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NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

MCP 1173B

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Director
Chemicals Notification and Assessment

FULL PUBLIC REPORT

MCP 1173B

1. APPLICANT

Hellay Laboratories of 8/9 Monterey Rd DANDENONG VIC 3075 has submitted a limited notification statement with their application for an assessment certificate for MCP 1173B.

2. IDENTITY OF THE CHEMICAL

MCP 1173B 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 and spectral data have been exempted from publication in the Full Public Report and the Summary Report.

Trade name:	MCP 1173B, MCP 1186B
Molecular weight:	> 942
Method of detection and determination:	nuclear magnetic resonance spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	yellow liquid
Boiling Point:	refluxes at 372°C
Specific Gravity:	1.0027
Vapour Pressure:	3.75 X 10^{-8} kPa at 25°C
Water Solubility:	< 10^{-6} g/L at 20 °C (based on log P estimation)
Fat Solubility:	freely soluble in coconut fat at 24±3°C
Partition Coefficient (n-octanol/water):	log P_{ow} > 8 (estimated from given structure)

Adsorption/Desorption:	absorbs extensively (86-99%) to 3 soils tested; desorbs from strongly acidic sandy soil (33%) and from other soils to an extent of < 15%
Flash Point:	234°C at 100.9 kPa
Flammability Limits:	not flammable
Autoignition Temperature:	391°C
Explosive Properties:	none
Pyrophoric properties:	none

Comments on Physico-Chemical Properties

The notified liquid is relatively non-volatile and practically insoluble at room temperature. The estimation for solubility was via calculations for the partition coefficient. The negligible water solubility measured for this chemical is supported by the lack of functionality that might confer such properties to this chemical. About 3% (likely unreacted small molecules) is said to have a high solubility.

Despite the presence of several ester linkages, the notified chemical is not expected to hydrolyse under the expected environmental conditions, due to low solubility.

Partition coefficient data for this chemical was estimated from structure based calculations using the fragment addition method for the most hydrophilic fraction. The result is said to be in agreement with that obtained by the OECD TG117 HPLC method, but no further details are given.

Adsorption/desorption results are discussed in the Environmental Fate section below.

The are no dissociable hydrogens in the notified chemical.

4. PURITY OF THE CHEMICAL

Degree of purity:	97 %
Toxic or hazardous impurities:	four hazardous impurities are present at concentrations (< 1%) below the level which would render the notified chemical hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1)
Non-hazardous impurities (> 1% by weight):	none

Additives/adjuvants: none

5. USE, VOLUME AND FORMULATION

The notified chemical is to be used as a synthetic base stock in hydraulic oils for equipment used in environmentally sensitive areas. A small volume may be used in marine or farm applications. The finished hydraulic oil containing 50-80% by weight of the notified chemical is intended to be imported at a rate of 18 tonnes in the first year rising to 72 tonnes per year in the fifth year.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be imported as a component of a finished oil in 200 L steel drums. Exposure to transport workers is possible in the rare event of an accident.

Repackaging, when it occurs, will be into 1 L containers and may involve the use of any of a number of different pump types and may include those operated by hand, air or electrical means. Automated pumps will be used for repackaging the notified chemical from the majority of the drums. Exposure to the notified chemical is expected to be low but some drips and spills may be expected on each transfer from opening of drums and when lines are connected or disconnected.

Manual pumps will be used for repackaging if the number of drums (and/or surrounding conditions) limit the use of automated pumps.

During use of the finished oil individuals may be exposed to drips and spills while charging, repairing and draining hydraulic systems.

Disposal of waste oil is accomplished by a contractor at industrial sites. The oil is then either burned as fuel or disposed of by high temperature incineration. The oil is presumed to be pumped into a storage container for transport with exposure to drips and spills a possibility.

7. PUBLIC EXPOSURE

As the notified chemical will be used predominantly in heavy machinery, maintained by qualified persons, and waste material will be either recycled or burnt as fuel oil, exposure of the public is expected to be minimal. The low vapour pressure and biodegradability of the notified chemical should ensure that exposure from accidental spills and repackaging and recycling operations, will be minimal.

8. ENVIRONMENTAL EXPOSURE

Release

The notified chemical is imported within a finished hydraulic oil. It is either transferred direct from the 200 L drums (used for importation) to end use hydraulic systems, or may be repackaged into 1 litre containers. Equipment used for repackaging is cleaned by either having air blown through the lines or flushing them with water or a solvent. Resulting waste is collected by a hazardous waste hauler, and release is expected to be negligible.

