

TRICLOSAN - DECISIONS ON REQUESTS FOR VARIATIONS

1. Ciba Inc., Switzerland through Ciba Expert Services, Australia.

Request 1.1:

Proposed Classification as R23: Toxic by Inhalation

According to this draft assessment, NICNAS has employed The National Occupational Health and Safety Commission (NOHSC) Approved Criteria for Classifying Hazardous Substances, Third Edition, as the basis for proposing that triclosan be classified and labeled as R23: Toxic by Inhalation. This classification is usually applied when the rat acute inhalation LC₅₀ is less than or equal to 0.25 mg/L/4hr in an acute inhalation toxicity test.

We do not agree that this classification and labeling criteria can or should be applied to triclosan and ask removal of this classification category for the following reasons:

Ciba has submitted to NICNAS a valid 4-hour acute inhalation toxicity study in rats. In this study, the animals were exposed “nose only” to an aerosol during a single, continuous 4-hour exposure period. Of paramount significance is that the highest achievable aerosol concentration was tested; this exposure was about 0.15 mg/L to (gravimetric concentration) with 43.9% of particles found to have =3µm MMAD. Animal deaths and signs of treatment-related effects did not occur during the study. It is our opinion that this study outcome should be used as the basis for classification and labeling, in which case “R23: toxic by inhalation” would not be appropriate.

The NICNAS risk assessment, in contrast, discounts the relevance of this acute study since “No clinical signs of toxicity were observed following a 4h exposure to an aerosol of 0.15 mg triclosan/L, which was the highest technically achievable respirable concentration. Due to this very low dose tested in this study it is not possible to derive a conclusion about the acute inhalation toxicity of triclosan.” The NICNAS evaluation then goes on to apply the results of our 21-day rat inhalation study to the classification and labeling criterion for acute inhalation effects. We disagree with this approach because this subchronic study used triclosan at 10% in ethanol suspension administered “nose only” as an aerosol daily, 5 days per week, 2 hrs per day for 21 days. Such a formulation does not represent the form in which triclosan, a white crystalline powder, would be encountered in manufacturing or subsequent industrial handling situations.

While the subchronic inhalation study can inform hazard assessment for consumer product formulations, classification and labeling (C&L) of a chemical must reflect the physical and chemical characteristics of the substance in commerce. As stated by NICNAS, this (C&L) should therefore be based on triclosan raw material (100% powder), not triclosan solubilized in ethanol. Therefore, the acute 4-hour inhalation study remains the only representative study for C&L, which is why this study was conducted and submitted.

As a case in point, we have established the Ciba Internal Exposure Limit (CIEL) at our manufacturing sites with an upper limit of 1 mg/m³, after which respiratory Personal Protective Equipment is required; further, ventilation and handling steps in the plant are such that dusting is minimized and personnel exposure sustained at lowest possible levels. This extremely low CIEL level is far below the estimated LC50 proposed by NICNAS (650 mg/m³ or 0.65 mg/L) and is not a manufacturing issue. In other words, triclosan does not pose a dusting issue or inhalation toxicity issue under standard manufacturing and downstream user conditions.

Decision 1.1:

Variation not approved.

NICNAS comments 1.1:

The Approved Criteria for Classifying Hazardous Substances (NOHSC 2004) has three levels of classification based on the LC50 of an aerosol:

Very toxic by inhalation (R26):	LC50 ≤ 0.25 mg/L/4h
Toxic by inhalation (R23):	LC50 between > 0.25 mg/L/4h and ≤ 1 mg/L/4h
Harmful by inhalation (R20):	LC50 between > 1 mg/L/4h and ≤ 5 mg/L/4h

The value for R23 stated in the first paragraph of the request above is incorrect. For a value less than or equal to 0.25 mg/L/4h the risk phrase that applies is R26 - very toxic by inhalation.

The acute inhalation toxicity study tested a very low concentration of triclosan (0.15 mg/L) as this was the highest concentration achievable with the test system used. However, because of the very low dose tested this value could not be used to determine the degree of acute inhalation toxicity of triclosan using the above criteria.

