File No: NA/388

Date: July 1996

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

SUBSTANCE H112793

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), and Regulations. This legislation is an Act of the Commonwealth of Australia. The National Industrial Chemicals Notification and Assessment Scheme (NICNAS) is administered by Worksafe Australia which also conducts the occupational health & safety assessment. The assessment of environmental hazard is conducted by the Department of the Environment, Sport, and Territories and the assessment of public health is conducted by the Department of Health and Family Services

For the purposes of subsection 78(1) of the Act, copies of this full public report may be inspected by the public at the Library, Worksafe Australia, 92-94 Parramatta Road, Camperdown NSW 2050, between the hours of 10.00 a.m. and 12.00 noon and 2.00 p.m. and 4.00 p.m. each week day except on public holidays.

For Enquiries please contact the Administration Coordinator at:

Street Address: 92 Parramatta Rd Camperdown, NSW 2050, AUSTRALIA
Postal Address: GPO Box 58, Sydney 2001, AUSTRALIA
Telephone: (61) (02) 577-9466 **FAX (61) (02) 577-9465**

Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

SUBSTANCE H112793

1. APPLICANT

Epson Australia Pty Ltd of 70 Gibbes Street CHATSWOOD NSW 2067 has submitted a standard notification statement in support of their application for an assessment certificate for Substance H112793.

2. IDENTITY OF THE CHEMICAL

Substance H112793 is not considered to be hazardous based on the nature of the chemical and the data provided. Therefore the chemical name, CAS number, molecular and structural formulae have been exempted from publication in the Full Public Report and the Summary Report

The notified chemical contains no hazardous impurities at levels necessary to classify it as as a hazardous substance (11). Therefore, information on the purity of the chemical has been exempted from publication in the Full Public Report and the Summary Report.

Other names:	Substance H112793
Trade name:	Pro-jet Fast Cyan 2 Pro-jet Fast Cyan 2 Liquid (preparation)
Molecular weight:	1228 (approximately)
Method of detection and determination:	HPLC separation with UV/Visible detection at 350nm, 600 nm and 670 nm and infrared spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	blue/red granular powder
Melting Point:	> 300°C
Specific Gravity:	1.62 at 24°C
Vapour Pressure:	< 4 x 10^{-3} kPa (estimated from 9.4 kPa at 145.9°C)
Water Solubility:	> 320 -340 g/L at 22°C (flask method, exact value uncertain as chemical will gel)
Surface Tension of Aqueous Solution:	73 mN/m at 24°C

Partition Co-efficient (n-octanol/water):	log P_{ow}=-1.5 at 25°C
Hydrolysis as a Function of pH:	< 10% at pH 4, 7 and 9 at 50°C
Adsorption/Desorption:	not determined
Dissociation constant:	test not performed; the dissociation constants can be predicted for the functionalities
Flammability Limits:	does not propagate combustion
Autoignition Temperature:	387°C
Explosive Properties:	non-explosive
Reactivity/Stability:	non-reactive

Comments on Physico-Chemical Properties

Tests were performed according to EEC test guidelines and at facilities complying with OECD principles of Good Laboratory Practice.

By EEC definition, a chemical has surface activity when the surface tension is less than 60 mN/m, thus the substance is not considered surface active (EEC Directive 92/69, A5 "Surface Tension" (1992)).

The notifier's comments regarding adsorption/desorption indicate strong adsorption of the notified chemical may occur. However, the high water solubility, low partition coefficient, and low fat solubility of the notified chemical would tend to indicate low adsorption. Furthermore, during normal use a proportion of the notified chemical will encounter sewage and recycling effluents, the alkaline nature of these systems is likely to result in low sorption of the notified chemical to solids.

4. PURITY OF THE CHEMICAL

Degree of purity: 96.9% (range 95 - 99%)

Non-hazardous impurities (> 1% by weight):

Chemical name:	water
Weight percentage:	2.7%

Additives/Adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified chemical will be used as a component of a preparation used in ink-jet reprographic processes. It is to be imported as a 5% aqueous solution in sealed cartridges at a rate of less than 1.5 tonnes per year for the next 5 years. The notified chemical will be used Australia wide, predominantly in the home and small office market.

