlimb grip strength was observed in the 4.5 mg/g females at day 28; no similar observations were made for the 15.0 mg/g and 1.5 mg/g groups.

There were no significant differences in mean body weights among any of the groups.

Clinical chemistry/Haematology
There were no significant differences in clinical chemistry parameters among any of the groups. Changes in haematology values consisted of lower mean corpuscular haemoglobin concentrations for the 15 mg/g female group, and higher mean platelet counts for the 1.5 mg/g female group, compared with controls. Changes in cell morphology were limited to minimal poikilocytosis (presence of abnormally shaped erythrocytes), which was observed for a single male rat from the 1.5 mg/g group, four or five females each from the 0.0, 1.5 and 4.5 mg/g groups, and a single female rat from the 15 mg/g group.

Pathology:
Organ weights

The mean absolute and relative adrenal gland weights were significantly higher for all treated male groups compared with controls.

Gross pathology
Gross lesions at necropsy were limited to minor thymic haemorrhage which was observed for one 1.5 mg/g male rat, and minor watery fluid in the uterus which was observed for one 4.5 mg/g and one 0.0 mg/g female rat. No other gross lesions were observed.

Histopathology
Both treated and control groups had evidence of inflammation of the liver, lungs, stomach and epididymides, haemorrhage of the thymus and mesenteric lymph nodes, lymphoid hyperplasia of the ileum and cervical lymph nodes, cardiomyopathy, and dilation of the uterus. Additionally, one treated rat had inflammation of the prostate gland and three treated rats had mineralisation (medulla) or inflammation (cortex) of the kidney. One control rat had hydronephrosis of the kidney.

The lesions from the various groups were considered to be incidental due to their limited incidence or occurrence in both high dose and control animals, with no clear increases in incidence in the high dose groups.

Comment:
No histopathological changes related to the increased adrenal weights in treated males were observed, and therefore the observation was not considered biologically significant by the study authors. No dose dependent differences in clinical chemistry, haematology parameter or pathology were observed in the study. All lesions were considered to be incidental due to their limited incidence or occurrence in both high dose and control animals, with no clear increases in incidence in the high dose groups. Haematological changes were also considered by the authors to be within historical control ranges.

Result:
Based on the absence of significant findings at any dose tested, the notified chemical was found in this study to have a No-Observed-Adverse-Effect-Level (NOAEL) of 1176 mg/kg/day for male rats and 1285 mg/kg/day for female rats (15 mg/g in diet for both sexes).

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* and *Escherichia coli* Reverse Mutation Assay (Lawlor, 1999)

Strains:	*Salmonella typhimurium* TA1535, TA1537, TA98 and TA100; *Escherichia coli* WP2*uvr*A(pKM101)
Concentration range:	0, 33.3, 100, 333, 1000, 2500 and 5000 µg/plate, dissolved in dimethylsulphoxide (DMSO)
Metabolic activation:	10 % rat liver S9 fraction (Aroclor 1254-induced) in standard cofactors

Positive controls:	with S9: 2-aminoanthracene TA98, TA100, TA1535, TA1537: 2.5 μg/plate WP2*uvr*A: 5 μg/plate without S9 TA98: 2-nitrofluorene 1.0 μg/plate TA100,TA1535: sodium azide 2.0 μg/plate TA1537: ICR-191 2.0 μg/plate WP2*uvr*A: 4-nitroquinoline-N-oxide 2 μg/plate
Test method:	OECD TG 471 (plate incorporation method)
Comment:	each experiment, in the presence and absence of S9, was repeated once and all concentrations were tested in triplicate precipitation was observed at and above 1000 μg/plate but did not interfere with scoring of revertant colonies under the conditions of the study, the test substance caused no substantial increases in revertant colony numbers over control counts at any concentration in either the presence or absence of rat liver microsomal enzymes all positive and negative controls responded appropriately and all criteria for a valid study were met
Result:	the notified chemical was considered to be non-mutagenic under the conditions of the assay, either in the presence or absence of exogenous metabolic activation

9.3.2 Chromosome aberration test in Chinese hamster ovary (CHO) cells *in vitro* (Murli, 1999)

Cells:	Chinese Hamster Ovary (CHO) cells
Metabolic activation:	1.5 % rat liver S9 fraction (Aroclor 1254-induced) in standard cofactors
Positive controls:	With S9: 5 and 10 μg/mL cyclophosphamide Without S9: 0.75 and 1.5 μg/mL mitomycin C
Experimental design:	The test substance was dissolved in DMSO <u>Experiment 1.</u> cells were treated for 3 hours and harvested 20 hours from initiation of treatment; doses 8.4, 12.0, 17.2, 24.5, 35.0, 50.0, 71.4, 102, 146, 209, 298, 426, 608, 868 and 1240 μg/mL; doses analysed for chromosomal aberrations were