The use of the 21-day inhalation toxicity study to determine an LC50 is considered appropriate based on the following considerations:

- (1) Acute toxicity and dose examined – Although the study was a repeat dose inhalation toxicity study, more than 50% rats died after a single 2-h continuous exposure prior to the administration of the second dose and therefore this can be considered as an acute effect. Moreover the dose examined was between the classification ranges provided in the Approved Criteria.
- (2) No effect from the vehicle used - There were no deaths in the low dose group and the vehicle control group (10% ethanol)/The LC50 for ethanol is 20000 ppm (10 h) in rats (ChemIDplus Advanced). This indicates that ethanol is not likely to have contributed to any additive or synergistic effect on rat deaths in the 21-day inhalation toxicity study; and
- (3) Consistency with international guidelines - The OECD Guideline No: 403 for acute inhalation toxicity clearly states that, ‘Where necessary, a suitable vehicle may be added to the test substance to help generate an appropriate concentration of the test substance in the atmosphere’ and ‘Where a vehicle is used to help generate an appropriate concentration of the substance in the atmosphere a vehicle control group should be used’. It also states that ‘The LC50 value is a relatively coarse measurement, useful only as a reference for classification and labelling purposes and an expression of lethal potential of the test substance following inhalation’.

Based on deaths reported after 2 h of exposure at 1.3 mg/L triclosan (in 10% ethanol as an aerosol), the LC50 for triclosan was considered to be in the range for classification as 'Toxic by inhalation (R23)' (LC50 between > 0.25 mg/L/4h and ≤ 1 mg/L/4h) (Section 20 of PEC report).

The US EPA Reregistration Eligibility Decision (RED) for triclosan released for public comment recently has determined acute inhalation toxicity of triclosan as Category II (indicating that the 4h LC50 for triclosan lies between 0.05 and 0.5 mg/L), and is consistent with the NICNAS assessment.

Hazard is an inherent property of the chemical regardless of the formulation used in commerce. Therefore, in determining the health hazard classification of a chemical, the formulations used in commerce is not taken into consideration. Physical and chemical characteristics of the substance in commerce are applicable when classifying the chemical for its physico-chemical effects (Appendix 6 of the NOHSC Approved Criteria, 2004). Formulations used in commerce are also considered when carrying out exposure assessments.

Under the National Model Regulations for the Control of Workplace Hazardous Substances [NOHSC:1005 (1994)] (National Model Regulations) and the Australian, State and Territory government regulations introduced in accordance with the National Model Regulations, manufacturers and importers of substances supplied to workplaces are required to determine whether the substances are hazardous to health before supply. It is not expected that employers and employees using substances in the workplace will need to apply these criteria; they would normally identify hazardous substances from the supplier's label or the MSDS.

An employer shall ensure that a suitable and sufficient assessment is made of the risks to health at workplaces from potential exposure to any hazardous substance. The employer shall ensure that exposure of employees to hazardous substances is either prevented or, where that is not practicable, adequately controlled so as to minimise risks to health [National Model Regulations, NOHSC:1005 (1994)]. As provided in the last paragraph of this request, NICNAS notes the control measures implemented by Ciba to minimise risks to health of workers.

The hazard classification can be reconsidered if any new data are provided to NICNAS.

Request 1.2:

Environmental Risk Assessment

(i) Risk to freshwater ecosystems: A species sensitivity distribution (SSD) was presented using the BurrliOZ software. For the PNEC derivation, an assessment factor of 5 was applied to the chronic data of the aquatic species. In our scientific view, an assessment factor of 1 or 2 can be applied to the data, as the species are diverse with a broad taxonomic distribution (fish, amphibian, crustacean, insect, algae, aquatic plant, rotatoria) including 11 endpoints for algal species representing the most sensitive taxonomic group.

Yang et al. (2008) calculated the IC50 values by plotting the log concentration versus

algal cell counts (yield). The authors did not show the dose-response curve, nor did they give any confidence limits. In addition, they report in “Materials and Methods” that they followed the OECD guideline 201 with “minor modifications”. Therefore, these results should be taken with caution. Since other studies are available with this species that were conducted according to GLP and followed fully the OECD guideline, a preference should be given to these studies when evaluating the results.

(ii) Risk to sediment dwelling organisms: Additional data was provided to describe the risk for sediment dwelling organisms. The studies of Dussault et al. (2008) and Memmert (2006) report the acute toxicity to *Chironomus tentans* and *Hyaella azteca*, as well as the chronic toxicity to *Chironomus riparius* in a water-sediment system. The availability of this data supports the usage of a lower assessment factor for the PNEC_{sediment} for sediment-dwelling organisms. The assessment factor of 1000 seems to be too conservative for using it in this ERA. We suggest using an assessment factor of 100 as described in the EU Technical Guidance Document on Risk assessment following European Regulations and Directives, Part II (2003).

(iii) Data gaps: Even though much additional information was added this section was not updated.

Decision 1.2:

Variations partly approved.

NICNAS comments 1.2:

(i) The assessment factor 5 applied to the SSD to derive the PNEC was in line with the approach adopted in the EU Technical Guidance Document on Risk assessment. Although a diverse range of species has been used for the SSD there are some uncertainties with the quality of the data incorporated (eg many results are only from a presented poster with no details of the study available). Consequently, the default assessment factor of 5 was considered appropriate.

