File No: NA/365

Date:15 April 1996

NATIONAL INDUSTRIAL CHEMICALS NOTIFICATION AND ASSESSMENT SCHEME

FULL PUBLIC REPORT

Substituted tetrazole-2,5-dihydro-5-thioxo

This Assessment has been compiled in accordance with the provisions of *the Industrial Chemicals (Notification and Assessment) Act 1989,* 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

Substituted tetrazole-2,5-dihydro-5-thioxo

1. APPLICANT

Agfa-Gevaert Ltd of 372 Whitehorse Road NUNAWADING VICTORIA 3131 has submitted a limited notification statement in support of their application for an assessment certificate for substituted tetrazole-2,5-dihydro-5-thioxo.

2. IDENTITY OF THE CHEMICAL

Substituted tetrazole-2,5-dihydro-5-thioxo has been classified as hazardous according to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1), due to its skin sensitisation, eye irritation properties and subchronic oral toxicity. However, for commercial reasons, the chemical identity, and spectral data have been granted exemption from publication in the Full Public Report and Summary Report. The conditions of this being permitted are:

- A descriptive generic name be used to identify the substance in public reports and the Material Safety Data Sheet (MSDS)

- The relevant employee unions shall be informed of the conditions of use of substituted tetrazole-2,5-dihydro-5-thioxo,

- The full chemical name shall be provided to any health professionals in the case of a legitimate need where exposure to the chemical may involve a health risk,

- The full chemical name shall be provided to those on site who are using the chemical and to those who are involved in planning for safe use, etc. in the case of a legitimate need,

- The Director of NICNAS will release the full chemical name etc in the case of a request from a medical practitioner,

- Confidentiality will expire after a 3 year period,

- The chemical be identified as an eye irritant, sensitiser and have its toxicity by repeated dose mentioned in the Health Effects Section of the MSDS, and that reference to its assessment by NICNAS be made on the MSDS,

- These conditions shall be published in the Chemical Gazette.

Other names:	substituted tetrazole-2,5-dihydro-5-thioxo
Trade name:	DBT contained in imported formulation G5400B at <0.1%
Number-average molecular weight:	< 1000
Method of detection and determination:	high pressure liquid chromatography, ultraviolet-visible, infrared and nuclear magnetic resonance spectroscopy

3. PHYSICAL AND CHEMICAL PROPERTIES

Appearance at 20°C and 101.3 kPa:	light red solid
Melting point:	125°C
Specific gravity:	1.20
Vapour pressure:	(6.4 $\pm$ 1.0) x 10^{-2} Pa at 20°C
Water solubility:	0.448g/L at 20°C
Partition co-efficient (n-octanol/water):	log P_{ow} 1.35 at 24.5-26°C
Hydrolysis as a function of pH:	$T_{1/2}$ at pH 4.0 hydrolytically stable $T_{1/2}$ at pH 7.0 hydrolytically stable $T_{1/2}$ at pH 9.0 hydrolytically stable
Adsorption/Desorption:	not expected to adsorb to soils or sediments due to low partition coefficient and high water solubility
Dissociation constant:	4 pK_a (calculated)
Flash point:	not flammable
Flammability limits:	not flammable
Autoignition temperature:	not self-ignitable
Explosive properties:	not explosive
Reactivity/Stability:	substance is stable and exhibits no oxidising properties or decomposition products

Comments on Physico-Chemical Properties

Because of the relatively high water solubility and low partition coefficient, adsorption to sediments or organic matter would not be expected to be strong.
The substance is hydrolytically stable at pH 4, 7 and 9 indicating the amide functionality would not hydrolyse in the environmental pH range. The chemical is imported in an aqueous solution.

The dissociation constant, pKa, was determined mathematically, based on water solubility, molecular weight and pH. The formula pKa = -log ($[H^+]^2$ / conc.) was used. pH was stated as 3.3, although it is not clear whether this is for the substance, or a saturated solution.

The pKa value was calculated to be 4 which is consistent with weak acids. Solubility of the chemical is likely to increase under more basic conditions, and slight acidity would be expected.