	146, 209, 426, and 868 μg/mL, and 71.4 102, 146 and 608 μg/mL in the absence and presence of S9, respectively reductions in mitotic index of 54 % and 55 % were observed at the highest dose evaluated in the absence and presence of S9, respectively <u>Experiment 2.</u> cells were treated for 17.8 hours (-S9) and 3.0 hours (+S9) and harvested 21 hours from initation of treatment; doses 7.85 and 15.7 μg/mL in the absence of S9 and 31.3, 62.5, 125, 250, 500, 750 and 1000 μg/mL both in the absence and presence of S9; culture test concentrations analysed for chromosomal aberrations were 62.5, 500, 750 and 1000 μg/mL in both cases reductions in mitotic index of 40 % and 35 % were observed at the highest dose evaluated in the absence and presence of S9, respectively
Test method:	OECD TG 473
Comment:	the test substance did not induce any significant or dose-related increases in the frequency of cells with aberrations in either the initial or the confirmatory experiments all positive and negative controls responded appropriately and all criteria for a valid study were met
Result:	the notified chemical was considered to be non-clastogenic under the conditions of the study

9.4 Overall Assessment of Toxicological Data

The notified chemical was of very low acute oral toxicity (LD_{50} > 2000 mg/kg) and low acute dermal toxicity (LD_{50} > 2000 mg/kg) in the rat. In the latter study, there was a transient weight loss in one animal during the first week, with recovery evident by the end of the study. The notified chemical was non-irritating to rabbit skin. It produced very slight signs of conjunctival redness in the eyes of rabbits at the one-hour observation but this disappeared totally by the 24 hour observation period. There was no evidence of sensitisation in a adjuvant type study with guinea pigs. No acute inhalation toxicity study report was provided by the notifier.

In a 28 day repeat dose oral (dietary admixture) toxicity study in rats, lesions from the various groups were considered to be incidental due to their limited incidence or occurrence in both high dose (1176 mg/kg/day for male rats and 1285 mg/kg/day for female rats) and control animals, with no clear increases in incidence in the high dose groups. An increase in adrenal weights was observed for all treated male groups, but no related histopathological changes were seen. Based on the absence of significant findings at any dose tested, the results

of the study established a NOAEL of 1176 and 1285 mg/kg/day (the highest doses tested) for male and female rats, respectively.

In genotoxicity studies, the notified chemical was not mutagenic in bacteria, nor did it induce an increased incidence of chromosomal aberrations in Chinese hamster ovary cells *in vitro*.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The notifier supplied the following ecotoxicity data in support of the application. The test data were generated according to OECD protocols.

Test	*Species*	*Results (nominal)*
Acute Toxicity to Fish [OECD 203]	Fathead minnow *Pimephales promelas*	LC_{50} (96 h) > 1.01 mg/L See notes below.
Acute Immobilisation to Fresh water invertebrates [OECD 202]	*Daphnia magna*	EC_{50} (48 h) > 0.90 mg/L See notes below.
Inhibition of Algal growth [OECD TG 201]	*Selenastrum capricornutum*	E_bC_{50} (72 h) > 3.3 mg/L See notes below.
Respiration Inhibition of Activated Sludge Bacteria [OECD TG 209]	Activated sludge bacteria	EC_{50} (3h) > 1000 mg/L See notes below.

Fish
Two replicate solutions containing 1.0 mg/L CIN 10092964 were prepared by adding the appropriate volume of a stock solution of the chemical in N,N-dimethylformamide to 20 L of dilution water (Light, 1999c). The vessels were stirred by hand using a Teflon rod and appeared clear and colourless throughout the test. Following preparation of the test media 7 fathead minnows were added to each of the three vessels, and the general health of these animals monitored over a four day (96 hour) period. As a control, 7 fish were also placed in a separate test vessel to which no test compound had been added. Temperature was maintained at 20±1.0°C, pH values were between 8.1 to 8.6 and dissolved oxygen levels were between 7.4 and 8.9 mg/L.

No mortality or aberrant behaviour was observed in any of the test specimens or in the control fish. From these observations, it was concluded that the new compound is not toxic to this species up to the limits of its water solubility. This was determined to be 1.01 mg/L in this test (geometric mean of analysed solutions at t=0 and 96 h, n=2).