(ii) The main exposure route for the sediment dwelling organisms was considered to be via the overlying water. Consequently, based on the lack of data for this route of exposure an assessment factor of 1000 for sediment dwelling organisms was chosen according to the of the EU Technical Guidance Document on Risk assessment (ie. results for *Chironomus tentans* and *Hyaella azteca*). The chronic study in which triclosan was adsorbed to sand prior to exposure is not considered to be representative of the exposure route in the environment as was made clear in Section 9.2.4 of the report.

(iii) Section 9.5 ‘Data Gaps’ will be revised to reflect the data received. The contents under the heading “Toxicity Data” will be updated. Mention of the data received during the public comment period will be deleted.

Except for the two environmental risk assessment reports from Europe (Environ, 2006) and USA (Environ, 2008), the additional studies provided by Ciba during the correction stage of the draft triclosan report in August 2008 were included in the second draft released for public comment in October 2008.

The following paragraph will be added to the final report in Section 9.2.1 based on the two Environ reports:

In an environmental risk assessment for Europe (Environ 2006), a surface water PNEC 5th percentile of 1.7 µg/L has been determined using a species sensitivity approach, utilising NOECs, EC5s, EC10s or EC20s of 16 species. These authors (Environ 2008) have also derived a surface water 5th percentile of 3.5 µg/L using acute EC50 or IC50 data for 17 species as part of an aquatic risk assessment for the United States.

While the Europe and USA environmental risk assessments are comprehensive risk assessments they are not applicable to Australia due to the differing nature of the receiving environments particularly the volume of water in receiving waters from sewage treatment outfalls. The reports are based on a probabilistic analysis of the data for both release and effects.

2. Advocate for the Consumer, Cosmetic, Hygiene and Specialty Products Industry (ACCORD)

Request 2.1:

Re-assess the practicality of secondary notification requirements.

ACCORD has previously voiced concerns about the secondary notification requirements of chemicals that have been assessed under the ICNA Act, where the compliance to certain requirements as interpreted by NICNAS, are impossible, necessitates companies disclosing business sensitive information or imposes unfair burden on the company notifying to NICNAS under the secondary notification requirements.

The draft report imposes secondary notification requirements on triclosan which reiterates the concerns we have previously voiced. The specific circumstances that warrant secondary notification listed in the draft report are as follows:

- The function or use of triclosan has increased, or is likely to change, significantly;
- The amount of triclosan introduced into Australia has increased, or is likely to increase significantly;
- Manufacture of triclosan in Australia is proposed;
- Significant new information has become available to the applicant/notifier as to adverse environmental effects of triclosan such as those identified in this assessment (e.g. methyltriclosan and 2,8-dichlorodibenzo-p-dioxine);
- Additional data has become available to the applicant/notifier to confirm and clarify the biological significance of the observed effects of triclosan on the development of tadpoles of the North American bullfrog, *Rana catesbeiana*,
- Recommended environmental monitoring detects the presence of triclosan in the Australian aquatic environment above levels of concerns (i.e. 0.05µg/L);
- Additional information has become available to the applicant/notifier as to the adverse health effects of triclosan, including development of antimicrobial resistance to triclosan in clinical or natural settings; or

- Additional information has become available on the amount of triclosan that may be leached from textile and plastic articles under normal conditions of use, or from the sucking or mouthing of such (i.e. extraction into saliva).

We are unsure why there is an obligation on the applicant/notifier for secondary notification when the “recommended environmental monitoring detects the presence of triclosan in the Australian aquatic environment above levels of concern”. The recommendation for monitoring indicates that the monitoring will be undertaken by the federal, state and territory agencies through Environment Protection and Heritage Council (EPHC) Chemicals Working Group. We assume that these agencies will share the final information with NICNAS. How the applicant/notifier will link into the monitoring process, or why the notification by the applicant/notifier is required when NICNAS should already have the information through the EPHC Chemicals Working Group needs some clarification.

The requirement to notify the Director when the usage volume of triclosan is increased significantly or when the function of the chemical has changed significantly is problematic for the industry. There is no way for one company to know the usage volume or use pattern of other companies. Also, as triclosan is listed on AICS, anyone can import triclosan without notifying NICNAS of volume or use pattern. The only way that companies can track the national usage volume or work out what may be considered a significant deviation from current usage pattern for triclosan, is for all companies importing triclosan in any form to meet regularly and swap information on use pattern and volume. Not only is this impractical, but it may also breach the Trade Practices Act.