4. PURITY OF THE CHEMICAL

Degree of purity:	99.5%%
Toxic or hazardous impurities:	none
Non-hazardous impurities (> 1% by weight):	not determined
Additives/Adjuvants:	none

5. USE, VOLUME AND FORMULATION

The notified chemical will be not be imported as a single substance but as a component within the formulated photographic stabiliser solution G5400B at a concentration of < 0.1% w/w. The amount of substituted tetrazole-2,5-dihydro-5-thioxo to be imported over the next five years will be between 100 and 1000 kg per year.

6. OCCUPATIONAL EXPOSURE

The notified chemical will be imported in a formulation at < 0.1% and therefore there is not expected to be any major occupational exposure. The photographic stabiliser formulation is packaged in strong plastic 5 litre bottles closed by a screw cap and packed in fibreboard cartons for transport and storage purposes. Up to sixty five workers will be involved in the transport and storage of the notified chemical in the imported formulation with little or no contact with the substance except in the case of an accidental spill.

The stabiliser containing the notified chemical will be used in a processor/ platemaker unit by up to one hundred and twenty operators. An operator will fill the

stabiliser tank of the unit by pouring the stabiliser directly from the bottles. During operation the photographically exposed film or paper plates are passed automatically by rollers through the activating solution which stimulates the development of an image and through the stabiliser which prevents further development and fixes the image. There will be exhaust ventilation systems installed in the photographic workrooms as standard practice because of the possibility of exposure to vapours from other chemicals used in the machine process.

At the end of every 4-6 weeks the used activator solutions are drained from the processor units into plastic bottles for disposal. The bottles will be collected by a waste disposal company who will process the waste by incineration or landfill before disposal. The disposal will be performed by up to fifty five workers.

7. PUBLIC EXPOSURE

No public exposure to the notified chemical is expected to occur during its distribution to warehouses and printers. The activator solution, G5400B, will not be sold directly to the public.

Considering the concentration of substituted tetrazole-2,5-dihydro-5-thioxo in the activator solution (<0.1% w/w) disposal via the sewerage, incineration or landfill is not likely to result in notable public exposure to the notified chemical.

8. ENVIRONMENTAL EXPOSURE

Release

The approximate number of sites in Australia where the stabiliser is expected to be used is 120. No environmental exposure during transport of the chemical is expected. In the event of accidental spillages, environmental exposure would be minimal due to the small container size. Also there are adequate instructions on the MSDS to deal with spillage situations.

At each site, processing will take place in a platemaker unit. To prepare the unit for use an operator will fill the stabiliser tank by pouring from 5 litre bottles. During operation the photographically exposed film or paper plates are automatically fed by rollers through an activator solution, and then transported through the stabiliser bath. Once the plate leaves the processor it is ready for printing. Throughout the process the stabiliser liquid remains inside the machine. Empty bottles will be landfilled with residues either being washed to sewer, or remaining in the bottles when landfilled.

The greatest environmental exposure will come from disposal of the exhausted chemical solution from the tank. Every 4 to 6 weeks, the stabiliser solution is replaced. The exhausted solution will be collected by a disposal company, along with other photographic chemical waste where it will be treated for the removal of solids and other substances, and then neutralised. The remaining liquid will be discharged to the sewer. Because of the high solubility and unlikeliness of DBT to adsorb to sludge, it is likely to remain in solution during the waste treatment process

and be discharged to sewer

Fate

Under the P.U.R.E. guidelines (2), the preferred method of disposal of photographic chemicals is dilution and balancing with other photo-chemicals and water, and desilvering, then disposal to sewer. The notifier has indicated a procedure similar to this through removal of solids, neutralising, then disposal to sewer. Other disposal to sewer throughout this operation occurs when the tanks and transport rollers are cleaned (at the same time as the tanks being drained), or if any residues from refill bottles are rinsed. Any traces of substituted tetrazole-2,5-dihydro-5-thioxo remaining in the tanks and on the rollers are washed to the sewer.