6. OCCUPATIONAL EXPOSURE

The volume of ink in a cartridge will not exceed 50 mL. The volume of any single coloured (non-black) is expected to be < 15 mL. The rate of usage of coloured ink is not uniform. It is stated that normal handling, involving replacement of the spent ink cartridge by service technicians or office workers will not result in exposure to the ink and such exposure should only result if the cartridge is faulty and ruptures. Up to 1000 printer service technicians and several thousand office workers may be potentially exposed to the notified chemical.

7. PUBLIC EXPOSURE

Normal handling involving replacement of spent ink cartridge by consumers is not expected to result in significant exposure to the notified chemical. However, exposure may occur through accidental rupture of a cartridge.

The public may come in contact with paper printed with the formulated ink, but the potential for public exposure is expected to be minimal. This is because the printed paper will contain only milligram quantities of the notified chemical per sheet and the notified chemical being insoluble on contact with the surface of paper.

Negligible public exposure is expected as a result of disposal of empty cartridges or printed paper or recycling of printed paper.

8. ENVIRONMENTAL EXPOSURE

Release

During normal use the notified substance will become bound to cellulosic substrates and in this state is not expected to adversely impact on the environment. Although the notified chemical is soluble at the pH of the ink solution (pH 9), it becomes insoluble on contact with paper, a result of the lower pH of the paper.

Environmental exposure will result from the disposal of printed paper and discarded cartridges. In addition to landfill, printed paper may also be recycled after first being subjected to a de-inking process. De-inking wastes are expected to go to trade waste sewers. On combustion oxides of carbon, nitrogen and sulphur will be released.

Ink residues contained in the emptied cartridges are expected to remain within the cartridge housing.

Fate

The high water solubility of the notified chemical indicates that unbound residues released directly to the aquatic compartment are likely to remain in solution where they will be rapidly diluted.

The ready biodegradability of the notified chemical was assessed using the modified MITI test (OECD TG 301C). Analysis of BOD at the end of the test indicated that no measurable biodegradation had occurred. Biochemical and chemical oxygen demand tests (BOD_5 < 0.01 g/L, COD 1.11 g O_2/g) indicate no significant biodegradation is likely under aerobic conditions. Colorimetric analysis showed negligible colour removal over 28 days, indicating that the chemical may be persistent.

The bioaccumulation potential of the dye was not investigated. The high molecular weight (> 1000), low partition coefficient (log P_{ow} = -1.5) and high water solubility (~320 - 340 g/L) of the notified chemical indicate that significant bioaccumulation is not likely.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Summary of the acute toxicity of Substance H112793

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50} > 2000 mg/kg	(1)
acute dermal toxicity	rat	LD_{50} > 2000 mg/kg	(3)
skin irritation	rabbit	slight irritant	(4)
eye irritation	rabbit	moderate irritant	(6)
skin sensitisation	guinea pig	mild sensitiser	(7)

9.1.1 Oral Toxicity (1)

Species/strain:	rat - Wistar-derived albino (AlpK:APfSD)
Number/sex of animals:	5 males, 5 females
Observation period:	14 days
Method of administration:	gavage (corn oil)
Clinical observations:	no signs of toxicity
Mortality:	no deaths
Morphological findings:	no treatment-related findings
Test method:	directive 84/449/EEC (2)
LD_{50}:	> 2000 mg/kg
Result:	the notified chemical exhibited low acute oral toxicity in rats

9.1.2 Dermal Toxicity (3)

Species/strain:	rat - Wistar-derived albino (AlpK:APfSD)
Number/sex of animals:	5 males, 5 females
Observation period:	14 days
Method of administration:	occlusive dressing (corn oil), 24 hours duration
Clinical observations:	slight erythema, oedema and scabbing were

observed in 3 females, regressed by day 5 but no other significant signs of toxicity

Mortality: no deaths

Morphological findings: no treatment-related findings

Test method: directive 84/449/EEC (2)

Result: the notified chemical exhibited low acute dermal toxicity in rats

9.1.4 Skin Irritation (4)

Species/strain: New Zealand White rabbits

Number/sex of animals: 3 males

Method of administration: occlusive dressing, 500 mg of chemical in deionised water, 4 hour exposure

Draize scores (5):

Time after treatment (days)	***Animal #***		
	1	***2***	***3***
Erythema			
1	0[i]	0	1
2	0	0	1
3	0	0	0
Oedema			
1	1	0	1
2	0	0	0
3	0	0	0

[i] see Attachment 1 for Draize scales

Test method: directive 84/449/EEC (2)