The secondary notification requirements imply that the responsibility for the notification including the secondary notifications fees, rests with the applicant/notifier that contacts NICNAS. It is inappropriate to penalise one applicant/notifier for alerting NICNAS to potential concerns, particularly where the concern relates to all importers of triclosan (e.g. new information on the effects on the environment).

NICNAS must consider which secondary notification requirements are feasible and which are important rather than having a “wish list” with no clear direction or information on how companies can comply with the imposition of the requirements.

Decision 2.1:

Variation partly approved

The Secondary Notification section has been revised to address comments on two specific circumstances.

Amended the second dot point to read ‘The amount of triclosan introduced by an importer into Australia has increased significantly compared to their usual importation volume, or likely to increase significantly’.

6th dot point moved as the final paragraph of the section to read:

Information from the environmental monitoring recommended in the report (Recommendations 7 and 8) will be forwarded to NICNAS. If environmental

monitoring detects the presence of triclosan in the Australian aquatic environment above levels of concern (i.e. 0.05µg/L), the Director may require a secondary notification according to section 65(2) of the Act and further risk mitigation measures may be considered.

NICNAS comments 2.1:

NICNAS understands that it is not possible for one company to be aware of the usage volume or use pattern of other companies. Under the secondary notification provisions an applicant should notify NICNAS if their imports have increased or are likely to increase significantly. NICNAS may then call for information on imports generally and determine if a secondary notification is warranted.

NICNAS does not charge fees for secondary notifications of existing chemicals. As triclosan is an existing chemical there will be no charge for the industry for secondary notifications.

The Director is able to call for a secondary notification if the Director becomes aware of any new information such as information from the monitoring studies recommended in the report. Section 65(2) of the Act states, 'Where, in relation to an industrial chemical assessed under this Act, the Director becomes aware, because of notification under subsection 64(2) or otherwise, that, since the assessment, any of the circumstances referred to in that subsection occurred, the Director may, by notice in the Chemical Gazette, require the secondary notification of the chemical by persons to whom the notice applies'.

3. Haztech Environmental

Request 3.1:

This assessment did not adequately take into account the health or environmental effects of Triclosan imported as part of finished plastic and textile articles, as no information was provided on the amounts of Triclosan in imported articles (page xiv).

Comment: Considering that the embedded Triclosan provides its antibacterial effect by being released at the surface of an article, this type of article is deliberately releasing a chemical which comes under the control of NICNAS. A consumer would need to address a concern to the ACCC which ACCC would then need to work with NICNAS as the chemical control authority to manage the issue.

A dishtowel released 1100 µg/L Triclosan (p136). I would suggest that several typical articles be analysed for the actual embedded Triclosan concentrations and the initial maximum surface concentrations released be determined.

Decision 3.1:

Comments noted. No specific variation requested.

NICNAS comments 3.1:

NICNAS did not receive any information from applicants to be able to assess the amounts of triclosan in imported articles and leaching of triclosan from articles. A

comprehensive literature search indicated that there was limited international data available.

Page 136 (Section 16.1.4) of the NICNAS report indicates that data on the concentration of triclosan in articles were available only for plastic coupons (5% w/w triclosan) (Junker and Hay, 2004). The full data of this study were not available. Therefore, no valid conclusion can be made from this single study alone. The study was carried out under extreme experimental conditions to dislodge the triclosan in these articles. It does not represent a normal consumer use situation and it is difficult to determine if consumers will be exposed to these levels of triclosan when using articles impregnated with the chemical.

If information on leaching of triclosan from articles becomes available, NICNAS will consider an assessment of the new information under the secondary notification provisions of the Act.

Request 3.2:

Impurities in Triclosan from Indian and Chinese producers (p10) show levels of 2,3,7,8-TetraChloro-Dibenzo-p-Dioxin to range from 17.2 to 1720 pg/g and 2,3,7,8-TetraChloro-DibenzoFuran to range from 0.43 to 207.3 pg/g respectively. The USP limit for both is 1 pg/g.

Comment: Considered the potentially high levels of impurities found from some of these sources I suggest that the values provided in the Certificates of Analysis for raw materials from all sources need to be audited and independently analysed until they are shown to be complying with the USP.

Note: It also raises the issue of how should we manage these impurities when they are in articles coming into Australia from Asia in which Triclosan is embedded and released at the surface to carry out an anti-bacterial function.

Decision 3.2:

Comments noted. No specific variation requested.

NICNAS comments 3.2:

NICNAS reviewed the 'Certificates of Analysis' for triclosan raw material provided by importers during the assessment process and recommendations 6a and 6b of the draft report were formulated based on the analysis of this information. Due to the range of impurities observed in triclosan imports, NICNAS recommends that importers should ensure that the triclosan imported by them contains low levels of impurities as part of best practice.