The ready biodegradability of the substance was assessed in the Modified Sturm Test (CO_2 evolution test following OECD Guideline No. 301 B). Results showed that substituted tetrazole-2,5-dihydro-5-thioxo is not readily degradable, with <10% CO_2 (6.5 mg CO_2/2 L) produced in 29 days. Activated sludge tests however, showed that, although the substance is not readily biodegradable, it is not toxic to waste water bacteria, so will not affect the ability of these bacteria to biodegrade other materials.

Bioaccumulation is not expected due to the chemicals relatively low Log P_{ow} and high water solubility (3).

9. EVALUATION OF TOXICOLOGICAL DATA

9.1 Acute Toxicity

Summary of the acute toxicity of substituted tetrazole-2,5-dihydro-5-thioxo

Test	*Species*	*Outcome*	*Reference*
acute oral toxicity	rat	LD_{50} > 2000 mg/kg	(4)
acute dermal toxicity	rat	LD_{50} > 2000 mg/kg	(7)
skin irritation	rabbit	non irritant	(8)
eye irritation	rabbit	eye irritant	(10)
skin sensitisation	guinea pig	skin sensitiser	(11)

9.1.1 Oral Toxicity (4)

Species/strain: Wistar Crl:(WI)BR rat

Number/sex of animals: 5 males/5 females

Observation period: 15 days

Method of administration:	2000 mg/kg of notified chemical was administered once in polyethylene glycol by oral gavage at a volume of 10 ml/kg. The rats were then observed twice daily for 15 days until they were culled for necropsy2000 mg/kg of notified chemical was administered once in polyethylene glycol by oral gavage at a volume of 10 ml/kg. The rats were then observed twice daily for 15 days until they were culled for necropsy
Clinical observations:	lethargy was noted in one male and red staining of the skin/fur on the head or snout was noted in one male and two females on day 1. These effects are not believed to be treatment related
Mortality:	none
Morphological findings:	no significant observations
Test method:	according to OECD Guidelines for the Testing of Chemicals (5) and EEC Directives (6)
LD_{50}:	> 2000 mg/kg
Result:	there were no significant toxicological observations which were considered to be treatment related. The notified chemical exhibits low toxicity by oral administration

9.1.2 Dermal Toxicity (7)

Species/strain:	Wistar Crl:(WI)BR rat
Number/sex of animals:	5 males/5 females
Observation period:	15
Method of administration:	the notified chemical was administered once at 2000 mg/kg in polyethylene glycol to an area of 25 cm^2 for males and 18 cm^2 for females by application on a gauze patch fixed successively to aluminium foil and a flexible bandage with drops of petrolatum. After 24 hours the dressings were removed and the rats observed twice daily for 15 days until culled for necropsy

Clinical observations:	red staining was seen in the treated skin-area of three females during the first week of observation. This was thought to be due to the colour of the notified chemical
Mortality:	none
Morphological findings:	no significant observations
Test method:	according to OECD Guidelines for the Testing of Chemicals (5) and EEC Directives (6)
Result:	there were no significant clinical or pathological observations. The notified chemical exhibits low toxicity by dermal application

9.1.3 Inhalation Toxicity

not performed

9.1.4 Skin Irritation (8)

Species/strain:	New Zealand White Rabbits
Number/sex of animals:	3 male rabbits
Observation period:	72 hours
Method of administration:	0.5 grams of the notified chemical was moistened and applied to the intact skin of the shaved area on one flank using a non woven patch (6 cm^2). A similar patch without the notified chemical was applied to the contralateral flank to act as a control. Both patches were mounted with micropore tape and secured with an elastic bandage. Four hours after application the dressing was removed and observations for Draize (8) scores taken for 72 hours
Test method:	according to OECD Guidelines for the Testing of Chemicals (5) and EEC Directives (6)
Result:	there were no significant observations. The notified chemical was not a skin irritant in rabbits

9.1.5 Eye Irritation (10)

Species/strain: New Zealand White Rabbits

Number/sex of animals: 3 males

Observation period: 15 days

Method of administration: 49 ± 3 mg of the notified chemical was instilled in the conjunctival sac of one eye of each animal. The other eye remained untreated and served as a reference control. Immediately after the 24 hours observation a solution of 2% fluorescein in water was instilled into both eyes of each animal to determine corneal epithelial damage. This procedure was repeated in all three animals 24 hours after observation on days 4, 8 and 15