Some environmental release can occur through reconditioning of the 200 L import drums. Where on-site waste water treatment plants are available, drums are collected and cleaned, with the washings sent to the plant before disposal. Otherwise, drums and residues are expected to be landfilled. Residues of notified chemical left in the drums are estimated at less than 0.3 kg per drum. With a maximum import volume of 100 tonnes, this equates to 150 kg per annum spread over the major cities.

While hydraulic systems are noted to lose very little volume over the service life of the oil, and a very high proportion is available as waste oil (2), the notifier has indicated that the equipment the notified chemical is used to lubricate is often not a fully closed system. Thus releases to the environment may occur if the machinery is not functioning properly. However, it is difficult to determine the amount that may be released in this way as the size of the hydraulic equipment is a factor.

Loss of notified chemical will also occur via regular maintenance and replacement. Again, it is difficult to estimate the volume released in this way due to several factors, such as the expertise of the worker and the conditions of the equipment. However, the notifier believes that minimal (“only a few drops”) of the finished oil are likely to be lost per oil change.

Losses attributed to accidental spills of larger amounts are likely to be extensively adsorbed to soils or absorbent materials. They can be shovelled up or recovered by vacuum equipment and disposed of at an appropriate waste disposal facility. The notified chemical is unlikely to enter the aquatic environment due to its low water solubility, except when sorbed to eroded soil particles.

Waste oil is likely to account for the greatest level of environmental exposure of the notified chemical, and may be disposed of in two ways. Some customers may elect to drain the used oil and store it in a used oil container for later collection by a contractor. The material safety data sheet (MSDS) recommends disposal through burning in enclosed systems for fuel value, or under supervised incineration. However, it is realistic to assume that smaller and more remote facilities may dispose of the oil by open burning, or other unapproved disposal to soil or water.

Fate

The majority of the notified chemical released to the environment would be via spillage of the hydraulic oil at either servicing or during use. This material will be collected and then disposed of at an approved incineration facility. When used oil is not contaminated with water the notified chemical will be directly burned for fuel. In either case, incineration of the notified chemical will result in oxides of carbon and dispersed into the atmosphere.

Adsorption/desorption results were obtained from standard flask equilibrium tests along the lines of OECD TG106. They were conducted on 3 soils, with the results summarised as follows:

Soil description	***pH***	***Clay content (%)***	***Organic carbon (%)***	***% Adsorbed (average)***	***% Desorbed (average)***
Acidic Sandy Soil	5.1	3	1.9	92	33
Moderate Loamy Soil	5.7	25	0.4	86	<15
Alkaline Loamy Soil	9.0	30	7.8	99	<15

This observed high percentage of adsorption suggests the notified chemical would strongly adsorb to soils, especially if they have a high clay and/or silt content. The observed low percent desorption of the notified chemical, combined with its low solubility, would act to mitigate movement through soils.

Biodegradation

The biodegradation of the notified chemical has been determined by the modified OECD screening test (3). This protocol determines the aerobic biodegradation potential of organic material by measuring the loss of dissolved organic carbon in these test systems over a period of 28 days. The notified adduct showed 84.2% biodegradation over the 28 day period which indicates the chemical is readily biodegradable, in spite of its low solubility.

Bioaccumulation

The waste generated by use of the notified chemical will, in the general case, be collected during servicing and sent to appropriate waste disposal facilities. The quantities of the hydraulic oil that might exposed to the aquatic environment via accidental spills should be negligible. Given the biodegradability of the notified chemical the potential for bioaccumulation seems negligible in spite of its low water and high fat solubility.