Invertebrates
An acute toxicity test of new chemical against *Daphnia magna* was conducted using a static methodology (Light, 1999b). As with the fish test, the media was made up by adding the appropriate volume of a stock solution of the chemical in N,N-dimethylformamide to two 20 L glass vessels of dilution water. Aliquots were then transferred to the 250 mL test vessels.

Ten daphnia were placed in the duplicate test vessels. The general behaviour of the animals in

the test and control vessels was monitored over a 48 hour test period. Temperature was maintained between 19 and 20°C, pH values were between 8.3 to 8.6 and dissolved oxygen levels were between 8.4 and 8.9 mg/L.

No immobility or mortality was observed in the test media or control solutions throughout the test. Consequently it was concluded that the new compound is not toxic to *Daphnia magna* up to the limits of its water solubility. This was determined to be 1.01 mg/L in this test (geometric mean of analysed solutions at t=0 and 48 h, n=2).

Algae
Due to the low solubility of the notified chemical in water a semi-stable suspension prepared at a concentration of 4.0 mg/L was used as the test media (Light, 1999a). Throughout the study, the flasks were shaken at 100 rpm, the temperature was maintained at 24°C and the pH ranged from 7.99 to 7.87. Observations were made at 0, 24, 48 and 72 hours.

No inhibition of biomass or algal growth rates was observed for the controls or any of the test media. From the results of this test it was concluded that the new compound is not toxic to this species of green algae (*Selenastrum capricornutum*) up to the limits of its water solubility (3.3 mg/L geometric mean of analysed test cultures at t=0).

Sewage Bacteria
The 3 hour test was performed using activated sludge from a domestic waste water treatment plant (Berlinger, 1999). The sludge was exposed to five concentrations (25, 50, 100, 500 and 1000 mg/L) of the notified chemical. The respiration rate was measured following the 3 hour exposure period, and compared with that in a control vessel. None of the samples indicated any significant inhibition of bacterial respiration compared with the controls, and it was concluded that the new chemical is not toxic to sewage bacteria up to a nominal concentration of 1000 mg/L. However, very little of this may be expected to have been in solution.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified chemical is not considered to pose a hazard to the environment when used as a component of photographic emulsions in the manner indicated by the notifier.

As a result of the disposal of industrial wastes from the production of photographic emulsion, it is estimated that up to 567 kg of the chemical could be released into the Melbourne sewage system each year.

Total influent to the Werribee sewage treatment plant is around 500,000,000 litres per day (180×10^9 L per year), and consequently the Predicted Environmental Concentration (PEC) of the compound in the sewage is then 567 (kg)/180×10^9 (L) = 3.2 μg/L.

The chemical is not toxic to those species of fish, daphnia or algae against which it has been tested up to the limits of its water solubility. Similarly, the new compound does not inhibit the respiration of sewage bacteria. However, it should be noted that the water solubility may be only slightly greater than the PEC.

The chemical is not readily biodegradable or susceptible to chemical hydrolysis, and once

released it may persist in the environment. Due to the low water solubility and high n-octanol/water partition coefficient, most of the chemical released to the sewer in this manner is expected to become associated with the aquatic sediments. The compound may be persistent in the environment so its concentration in the sewer sediments may increase with time. However, most of the chemical released to the sewer system would be expected to stay in the sewer lines or adsorb to pasture/soil when land farmed at Werribee Treatment Farm.

Up to 0.1 % (31.5 kg) of the notified chemical may be disposed of to landfill as reject gelatin dispersion. In addition, approximately 1.5 kg per year of the compound is expected to remain as residues in the empty bags and air filters used in the dust extraction system and disposed of similarly. Chemical released from these sources will become associated with the organic component of soils and sediments, and is not expected to be mobile.

Most of the chemical is expected to be retained in the photographic emulsions of film negatives and photographs, which are likely to be eventually discarded into landfill. Here the chemical is expected to be slowly released as the photographs degrade, and will then become associated with the organic component of soils. Some old photographs may be incinerated which will completely destroy the compound with production of water vapour and oxides of nitrogen and sulphur, and hydrogen chloride.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical does not meet the criteria for classification as a hazardous substance according to the *Approved Criteria for Classifying Hazardous Substances* (NOHSC, 1999).

The acute oral toxicity of CIN 10092964 is very low (LD_{50} > 2000 mg/kg) and the acute dermal toxicity is low (LD_{50} > 2000 mg/kg). It is not an irritant to the skin of rabbits, but is a slight irritant to rabbit eyes. It was not a skin sensitiser in guinea pigs in an adjuvant type test. No evidence of genotoxicity was observed in two *in vitro* genotoxicity tests. The major hazard from acute exposure arises from the eye irritant effects.