Draize scores (9)[i] of unirrigated eyes:

Animal	**Time after instillation**											
	1 hour		**1 days**		**2 days**		**3 days**		**7 days**		**14 days**	
CORNEA:	opacity/area		opacity/area		opacity/area		opacity/area		opacity/area		opacity/area	
1	1	1	1	1	1	1	1	1	1	1	0	0
2	0	1	1	1	1	1	1	1	1	1	0	0
3	1	1	1	2	1	2	1	2	2	1	0	0
IRIS												
1	1		1		1		1		0		0	
2	1		1		1		1		0		0	
3	1		1		0		0		0		0	
CONJUNCTIVA	r[a]	c[b] d[c]	r[a]	c[b] d[c]	r[a]	c[b] d[c]	r[a]	c[b] d[c]	r[a]	c[b] d[c]	r[a]	c[b] d[c]
1	1	2 1	3	2 1	3	2 1	3	2 1	1	0 0	0	0 0
2	1	2 1	3	2 2	3	1 1	3	1 1	1	0 0	0	0 0
3	2	3 1	3	2 2	3	2 1	3	2 1	2	0 0	1	0 0

[1] see Attachment 1
[a] redness [b] chemosis [c] discharge

Test method: according to OECD Guidelines for the Testing of Chemicals (5) and EEC Directives (6)

Result: all rabbits reacted to the notified chemical with mild corneal opacity, mild injury to the iris and significant conjunctival discharge and swelling. The notified chemical is a moderate eye irritant in rabbits

9.1.6 Skin Sensitisation (11)

Species/strain:	Dunkin Hartley Crl:(HA)BR albino guinea pig
Number of animals:	15 females (10 experimental group, 5 control)
Induction procedure:	on day 1 the experimental animals were intradermally injected with three pairs of injections (0.1 ml/site) in the clipped scapular region as follows: a) test substance at 1% in corn oil, b) Freunds' Complete Adjuvant 50% in water and c) the test substance at 2% emulsified in a 50% mixture of Freunds' Complete Adjuvant. Control animals were intradermally injected in a similar manner but without the test substance on day 7 the area of injection in the control and experimental animals was rubbed with 10% sodium-dodecyl-sulfate (SDS). On day 8 the experimental animals had 0.5 ml of a 50% concentration of the test substance applied to the area between the injection sites using a non-woven patch mounted on micropore tape and secured by a bandage. After 48 hours the dressing was removed and the skin reaction assessed. The control animals were similarly treated but only corn oil was used
Challenge procedure:	on day 22 all animals were treated epidermally with 0.05 ml of each of the following concentrations, 50%, 25% and 10% using dressing secured with tape and a bandage. After 24 hours the dressing was removed and the treated sites assessed. On day 29 a second challenge was conducted on a contralateral shaved flank using concentrations of 5%, 2%, 1% and corn oil vehicle
Test method:	according to OECD Guidelines for the Testing of Chemicals (5) and EEC Directives (6)
Result:	very slight to well defined erythema was seen on the skin of the animals when scored after a second challenge on days 31 and 32. The notified chemical is a sensitising agent in guinea pigs