Result: the notified chemical was a slight skin irritant in rabbits

9.1.5 Eye Irritation (6)

Species/strain: New Zealand White rabbits

Number/sex of animals: 3 males

Method of administration: 100 mg of the notified chemical applied into the conjunctival sac of the left eye

Draize scores (5) of unirrigated eyes:

	Time after instillation									
Animal	**1 day**		**2 days**		**3 days**		**4 days**		**7 days**	
Cornea	**o[a]**	**a[b]**	**o[a]**	**a[b]**	**o[a]**	**a[b]**	**o[a]**	**a[b]**	**o[a]**	**a[b]**
1	*	*	*	*	*	*	0	0	0	0
2	*	*	*	*	*	*	0	0	0	0
3	2	2	1	1	1	1	0	0	0	0
Iris										
1	0		0		0		0		0	
2	1		1		1		0		0	
3	1		1		0		0		0	

Conjunctiva	**r[c]**	**c[d]**	**d[e]**	**r[c]**	**c[d]**	**d[e]**	**r[c]**	**c[d]**	**d[e]**	**r[c]**	**c[d]**	**d[e]**	**r[c]**	**c[d]**	**d[e]**
1	2	1	0	1	0	0	1	0	0	1	0	0	0	0	0
2	*	1	2	*	1	0	*	0	0	*	0	0	*	0	0
3	*	1	3	*	0	0	0	0	0	0	0	0	0	0	0

[i] see Attachment 1 for Draize scales * the assessment of irritation prevented due to eye staining blue

[a] opacity [b] area [c] redness [d] chemosis [e] discharge

Test method: directive 84/449/EEC (2)

Result: the notified chemical was a slight eye irritant in rabbits

9.1.6 Skin Sensitisation (7)

Species/strain: albino guinea-pigs (Alpk: Dunkin-Hartley)

Number of animals: 20 test, 10 control

Induction procedure: injections of 0.05 - 0.1 mL FCA plus corn oil (1:1); 3% (w/v) notified chemical in corn oil; 3% (w/v) notified chemical in FCA plus corn oil (1:1); topical induction at day 8: 75% (w/v) notified chemical in corn oil

Challenge procedure: two weeks after topical induction 0.05-0.1 mL of test substance in corn oil at 30% or 75% (w/v) was applied under occlusive dressing

Challenge outcome:

	Test animals		**Control animals**	
Challenge concentration	**24 hrs***	**48 hrs***	**24 hrs**	**48 hrs**
30%	4/20**	0/20	0/10	0/10
75%	5/20	1/20	2/10	0/10

* time after patch removal
** number of animals exhibiting positive response

Test method:	directive 84/449/EEC (2)
Result:	a maximum of 20% of exposed animals exhibited a positive response (scattered mild redness); the notified chemical was a weak skin sensitiser in guinea pigs

9.2 Repeated Dose Toxicity (8)

Species/strain:	rat - Wistar-derived albino (AlpK:APfSD)
Number/sex of animals:	5/ sex at each dose plus an additional 5/ sex in control and high dose animals
Method of administration:	gavage (corn oil)
Dose/Study duration::	0, 50, 250 and 1000 mg/kg/day; 7 days per week for 4 weeks with a 14-day recovery period for control and high dose groups
Clinical observations:	none
Clinical chemistry/Haematology	no significant effects
Histopathology:	no significant changes
Test method:	directive 84/449/EEC (2)
Result:	the notified chemical did not exhibit any indications of organ toxicity on oral repeat dose administration for 28 days

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* Reverse Mutation Assay (9)

Strains:	*Salmonella typhimurium* TA 1535, TA 1537, TA 98 and TA 100 and *Escherichia coli* W2P2*uvrA*(pKM101) and WP2 (pKM101)
Concentration range:	200 - 5144 μg/ plate
Test method:	directive 84/449/EEC (2)
Result:	weakly mutagenic in bacteria; positive result in *Salmonella typhimurium*, TA 1535, up to 3.3 times background at a maximum of 1.3×10^{-2} mutants per μg (with S9) and *Escherichia coli WP2P and* WP2P*uvrA,* 1.9 times background at a maximum of 1.7×10^{-1} and 6.4×10^{-2} mutants per μg (with S9) respectively, with indications of a dose-response relationship