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Summary of the acute toxicity of MCP 1173B

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50} > 2 000 mg/kg	4
acute dermal toxicity	rabbit	LD_{50} > 2 000 mg/kg	5
skin irritation	rabbit	slight irritant	6
eye irritation	rabbit	slight irritant	7
skin sensitisation	guinea pig	non-sensitiser	8

9.1.1 Oral Toxicity (4)

Species/strain:	rat/Sprague-Dawley
Number/sex of animals:	5/sex
Observation period:	14 days
Method of administration:	undiluted by gavage
Clinical observations:	soft stool
Mortality:	none
Morphological findings:	none
Test method:	US EPA test guideline (9)
LD_{50}:	> 2 000 mg/kg
Result:	the notified chemical exhibited low acute oral toxicity in rats

9.1.2 Dermal Toxicity (5)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	5/sex
Observation period:	14 days
Method of administration:	undiluted MCP 1173B was applied to the shaved back of each animal and the test site

	was covered by 8-ply gauze followed by a rubber dam and surgical tape; the test site was wiped clean after patch removal 24 h later
Clinical observations:	soft stool, decreased faecal output, decreased food consumption
Mortality:	none
Morphological findings:	none
Test method:	US EPA test guideline (9)
Result:	the notified chemical exhibited low acute dermal toxicity in rabbits

9.1.3 Skin Irritation (6)

Species/strain:	rabbit/New Zealand White
Number/sex of animals:	3/sex
Observation period:	76 hr
Method of administration:	0.5 mL of undiluted MCP 1173B was applied to a shaved area on the anterior and posterior flanks of each animal; the test sites were occluded with Webril patches and secured with a rubber dam and surgical tape; anterior patches were removed after 1 h (corrosion test) and posterior patches after 4 h (irritation test); test sites were wiped clean after patch removal

Draize scores (10):

Time after treatment (hours)	***Animal #***					
	1	***2***	***3***	***4***	***5***	***6***
Erythema						
4.5	1[a]	1	1	2	2	1
28	0	1	1	2	1	1
52	0	0	1	1	0	0
76	0	0	0	0[f]	0	0
OOedema						
4.5	0	0	1	0	0	0

28	0	0	0	0	0	0
52	0	0	0	0	0	0
76	0	0	0	0	0	0

[a] see Attachment 1 for Draize scales [f] flaking

Test method: US EPA test guideline (9)

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

9.1.4 Eye Irritation (7)

Species/strain: rabbit/New Zealand White

Number/sex of animals: 3/sex

Observation period: 72 hr

Method of administration: 0.1 mL of undiluted MCP 1173B was instilled into the left conjunctival sac of each animal and the eyelids gently held together for 1 second; fluorescein staining was used to visualise any potential corneal damage during the 24 hr evaluation

Draize scores[a] (10) of unirrigated eyes:

	Time after instillation											
Animal	***1 hour***			***1 day***			***2 days***			***3 days***		
Conjunctiva	***r[b]***	***c[c]***	***d[d]***	***r[b]***	***c[c]***	***d[d]***	***r[b]***	***c[c]***	***d[d]***	***r[b]***	***c[c]***	***d[d]***
1	1	0	3	1	0	1	0	0	0	0	0	0
2	2	1	3	1	0	0	0	0	0	0	0	0
3	1	0	3	0	0	0	0	0	0	0	0	0
4	1	1	3	1	1	1	1	0	0	0	0	0
5	2	0	3	0	0	1	0	0	0	0	0	0
6	2	0	3	1	1	2	1	0	0	0	0	0

[1] see Attachment 1 for Draize scales
[a] no corneal or iridal effects [b] redness [c] chemosis [d] discharge were seen in any animal

Test method: US EPA test guideline (9)

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

9.1.5 Skin Sensitisation (8)

Species/strain: guinea pig/Dunkin Hartley

Number of animals: 20 test animals (10/sex), 10 control animals (5/sex)

Induction procedure: 0.3 mL of the notified chemical (100% concentration) was applied by occluded patch (6 h) and was repeated once a week for 3 weeks; positive control animals were treated with 0.4 mL of 2,4-dinitrochlorobenzene (0.05% in 80% ethanol)

Challenge procedure: 13 days after the last induction dose, 0.3 mL of 100% notified chemical was applied to test and control animals; positive control animals were treated with 0.05% 2,4-dinitrochloro benzene in acetone

Challenge outcome:

	Test animals		***Control animals***	
Challenge concentration	***24 hrs****	***48 hrs****	***24 hrs***	***48 hrs***
100%	2/20**	2/20	1/10	2/10

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

Test method: OECD Guidelines (11)

Result: the notified chemical was not a skin sensitiser in guinea pigs

9.2 Repeated Dose Toxicity (12)

Species/strain: rat/Sprague-Dawley

Number/sex of animals: 10/sex/dose

Method of administration: the notified chemical was applied undiluted to the clipped backs of each animal; animals were fitted with Elizabethan collars to prevent ingestion of the chemical