9.2 Repeated Dose Toxicity (12)

Species/strain:	Wistar Crl:(WI)BR Rats
Number/sex of animals:	20 males/20 females
Method of administration:	the notified chemical was administered in polyethylene glycol by oral gavage
Dose/Study duration::	the notified chemical was administered once daily for 28 days at the following dose levels: 0 mg/kg (vehicle), 10 mg/kg, 50 mg/kg and 200 mg/kg. These were administered at 5 ml/kg body weight. Blood samples were collected immediately prior to culling for haematological and clinical biochemical analysis. Rats were subjected to histopathological analysis after culling
Clinical observations:	no deaths occurred during the course of the study. There were no signs of clinical observations that were thought to be treatment related
Clinical chemistry/Haematology	the haematological parameters of treated rats were considered not to have been affected by treatment. Albumin levels and associated total protein levels in the serum of males receiving 200 mg/kg/day were decreased compared to controls. No such changes were detected in females of this group or in animals treated at lower dose levels. There were no other differences that were considered to be treatment related
Histopathology:	the spleen weights of females receiving 200 or 50 mg/kg/day appeared to be decreased in comparison with controls. The liver to body weight ratio of males was also decreased significantly. There was however a lack of additional pathological evidence to indicate that the decrease was treatment-related hyperkeratosis and parakeratosis were observed at the limiting ridge of the stomach of all animals receiving 200 mg /kg/day and some animals receiving 50 mg/kg/day. This is seen as a treatment-related abnormality
Test method:	according to OECD Guidelines for the Testing of Chemicals (5) and EEC Directives (6)

Result:	hyperkeratosis and parakeratosis were observed in the stomach of all animals receiving 200 mg/kg/day and some animals receiving 50 mg/kg/day. Males in these groups also had a significant decrease in liver to body weight ratios. The notified chemical has shown significant toxicological effects by repeated oral dose administration for 28 days, affecting in particular membrane layers of the stomach

9.3 Genotoxicity

9.3.1 Salmonella typhimurium Reverse Mutation Assay (13)

Strains:	*Salmonella typhimurium* TA 1537, TA 98, TA 1535, TA 100
Concentration range:	100-5000 μg/plate either with or without metabolic activation provided by rat liver S9. Positive and negative controls were also utilised and gave the expected results
Test method:	according to OECD Guidelines for the Testing of Chemicals (5) and EEC Directives (6)
Result:	there was no induction of reverse mutations of the histidine gene in the bacterial strains. The notified chemical was not mutagenic

9.4 Overall Assessment of Toxicological Data

The notified chemical was not found to be acutely toxic in rats by oral or dermal administration, nor was it found to be a skin irritant in rabbits. Eye irritation studies in rabbits demonstrated that the notified chemical was a moderate eye irritant. The notified chemical was also found to be a skin sensitiser in guinea-pigs. The repeat dose administration study showed significant pathological observations, including the presence of hyperkeratosis and parakeratosis in the stomach ridge of all the rats administered at 200 mg/kg/day and half of the 50 mg/kg/day, indicating that the notified chemical is harmful to rats. The notified chemical was not found to be mutagenic in bacterial strains.

According to Worksafe Australia's *Approved Criteria for Classifying Hazardous Substances* (1), the notified chemical is classified as hazardous in relation to its eye irritancy, skin sensitising effects and sub-chronic effects following oral administration.

10. ASSESSMENT OF ENVIRONMENTAL EFFECTS

Results of ecotoxicity tests are summarised in Table 3. Results indicate that the chemical can be classified as non-toxic to fish and water fleas, with slight toxicity to algae. It has no significant inhibition in respiration rates of waste water bacteria in sludge.

Table 3. Ecotoxicity test results

Species	**Test**	**Concentrations** [a] (mg/L)	**Result** (mg/L)
Carp *Cyprinus carpio*	96 h acute	100	LC_{50} > 100 NOEC > 100
Water Flea (*Daphnia magna*)	48 h acute	100	EC_{50} > 100
Algae (*Selenastrum capricornutum*)	72 h growth	10, 32, 100	EC_{50}>100 NOEC = 56
Activated Sludge	30 min	200	> 200

a) Concentrations are nominal concentrations.

All ecotoxicity tests were performed to test methods following the EC Directive 92/69/EEC.

The final test for toxicity in *Daphnia magna* was a limit study exposing daphnia for a maximum of 48 hours to nominally 100 mg/L, and its filtrate. Although no immobility was observed in the filtered solution of 100 mg/L, 90% immobility of daphnia was observed in the unfiltered solution. Undissolved particles were observed in this solution despite complete recovery of the chemical, and it was concluded that immobilisation of the daphnia in this solution was probably related to physical damage induced by these particles. Therefore, the results from the filtered solution of EC_{50} > 100 mg/L have been used.