Request 3.3:

Triclosan raw material as the powder is being classified as a Class 6.1 TOXIC Dangerous Goods due to Acute Inhalation Toxicity. NICNAS has used data obtained from a 21-day repeat dose inhalation toxicity study in rats (Ciba Geigy Limited, 1974) to determine that Triclosan as a raw material is Acutely Toxic by inhalation. "Considering that >50% deaths occurred after a single exposure (2 h) at 1.3 mg/L, the LC50 for Triclosan is determined to be <1.3 mg/L (or <1300 mg/m³)." (Page 278 of the Report).

Comment: This will raise the issue for industry that raw material Triclosan shipped by sea will arrive in Australia as Class 9 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (TRICLOSAN) UN 3082 and provide them a dilemma as to which UN No. they order it with. Then industry will have to provide a local MSDS and relabel it as Class 6 TOXIC, SOLID, ORGANIC, N.O.S. (TRICLOSAN), UN 2811 to transport Triclosan in Australia.

Note: The ADG Code Competent Authorities will need to look at this classification and decide whether they agree that raw material TRICLOSAN is correctly classified as Class 6.1.

It would have been useful in the time that NICNAS has taken to prepare the PEC, for it to have arranged that the actual Acute Inhalation LC50 test on rats be carried out. This would then have provided test data using today's testing protocols, and have provided a firm basis to ask for a change worldwide.

Comment: When the EU added Triclosan in the 29th ATP I would expect that the 1974 Ciba Geigy data would have been available to them, but they did not classify with R23.

Decision 3.3:

Comment noted. No specific variation requested.

NICNAS comments 3.3:

NICNAS was advised by an EU country that the 21-day inhalation toxicity study in rats (Ciba Geigy, 1974) was not provided in the package discussed at the EU classification and labelling meeting. Triclosan was last discussed at this meeting in 2003 following a proposal from the Norwegian authorities.

NICNAS consulted the Department of Infrastructure, Transport, Regional Development & Local Government (DITRDLG) regarding the dangerous goods transport classification of triclosan. DITRDLG confirmed that the proposed Class 6 classification for transport of triclosan, based on the LC50 value, was appropriate. NICNAS will forward the final report to DITRDLG for consideration of a submission to the UN Dangerous Goods Committee to re-classify triclosan based on the LC50 test results

, Use of the 21-day inhalation toxicity study to determine the LC50 of triclosan is consistent with the OECD Guideline No: 403 for acute inhalation toxicity testing and Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004) (see NICNS comments 1.1).

The Approved Criteria for Classifying Hazardous Substances (NOHSC, 2004), states that information on health effects for a substance can be obtained from a number of different sources and it is not intended that additional animal testing need to be carried out. Therefore, the 21-day inhalation toxicity study available is sufficient to classify triclosan for that end point and avoids unnecessary animal testing.

The US EPA Reregistration Eligibility Decision (RED) for triclosan released recently for public comment has determined acute inhalation toxicity category II for triclosan (4h LC50 >0.05 to 0.5 mg/L), which is consistent with the NICNAS transport classification for Class 6 (1h LC50 <4mg/L) (ADG Code, 2007).

NICNAS supports international harmonisation and on finalisation of the triclosan assessment report will forward the report to international regulatory agencies.

Request 3.4:

Triclosan is highly toxic to fish and aquatic invertebrates (EC/LC50 < 1 mg/L) and very highly toxic to algae (EC50 < 0.1 mg/L) indicating that potential for damage to the environment. Triclosan would meet the adverse environmental effects criterion of POP chemicals, but the report informed it was unlikely to meet the persistence criteria for a Stockholm Convention Persistent Organic Pollutant (POP).

Comment: It does raise the issue about whether it is appropriate to use such an environmentally toxic chemical that is persistent under anaerobic (low oxygen) conditions in such a wide range of domestic use products. From my understanding of the draft PEC it appears that various the Chlorinated Organic breakdown products from Triclosan are still hazardous to the environment and can accumulate. These breakdown products need to be monitored.

When I checked ESIS at: <http://ecb.jrc.ec.europa.eu/esis/> for Triclosan CAS 3380-34-5 the classifications they gave for Triclosan were:

C = 20% Xi, N; R36/38-50/53

0,25 % = C < 20 % N; R50/53

0,025 % = C < 0,25 % N; R51/53

0,0025 % = C < 0,025 % R52/53

This gives a classification as Environmentally Hazardous as Dangerous Goods goes down to <0.1% (which is below the concentration used in many domestic products), so the overall cartons of many domestic products with Triclosan are ENVIRONMENTALLY HAZARDOUS DANGEROUS GOODS when transported by sea.

Decision 3.4:

Comments noted. No specific variation requested.