9.3.2 *In Vitro* Cytogenetic Assay in Human Lymphocytes (10)

Doses:	1 - 500 μg/mL
Cell Culture:	PHA-stimulated peripheral blood lymphocytes in RPMI-1640 tissue culture medium, 48 hour growth prior to treatment; sampling times: 68 hours (male and female donors) and 92 hours (male donor)
Test method:	directive 84/449/EEC (2)
Result:	no statistically or biologically significant increases in the percentage of aberrant cells, compared to the medium controls, were observed at 68 or 92 hours response; the notified chemical was non-clastogenic in human lymphocytes

9.4 Overall Assessment of Toxicological Data

The notified chemical exhibited low toxicity via the oral and dermal routes in the rat with both LD_{50}s > 2000 mg/kg. It was a slight irritant to the skin and eye of rabbits and to the skin of rats. It was a mild skin sensitiser in guinea pigs. When rats were treated orally with up to 1000 mg/kg/day of the notified chemical for 28 days, no effects were observed. H112793 was found to be weakly mutagenic *in vitro* in *Salmonella typhimurium* TA 1535 and *Escherichia coli* WP2*uvrA* (pKM101) and WP2 (pKM101) only in the presence of metabolic activation. It was non-clastogenic in PHA-stimulated human peripheral blood lymphocytes.

On the basis of the submitted data, the notified chemical would not be classified as hazardous in accordance with Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (11) in relation to acute lethal effects (oral, dermal) irritant effects (skin, eye), severe effects on repeated or prolonged exposure (oral route) or sensitising effects (skin).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Ecotoxicity tests were performed using Substance H112793 and the results were provided by the notifier. These tests were performed in accordance with standard EEC test methods and at facilities complying with OECD principles of GLP.

Ecotoxicity test results (mean measured concentrations)

Species	Test	Result
Rainbow Trout, *Oncorhynchus mykiss*	96 hour acute	LC_{50} = >150 mg/L
Daphnia, *Daphnia magna*	acute immobilisation 48 h OECD TG 203	EC_{50} > 130 mg/L

Algae *Selenastrum capriconutum*	Growth Inhibition OECD TG 201	Biomass: NOEC = 1.56 mg/L E_bC_{50} = 23 mg/L Growth rate : NOEC = 1.56 mg/L E_rC_{50} > 100 mg/L
Activated sludge	ETAD Method 103	11% inhibition of respiration at 100 mg/L EC_{50} > 1000 mg/L

In the fish study mean measured concentrations ranged from 83 - 93% of nominal concentrations. Observations of toxicity symptoms were not possible in the test solutions with nominal concentration > 100 mg/L due to the intensity of the colour caused by the notified chemical. No fish mortalities were observed in the test solution.

For the *Daphnia* study the mean measured concentration at the start and end of the test was 72% of the nominal value of 180 mg/L. During testing no *Daphnia* were classed as immobile. The test solution was a clear, dark blue liquid.

The test results indicate that the notified chemical is practically non-toxic to the aquatic species tested above.

Algal growth inhibition testing indicated the active was slightly toxic in terms of biomass and practically non-toxic with respect to growth rate. Measured test concentrations at the start of testing ranged from 86 - 104% of nominal values. The slight algicidal activity measured may be attributed to the reduced light transmittance through the test solution and the possible reduction in photosynthetic activity resulting from the colouration of the test solution by the notified chemical.

The potential effects of the active on sewage treatment were investigated under aerobic and anaerobic conditions. Under aerobic conditions a 1000 mg/L (nominal) of the notified substance in activated sludge caused an 11% inhibition in the respiration rate of the microorganism (ETAD Method 103) (12). This result indicates no significant inhibition particularly as the concentrations expected in the sewage treatment plants will be significantly lower. A 7% reduction in the nitrification ability of the activated sludge was caused by a nominal test concentration of 1000 mg/L (UK Department of Environment Test Method) (13). Under anaerobic conditions, concentrations of up to 2.5% w/w of the active were reported to have inhibited gas production by only 10% indicating that no significant effects were expected during anaerobic sewage treatment.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

Substance H112793 is not expected to present a hazard to the environment. During normal use the chemical will be bound to the treated substrate.

The residues of uncured inks from discarded colour cartridges are expected to remain in the cartridge housing.