For longer-term systemic effects, in a 28 day feeding study in rats, no treatment related effects were observed apart from an increase in adrenal weights for all treated male groups, with no related histopathological changes seen. Based on the absence of toxicologically significant findings at any dose, the NOAEL was found to be 15 mg/g (the highest dose tested; equal to 1176 mg/kg/day for males and 1285 mg/kg/day for females).

Occupational Health and Safety
Occupational exposure to the notified chemical can be divided into exposure to the powdered solid, the gelatin dispersions, and the finished photographic film and paper. The dust includes a low proportion (0.56 %) in the inspirable range, and less again (< 0.45 %) within the respirable range, and therefore the potential hazard by inhalation is expected to be low. Workers will handle the powdered solid for short periods during weighing and addition to the mix tanks where the gelatin dispersion is produced. Exposure may occur many times throughout the year. There is a risk of eye irritation on acute exposure to dust from the chemical.

The risk of adverse health effects will be further reduced by local exhaust ventilation during

the processes which involve handling the powdered solid. The wearing of overalls, protective gloves, glasses and respiratory protection while weighing and mixing the powdered solid will also be required.

The handling of the gelatin dispersions, containing less than 10 % notified chemical, is a potential hazard by dermal exposure, particularly during cleaning of equipment, although the hazard is expected to be slight due to the low toxicity of the notified chemical. Standard procedures require the use of gloves, overalls and protective glasses by workers handling the gelatin dispersions. After incorporation in articles, the potential hazard should be negligible as the notified chemical will be beneath several overcoat layers.

Public Health
Photographic film and/or paper containing the notified chemical will be sold to the public; consequently there will be widespread availability in the public domain. Once incorporated onto photographic film and paper, the gelatin dispersion containing the notified chemical will reside beneath several overcoat layers, which limits the possibility of dermal contact. Consequently the potential for public exposure to the notified chemical during all phases of its life cycle is considered to be low and the notified chemical is not expected to pose a significant hazard to public health when used in the proposed manner.

13. RECOMMENDATIONS

To minimise occupational exposure to CIN 10092964 the following guidelines and precautions should be observed:

- 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 3765.2 (Standards Australia, 1990); impermeable gloves should conform to AS/NZS 2161.2 (Standards Australia/Standards New Zealand, 1998); all occupational footwear should conform to AS/NZS 2210 (Standards Australia/Standards New Zealand, 1994);;
- 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.

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 of the notified chemical may be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

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Attachment 1

The Draize Scale for evaluation of skin reactions is as follows:

Erythema Formation	*Rating*	*Oedema Formation*	*Rating*
No erythema	0	No oedema	0
Very slight erythema (barely perceptible)	1	Very slight oedema (barely perceptible)	1
Well-defined erythema	2	Slight oedema (edges of area well-defined by definite raising	2
Moderate to severe erythema	3	Moderate oedema (raised approx. 1 mm)	3
Severe erythema (beet redness)	4	Severe oedema (raised more than 1 mm and extending beyond area of exposure)	4

The Draize scale for evaluation of eye reactions is as follows:

CORNEA

Opacity	*Rating*	*Area of Cornea involved*	*Rating*
No opacity	0 none	25% or less (not zero)	1
Diffuse area, details of iris clearly visible	1 slight	25% to 50%	2
Easily visible translucent areas, details of iris slightly obscure	2 mild	50% to 75%	3
Opalescent areas, no details of iris visible, size of pupil barely discernible	3 moderate	Greater than 75%	4
Opaque, iris invisible	4 severe		

CONJUNCTIVAE

Redness	*Rating*	*Chemosis*	*Rating*	*Discharge*	*Rating*
Vessels normal	0 none	No swelling	0 none	No discharge	0 none
Vessels definitely injected above normal	1 slight	Any swelling above normal	1 slight	Any amount different from normal	1 slight
More diffuse, deeper crimson red with individual vessels not easily discernible	2 mod.	Obvious swelling with partial eversion of lids	2 mild	Discharge with moistening of lids and adjacent hairs	2 mod.
		Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	3 severe
Diffuse beefy red	3 severe	Swelling with lids half-closed to completely closed	4 severe		

IRIS

Values	*Rating*
Normal	0 none
Folds above normal, congestion, swelling, circumcorneal injection, iris reacts to light	1 slight
No reaction to light, haemorrhage, gross destruction	2 severe