NICNAS comments 3.4:

Recommendation 2a in the NICNAS draft report provides the transport recommendations for triclosan raw material. Although the ESIS classification for triclosan indicates concentrations above 0.0025% triclosan with environmental risk

phrases, product toxicity can vary due to other ingredients present in various formulations.

It is the responsibility of the manufacturer/importer to determine hazards of domestic products containing triclosan to determine whether the criteria for Class 9 applies for their products when transported by sea.

4. National Toxics Network (NTN)

Request 4.1:

Imported articles and products - "This assessment did not take into account the health or environmental effects of triclosan imported as part of finished plastic and textile articles, as no information was provided on the amounts of triclosan in imported articles." (Page xiv).

Millions of Australians, including babies and children, are exposed to triclosan from imported articles and products. Considering that the embedded triclosan apparently provides its antibacterial effect by being released at the surface of an article, this type of article is deliberately releasing triclosan, which comes under the control of NICNAS.

If a consumer addressed a concern to the ACCC surely the ACCC would work with NICNAS as the chemical control authority to manage the issue.

NTN fails to understand why NICNAS did not find a way to determine quantities of triclosan in imported articles as well as arranging to analyse typical items for the actual embedded triclosan concentration and to determine the surface concentration achievable that could be released in order to get a more accurate picture of triclosan use and exposure in Australia.

Decision 4.1:

Comments noted. No specific variation requested.

NICNAS comments 4.1:

NICNAS did not receive any information from applicants to be able to assess the amounts of triclosan in imported articles and leaching of triclosan from articles. A comprehensive literature search indicated that there was limited international data available.

If information on leaching of triclosan from articles becomes available, NICNAS will consider an assessment of the new information under the secondary notification provisions of the Act.

Request 4.2:

Dioxin impurities in Triclosan - Impurities in Triclosan from Indian and Chinese producers (p 10) show levels of 2,3,7,8-TetraChloro-Dibenzo-p-Dioxin to range from 17.2 to 1720 pg/g and 2,3,7,8-DibenzoFuran to range from 0.43 to 207.3 pg/g respectively. The USP limit for both is 1 pg/g.

Considering the potentially high levels of dioxin impurities found from some of these sources, and the fact that a large proportion of triclosan embedded in imported products is likely to originate from these sources, NTN believes a stronger Recommendation (6b) is required for industry than a 'voluntary measure for importers to check'.

NTN recommends that it be mandatory for the values provided in the Certificates of Analysis for raw materials from all sources to be audited and independently analysed until they are shown to be complying with the USP.

Given Australia's obligations under the Stockholm Convention on Persistent Organic Pollutants and requirements under the National Dioxins Program, NTN believes all agencies with responsibility for products containing triclosan should have a responsibility to ensure those products comply with the USP specifications.

Subsequently, NTN recommends stronger wording in Recommendation (6a). Rather than just 'note' that the USP has set limits for dioxins in therapeutics, the TGA should act to ensure products that they regulate meet those requirements. This obligation should also be extended to all agencies that have responsibility for products potentially containing these dangerous impurities, including NICNAS, APVMA and ACCC.

Decision 4.2:

Variation not approved.

NICNAS comments 4.2:

As recommended in the NICNAS report (Recommendation 6b), importers should only source triclosan from manufacturers implementing best available techniques so that the impurity levels are as low as possible.

NICNAS will forward the final triclosan report to the TGA and the APVMA for appropriate action as therapeutics and pesticides are outside the scope of the *Industrial Chemicals (Notification and Assessment) Act*.

Request 4.3:

Classification of Triclosan - Triclosan raw material as the powder, is being classified as a Class 6.1 TOXIC Dangerous Goods due to Acute Inhalation Toxicity.

NICNAS has used data obtained from a 21-day repeat dose inhalation toxicity study in rats (Ciba Geigy Limited, 1974) to determine that Triclosan as a raw material is Acutely Toxic by inhalation. "Considering that >50% deaths occurred after a single exposure (2 h) at 1.3 mg/L the LC50 for Tric/osan is determined to be <1.3 mg/L (or <1300 mg/m3)." (page 278).

Based on advice given to NTN from Mr Jeff Simpson, Hazardous Materials Consultant, this will raise the issue for industry that raw material Triclosan shipped by sea will arrive in Australia as Class 9 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S. (TRICLOSAN) UN 3082 and provide them a dilemma as to which UN No. they order it with.

Then industry will have to provide a local MSDS and relabel it as Class 6 TOXIC, SOLID, ORGANIC, N.O.S. (TRICLOSAN), UN 2811 to transport Triclosan in Australia.