EC_{50} for both cell growth inhibition and growth rate reduction were above 100 mg/L, although under the condition of the study, the notified chemical appeared to inhibit cell growth and reduce growth rate of the algae species significantly at 100 mg/L.

The activated sludge test used a rapid screening method whereby test substances which may adversely effect aerobic microbial treatment plants can be identified. The test followed OECD Guideline No. 209, and the results showed that there was no significant inhibition (<10%) of the respiration rate of the sludge at concentration of 200 ppm.

11. ASSESSMENT OF ENVIRONMENTAL HAZARD

The chemical will be imported in a photographic stabiliser solution at a stated concentration of less than 0.1% w/w. No repacking or reformulating will take place in Australia. Estimated import volumes are from 100 - 1000 kg, and it is anticipated the chemical will be used at around 120 sites throughout Australia, some which may contain more than one processing unit.

The greatest potential for environmental exposure from substituted tetrazole-2,5-dihydro-5-thioxo will result from disposal of the exhausted activator solution after draining the tanks from the processor units. The solution, after solids removal and neutralising, is disposed of to sewer. The quantity drained from each tank is in the order of 6 litres, or 4.5 g substituted tetrazole-2,5-dihydro-5-thioxo, and the drainage is carried out every 4 to 6 weeks. The notifier estimates about 500 litres (< 5 litres of substituted tetrazole-2,5-dihydro-5-thioxo as the chemical is present in the stabiliser solution at a level < 1% w/w) of stabiliser to be disposed of each week throughout the country.

The estimated weekly release of 500 litres is an average of 4.2 litres per site, or approximately 4.2 g of substituted tetrazole-2,5-dihydro-5-thioxo per site per week. If this was released in a large country town, using 5 megalitres as a benchmark for sewage output, the chemical, once diluted in the sewage system, would be present in a concentration of 8.4 ppb. This is in a concentration several orders of magnitude below the most sensitive effects concentration (NOEC = 56 ppm for *Selenastrum capricornutum*).

12. ASSESSMENT OF PUBLIC AND OCCUPATIONAL HEALTH AND SAFETY EFFECTS

The notified chemical is not expected to exhibit acute oral or dermal toxicity in humans. Substituted tetrazole-2,5-dihydro-5-thioxo is not likely to be a skin irritant, but is likely to be a moderate eye irritant. It is possible that the notified chemical may be a skin sensitiser in humans. The toxicological studies also show that the notified chemical may be harmful by repeat oral dose, but is unlikely to be mutagenic.

The notified chemical may have a significant irritant effect upon mucous membranes as there was both eye irritancy and a direct local effect upon the stomach ridge by the formation of a cornified membrane. According to Worksafe Australia's *Approved*

Criteria for Classifying Hazardous Substances (13), the notified chemical is classified as hazardous due to it's eye irritancy and harmful effects from repeated oral administration.

There is little chance of significant exposure to the notified chemical as it will exist at <0.1% in the imported formulation. During importation, storage and transport there is little chance of exposure to the notified chemical occurring except in the event of spill.

There will be mechanical ventilation in the work areas to remove any possible fumes from other photochemicals used in the automated machinery. This will serve to reduce any possible exposure to the notified chemical in the course of normal work practices. During the loading and emptying of the stabiliser tanks of the photographic processor units, protective gloves and eye goggles will be utilised to prevent exposure to the stabiliser solution. There is negligible likelihood of exposure to the notified chemical during the use of the processing units as the film is immersed in the activating solution automatically within a closed system.

The notified substance will not be sold to the public. The public will not be exposed to substituted tetrazole-2,5-dihydro-5-thioxo during its importation and industrial use. Whilst the public may be exposed to substituted tetrazole-2,5-dihydro-5-thioxo if an accidental spillage occurs, considering the clean-up procedures, its concentration in the activator solution and low acute toxicity, the notified chemical is unlikely to constitute a risk to public health.