Dose/Study duration: 10 animals of each sex were given 0, 125, 500 or 2 000 mg/kg of the notified chemical 5 days per week for 4 weeks; an additional 10 animals of each sex were given 0 or 2 000

	mg/kg of the notified chemical for the same period and were allowed a 2 week recovery period prior to necropsy
Clinical observations:	none; decreased body weight gain was observed in high dose males and high dose recovery females
Clinical chemistry/Haematology	*Haemotology:* increase in segmented neutrophils in female mid-dose group, however no dose-response was observed; decrease in lymphocytes in male recovery group at weeks 5 and 7 was within historical limits *Clinical Chemistry:* increase aspartate aminotransferase in low dose females without dose reponse; increase in alanine aminotransferase in recovery males but not in other groups; decreased albumin in males following the recovery period which was not observed at week 5
Histopathology:	increase in relative adrenal and brain weights in high dose females at the end of the recovery period attributed to lower final body weights; at 500 mg/kg/day and above reversible minor epidermal hyperplasia and hyperkeratosis and sebaceous gland hyperplasia; dermal inflammatory cell infiltration in a few of the affected rats; all effects on skin reversible
Test method:	not stated
Result:	no target organ identified for systemic toxicity in rats

9.3 Genotoxicity

9.3.1 *Salmonella typhimurium* Reverse Mutation Assay (13)

Strains:	TA 98, TA 100, TA 1535, TA 1537, TA 1538
Concentration range:	0.1 - 10.0 μL of notified chemical per plate
Test method:	US EPA Test Guideline (9)
Result:	the notified chemical was found not to induce

mutations in bacteria in the presence or absence of metabolic activation (rat liver S9)

9.3.2 Chromosomal Aberrations in Chinese Hamster Ovary Cells (14)

Concentration range:	0.05 - 0.40 μL/mL of the notified chemical in the culture medium
Procedure:	treatment time 2 hr (-S9) or 20 hr (+S9), harvest at 20 hr; repeat with additional harvest at 44 hr
Test method:	US EPA Test Guideline (9)
Result:	the notified chemical was found not to induce chromosomal aberrations in chinese hamster ovary cells *in vitro* in the presence or absence of metabolic activation (rat liver S9)

9.4 Overall Assessment of Toxicological Data

The notified chemical was of low acute oral toxicity in rats, low acute dermal toxicity in rabbits (LD_{50} > 2 000 mg/kg for both routes of administration) and did not exhibit significant systemic toxicity in a 28-day dermal repeat dose study at doses up to 2 000 mg/kg/day. The notified chemical was a slight skin irritant and a slight eye irritant in rabbits, was not a skin sensitiser in guinea pigs and was not genotoxic as judged by the lack of mutagenicity in bacteria and clastogenicity in chinese hamster ovary cells *in vitro*.

Based on the submitted toxicological data, the notified chemical would not be classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (3).

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

The following ecotoxicity studies have been provided by the notifier (the toxicity tests were carried out according to the notifiers' protocols):

Test	*Species*	*Results (Nominal WAF*)*
Acute Renewal Toxicity	Rainbow trout (*Oncorhynchus mykiss*)	96 h LC_{50} > 5017 ppm
Acute Immobilisation/	Daphnid (*Daphnia magna*)	48 h EC_{50} > 5076 ppm
3 brood chronic - Reproduction	Daphnid (*Daphnia magna*)	16 d IC_{50} > 5029 ppm
Acute Growth Inhibition	Algae (*Selenastrum capricornutum*)	72 h EC_{50} = 974 ppm

WAF* = water accommodated fractions, except for the fish test

For the toxicity tests on rainbow trout, an oil-water system was designed to maintain the oil in a dispersion of droplets throughout a water column. This 30 L cylinder contained a vertically mounted propeller that maintained a vortex at 1500 rpm, thus keeping the oil dispersed. Fish were exposed to concentrations of 99, 493, 1015, 2001 and 5017 ppm (w/v). No adverse effects were observed in any treatment and the No Observed Effect Concentration (NOEC) and LC_{50} were determined to be greater than 5017 ppm WAF.