Note: The ADG Code Competent Authorities will need to look at this classification and decide whether they agree that raw material TRICLOSAN is correctly classified as Class 6.1.

It would have been useful in the time that NICNAS has taken prepare the PEC, for it to have arranged that the actual Acute Inhalation LC50 test on rats be carried out. This would then have provided test data using today's testing protocols, and have provided a firm basis to ask for a change worldwide.

Decision 4.3:

Comments noted. No specific variation requested.

NICNAS comments 4.3:

NICNAS was advised by an EU country that the 21-day inhalation toxicity study in rats (Ciba Geigy, 1974) was not provided in the package discussed at the EU classification and labelling meeting. Triclosan was last discussed at this meeting in 2003 following a proposal from the Norwegian authorities.

NICNAS consulted the Department of Infrastructure, Transport, Regional Development & Local Government (DITRDLG) regarding the dangerous goods transport classification of triclosan. DITRDLG confirmed that the proposed Class 6 classification for transport of triclosan, based on the LC50 value, was appropriate. NICNAS will forward the final report to DITRDLG for consideration of a submission to the UN Dangerous Goods Committee to re-classify triclosan based on the LC50 test results

Considering the OECD Guideline No: 403 for acute inhalation toxicity testing and NOHSC Approved Criteria for Classifying Hazardous Substances (2004), use of this 21-day inhalation toxicity study is appropriate to determine the LC50 of triclosan (see NICNS comments 1.1).

The Approved Criteria for Classifying Hazardous Substances (NOHSC 2004), states that information on health effects for a substance can be obtained from a number of different sources and it is not intended that additional animal testing need to be carried out. Therefore, the 21-day inhalation toxicity study available is sufficient to classify triclosan for that end point and avoids unnecessary animal testing.

The US EPA Reregistration Eligibility Decision (RED) for triclosan released recently for public comment has determined acute inhalation toxicity category II for triclosan (4h LC50 >0.05 to 0.5 mg/L), which is consistent with the NICNAS transport classification for Class 6 (1h LC50 <4mg/L) (ADG Code, 2007).

NICNAS supports international harmonisation and on finalisation of the triclosan assessment report will forward the report to international regulatory agencies.

Request 4.4:

(i) Triclosan an environmental pollutant

Triclosan is highly toxic to fish and aquatic invertebrates (EC/LC50 < 1 mg/L) and very highly toxic to algae (EC50 < 0.1 mg/L) indicating that potential for damage to the environment. Triclosan would meet the adverse environmental effects criterion of POP chemicals, but the assessment states it was unlikely to meet the persistence criteria for a Stockholm Convention Persistent Organic Pollutant (POP).

Triclosan's high environmental toxicity was the reason it was declared a PEC. It has been shown that triclosan is relatively persistent under anaerobic (low oxygen) conditions. Triclosan has become one of the most frequently detected compounds in waterways in the USA and Sweden, and Australia.

The assessment says: "Triclosan is predominantly released to the sewerage system in various cosmetics and personal care products" (page xvii).

The assessment says: "Studies indicate that Triclosan is present in biosolids at levels which, when applied to soil may result in adverse effects on plants" (page xviii).

NTN fails to see how recommendations (8a, 8b, 8c) will effectively address environmental safety. If the source of the pollutant is known and, it's known that it causes environmental damage and it persists in the environment, then the best way to protect the environment would be to limit the pollutant at the source. There seems little point recommending studies that won't result in any reduction of the pollutant and risks to the environment.

(ii) More exposure sources

As well as cosmetics and personal care products, triclosan is also released to the environment (aquatic and terrestrial) from the use of household articles that have not been assessed by NICNAS such as sponges, cutting boards and fabrics for example.

The use of triclosan in paints is more extensive than suggested and presents a greater risk of exposure than stated. Triclosan is also found in acrylic paints specifically recommended for use inside homes to protect against 'harmful bacteria'. These paints require washing out of painting equipment in water, which would find its way into the environment.

The ACCC must also investigate whether the claims made by these paints are indeed correct and whether they contain dioxin impurities or could create dioxins when exposed to sunlight.

(iii) Methyl triclosan

"Several studies highlight the production of methyl-triclosan during wastewater treatment, probably due to microbial methylation" (page 139)

Methyl triclosan, a breakdown product of triclosan, is actually more lipophilic than the parent compound and, therefore, more bio accumulative. It has also been measured in fish.

While the assessment makes recommendations in relation to STPs, biosolids and soils for triclosan, NTN believes these recommendations do not go far enough. It is vital

that the toxic breakdown products are also tested for in the environment, including STPs, wastewater, biosolids and soil as they potentially represent a greater risk.