13. RECOMMENDATIONS

To minimise occupational exposure to substituted tetrazole-2,5-dihydro-5-thioxo the following guidelines and precautions should be observed:

- local exhaust ventilation should be implemented where there is the likelihood of dust generation. Any dust generation should be kept below the Worksafe Australia Exposure Standard for nuisance dust: TWA 10 mg/m^3

- the appropriate protective devices should be employed to minimise occupational exposure if engineering controls and work practices are insufficient to reduce exposure to a safe level. These should include:

  - the appropriate respiratory device should be selected and used in accordance with Australian Standard/ New Zealand Standard (AS/ NZS) 1715 (14) and should comply with AS/NZS 1716 (15)

  - eye protection should be selected and fitted in accordance with AS 1336 (16) and meet the requirements of AS/NZS 1337 (17)

  - industrial clothing should conform to the specifications detailed in AS 2919 (18)

- industrial gloves should conform to the standards detailed in AS 2161 (19)

- care should be taken to avoid spillage of the notified chemical. Should spillage occur the notified chemical should be swept or vacuumed for collection into a container for disposal by landfill or incineration

- 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 substituted tetrazole-2,5-dihydro-5-thioxo and the formulation G5400B in which it is imported was provided in an acceptable format in accordance with the *National Code of Practice for the Preparation of Material Safety Data Sheets* (20).

This MSDS was provided by Agfa-Gevaert Ltd as part of their notification statement. The accuracy of this information remains the responsibility of Agfa-Gevaert Ltd.

15. REQUIREMENTS FOR SECONDARY NOTIFICATION

Under the *Industrial Chemicals (Notification and Assessment) Act 1989* (the Act), secondary notification of substituted tetrazole-2,5-dihydro-5-thioxo shall be required if any of the circumstances stipulated under subsection 64(2) of the Act arise. No other specific conditions are prescribed.

16. REFERENCES

1. National Occupational Health and Safety Commission, 1994, *Approved Criteria for Classifying Hazardous Substances [NOHSC:1008 (1994)],* AGPS, Canberra.

2. P.U.R.E. Photographic Uniform Regulations for the Environment. *Photographic Industry Code of Practice*, March 1993.

3. Connell, DW, 1989, 'General characteristics of organic compounds which exhibit bioaccumulation'. In *Bioaccumulation of Xenobiotic Compounds*, DW Connell (ed). CRC Press, Boca Raton, USA. Chapter 3.

4. Pels Rijcken, WR, 1995, *Acute Oral Toxicity with V.159808 in the Rat (Fixed Dose Method),* Notox B.V., Netherlands, Project No. 142774.

5. Organisation for Economic Co-operation and Development, *OECD Guidelines for Testing of Chemicals,* OECD, Paris, France.

6. EEC Commission Directive 92/69 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. L 383 (29 December 1992).

7. Pels Rijcken, WR, 1995, *Assessment of Acute Dermal Toxicity with V.159808 in the Rat,* Notox B.V., Netherlands, Project No. 142785.

8. Pels Rijcken, WR, 1995, *Primary Skin Irritation/Corrosion Study with V.159808 in the Rabbit,* Notox B.V., Netherlands, Project No. 142796.

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

10. Pels Rijcken, WR, 1995, *Acute Eye Irritation/Corrosion Study with V.159808 in the Rabbit,* Notox B.V., Netherlands, Project No. 142807.

11. Pels Rijcken, WR, 1995, *Assessment of Contact Hypersensitivity to V.159808 in the Albino Guinea Pig,* Notox B.V., Netherlands, Project No.142818.

12. Schoenmakers, ACM, 1995, *Subacute 28-Day Oral Toxicity with V.159808 By Daily Gavage in the Rat,* Notox B.V., Netherlands, Project No. 142831.

13. Waart, EJ van de, 1995, *Evaluation of the Mutagenic Activity of V.159808 in the Ames Salmonella/Microsome Test (with Independent Repeat),* Notox B.V., Netherlands, Project No. 142842.

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

15. Standards Australia, 1991, *Australian Standard 1716-1991 Respiratory Protective Devices,* Standards Association of Australia Publ., Sydney, Australia.

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

17. Standards Australia, 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.

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

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

20. National Occupational Health and Safety Commission,1994*, National Code of Practice for the Preparation of Material Safety Data Sheets,* AGPS, Canberra.

Attachment 1

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