Daphnids were exposed to individual WAF solutions at concentrations of 324, 648, 1296, 2592 and 5076 ppm (w/v). The WAF were prepared by pipetting the appropriate quantities to bottles that were then stirred for 24 hr and then allowed to settle for 24 hr. Supernatants were removed and defined as the WAF's of nominal concentration. The NOEC and EC_{50} were determined to be 5076 ppm WAF.
The WAF solutions for the *Daphnia* chronic reproduction test were prepared as described above for the 48 hour acute study. The maximum WAF concentration used was 5029 ppm, and the test was terminated on day 16 since at least 80% of the control animals produced their third brood. The IC_{50} were determined to be greater than 5029 ppm WAF.

The test algae, *Selenastrum capricornutum,* were exposed to WAF of the notified chemical at concentrations of 324, 648, 1296, 2592 and 5076 ppm (w/v). All concentrations showed significant inhibition and thus the NOEC was ascribed less than 324 ppm and EC_{50} 974 ppm WAF. This result is nominal given that the EC_{50} is well above the level of solubility for the notified chemical.

The levels measured by the above tests, suggest this chemical would be considered non-toxic to the organisms tested, up to the level of its solubility. The reason for the very slight toxicity to the algae is unclear and from the test design cannot be related to actual levels in water of the notified chemical, probably reflecting soluble impurities.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The notified chemical is unlikely to present a hazard to the environment at any stage of its use. Of the original quantity of the notified chemical imported (between 10-100 tonnes per annum in the first 5 years) it is expected that negligible amounts will be released from the repackaging sites.

Maintained machinery should have minimal leakage of hydraulic oils. The ultimate fate of the waste hydraulic oil is treatment by incineration at an approved industrial facility; burning for fuel value; or by unapproved on-site burning of waste oil or disposal to land or water.

Any accidental spillage would be expected to sorb strongly to soils, and only reach the aquatic compartment if sorbed to eroded soil particles. Rapid biodegradation in soils/water may be expected. Combustion of the notified product will produce oxides of carbon and hydrogen.

A low environmental hazard is expected through the use of this chemical.

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

Based on the toxicological data provided the notified chemical is unlikely to exhibit acute or chronic toxicity, is not likely to be a skin sensitiser and is not likely to be genotoxic. The main hazard associated with use of the chemical is likely to be slight skin and slight eye irritancy.

Exposure of transport and storehouse workers to the notified chemical is only likely to occur in the rare event of an accident.

Exposure of workers involved in repackaging the finished oil containing the notified chemical into 1 L containers is expected to be low. Repackaging will involve mainly automated equipment so that exposure is only likely when connecting and disconnecting lines to 200 L drums. The notifier states that the likelihood of exposure is slightly greater when manually operated pumps are used but is still likely to be low. In this case the volumes are likely to be low as the oil will be sent to customers as samples.

Use of the oil in the industrial setting as a hydraulic oil involves manual addition to and removal from various systems. Exposure to drips and spills is possible. It is expected there will be a similar likelihood of exposure to used oil when it is pumped into and removed from tanks for disposal by incineration.

The main occupational health risk to workers involved in repackaging the imported oil containing the notified chemical and in the use as a hydraulic oil is likely to be slight skin irritation. This can be minimised by the use of protective gloves and clothing as outlined below. Slight eye irritation is a potential health risk but ocular exposure is likely to be rare. The health risk to other workers handling containers of the chemical is likely to be minimal. In the case of workers involved in disposal of

used oil, the risk of adverse health effects from oil contaminants is likely to be greater than that due to the notified chemical.

There is not expected to be any health risk to members of the public as exposure is extremely unlikely.

13. RECOMMENDATIONS

To minimise occupational exposure to the notified chemical the following guidelines and precautions should be observed:

- Safety goggles should be selected and fitted in accordance with Australian Standard (AS) 1336 (15) to comply with Australian/New Zealand Standard (AS/NZS) 1337 (16);
- Industrial clothing should conform to the specifications detailed in AS 2919 (17);
- Impermeable gloves or mittens should conform to AS 2161 (18);
- All occupational footwear should conform to AS/NZS 2210 (19);
- Spillage of the notified chemical should be avoided, spillages should be cleaned up promptly with absorbents which should then 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 accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (20).

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 shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. Under subsection 64(1) of the Act, secondary notification of the notified chemical shall be required if use leading to greater exposure to the aquatic compartment of the environment occurs.

16. REFERENCES

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

16. 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.

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

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

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

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

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