Recycling of treated paper could result in the release of a proportion of the notified chemical to the aquatic compartment where it will be rapidly diluted to environmentally negligible levels. Where recycling does not occur, the notified chemical will be widely distributed in landfills around Australia where the notified chemical is expected to remain bound to the treated paper. In the event of leaching the environmental effects are expected to be negligible due to the low toxicity and

low bioaccumulation potential of the notified chemical.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The toxicological profile of Substance H112793 suggests that it is unlikely to be acutely toxic via the oral and dermal routes and is likely to be weakly genotoxic. It is expected to be a slight skin and eye irritant and a weak skin sensitiser. It is unlikely to exhibit toxic effects on repeated or prolonged exposure. Substance H112793 is not classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (11) in relation to the toxicological data provided.

The notified chemical is to be used in ink-jet reprographic processes and is to be imported in sealed ink-jet cartridges which are inserted directly into ink-jet printers. Therefore, exposure to the notified chemical during normal handling is not expected other than in the unlikely event that the cartridge is faulty and ruptures.

The occupational health risk associated with importation, storage, use or disposal of the notified chemical is expected to be minimal.

The potential for public exposure to the notified chemical by handling the ink cartridges is expected to be negligible. Exposure by contact with the printed paper is also expected to be negligible because of the low level of the notified chemical used in the ink and its insolubility on the surface of paper.

13. RECOMMENDATIONS

To minimise occupational exposure to Substance H112793 the following guidelines and precautions should be observed:

- in the event of a spill or during routine cleaning or maintenance, if engineering controls or work practices are insufficient to reduce exposure of Substance H112793 to a safe level, personal protective devices which conform to and are used in accordance with Australian Standards (AS) or Australian/ New Zealand Standards (AS/NZS) for eye protection (AS 1336, AS/NZS 1337) (14,15), impermeable gloves (AS 2161) (16) and overalls (AS 2919) (17) should be worn; and

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

14. MATERIAL SAFETY DATA SHEET

The MSDS for the ink containing the notified chemical was provided in accordance with the *National Code of Practice for the Preparation of a Material Safety Data Sheets* (18).

This MSDS was provided by the applicant as part of their notification statement. 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 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. ICI Project SI/93/0009, June 1993. *Acute Oral Toxicity Study with* H113664 *in Rats*. Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

2. EEC Council Directive 84/449 on the approximation of the laws, regulations and administrative provisions relating to the classification, packaging and labelling of dangerous preparations, *Official Journal of the European Communities,* No. L251 (19 September 1984).

3. ICI Project SI/93/0009, June 1993. *Acute Dermal Toxicity Study with* H113664 *in Rats.* Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

4. ICI Project SI/93/0009, June 1993. Primary Skin Irritation Study with H113664 in Rabbits. Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

5. Draize J H, 1959, 'Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics', *Association of Food and Drug Officials of the US,* **49**.

6. ICI Project SI/93/0009, June 1993. *Primary Eye Irritation Study with* H113664 *in Rabbits*. Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

7. ICI Projects S!/93/0009 June 1993. *Contact Hypersensitivity to* H113664 *in Albino Guinea Pigs, Maximisation Test*, Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

8. ICI Project SH/93/0009, November 1993. *Subacute 28-Day Oral Toxicity Gavage Study with* H113664 *in Rats*. Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

9. ICI Projects SH/93/0009 April 1993. *Salmonella typhimurium and Escherichia coli Reverse Mutation Assay for Azo dyes* w*ith* H112793. Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

10. ICI Project SH/93/0009, September 1993. *In vitro* cytogenetic assay in human lymphocytes *withSubstance* H112793. Zeneca Central Toxicology Laboratory, Cheshire, United Kingdom.

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

12. ETAD (Ecological and Toxicological Association of the Dyestuffs Manufacturing Industry). Ecological Test Method 103 - A screening test for the Assessment of the Possible Inhibitory Effect of the Chemical Substance on Aerobic Waste-Water Bacteria.

13. Department of the Environment, UK 1980. The Assessment of the Nitrifying Ability of Ativated Sludge (Tentative Methods). HMSO London.

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

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

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

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

18. National Occupational Health and Safety Commission 1994, *National Code of Practice for the Preparation of Material Safety Data Sheets [NOHSC:2011(1994)]*, AGPS, Canberra, Australia.

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.
Diffuse beefy red	3 severe	Swelling with lids half-closed	3 mod.	Discharge with moistening of lids and hairs and considerable area around eye	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