(iv) Chloroform

Research in 2005 has shown that triclosan used in household dishwashing soaps reacts with chlorinated water to produce significant quantities of chloroform, which can exceed US EPA regulatory levels (Rule et al., 2005).

US EPA classifies chloroform as a probable human carcinogen. The presence of trihalomethanes such as chloroform in drinking water has already been linked with human bladder cancers and miscarriages. In light of other studies showing that the levels of trihalomethanes in people's blood increase when they shower, the research raises questions about exposures to chloroform when antimicrobial soaps are used.

The study also suggests that the reaction of triclosan with chlorine could be producing highly chlorinated dioxins in the presence of sunlight. Under normal household washing up conditions, triclosan reacts with free chlorine to generate more than 50 parts per billion (ppb) of chloroform in the dishwater. When combined with the other trihalomethanes already in the water, the additional chloroform could easily exceed the concentration of total trihalomethanes (80 ppb), the US EPA's maximum allowable amount.

Since chloroform and other trihalomethanes are highly volatile, there is a likelihood that washing dishes with triclosan-containing liquid could cause additional significant exposure to these volatiles through inhalation and potentially through skin absorption. The research also shows that triclosan's reaction with free chlorine produces a number of chlorinated triclosan intermediates or breakdown products, including 2,4 dichlorophenoL which is now detected in the blood of adults and children. In the presence of sunlight, these chlorinated intermediates can also produce dioxins.

Other studies have demonstrated that sunlight converts triclosan in river water to produce dioxins, the highly chlorinated more toxic dioxins could be generated from triclosan's breakdown products.

While it is unlikely that such dioxins would be generated during dishwashing even near a window on a sunny day because the glass would screen out most of the ultraviolet light necessary to produce the dioxin, the research suggests that dioxins could be forming near swimming pools in some situations and perhaps on people using triclosan in hand soaps and moisturizers.

Decision 4.4:

Comments noted. No specific variation requested.

NICNAS comments 4.4:

(i) There is uncertainty in the amount of triclosan reaching the Australian environment. If it is established by more robust monitoring that current practices are leading to triclosan reaching the receiving compartments of the Australian environment (ie water and soil) at levels which are of concern, further risk management measures will be explored for reducing this exposure.

(ii) As mentioned in the report, NICNAS did not receive any information on leaching of triclosan from articles. There is limited information on leaching of triclosan available in international literature.

From the information received during the assessment the amount of triclosan used in paints is low in Australia (see Section 3.5.3). However, one company informed NICNAS that use in paints was to be discontinued.

If information on increased use of triclosan in paints becomes available, NICNAS will consider an assessment of the new information (see first two circumstances under Secondary notification).

(iii) It is acknowledged that methyl triclosan may be produced during waste-water treatment. However, it will only represent a small fraction of the triclosan released. Further, the available toxicity data indicate that it is significantly less toxic than the parent (Sections 21.4.3 and 21.4.4 of the report). Consequently, it is not likely to present a risk to the Australian environment.

(iv) The information quoted on formation of significant quantities of chloroform through reaction of triclosan in household dishwashing soaps with chlorinated water was based on a single research study (Rule et al., 2005). The formation of dioxins in the presence of sunlight was also suggested in this study. This study was conducted with 'an excess of free chlorine', significantly higher than those present in domestic water supplies. The free chlorine level in drinking water is regulated in Australia to protect the public from exposure to high levels of chlorine. Therefore formation of chloroform (by reacting with triclosan in household soaps) to a level of concern to cause health effects is not expected.

As stated in the last paragraph of the comments provided, it is unlikely that dioxins would be generated during dishwashing. Even if dioxins are formed near swimming pools in some situations health effects are not expected, as the chemicals formed will be diluted in the swimming pool water with minimal systemic absorption.

More information on chlorination and dioxin formation in the environment are discussed under Section 16.1 of the draft triclosan report.

Request 4.5:

(i) Triclosan and health risks

"The available data in humans and animals provides no evidence that Triclosan has the potential to cause harm to breastfed babies." (page xvi)

While this finding is welcome, NTN believes there is no place for any levels of a lipophilic bio-accumulative chemical in breast milk, especially if it can be avoided. We remain concerned about the levels of triclosan and its metabolites in breast milk and as it is closely correlated with personal care and cosmetic use, a consumer education program is warranted to warn people of potential risks.

Evidence of contact dermatitis, skin irritation and photoallergic contact dermatitis as well as eye irritation calls for a recommendation to require label warnings and consumer education for products likely to come onto dermal and eye contact.

NTN supports recommendation 4, to schedule triclosan in the SUSDP and further monitoring of cleaning products, however we would also like to see an assessment of imported articles containing triclosan such as plastics, fabrics and paints, and in particular babies and children's products.

(ii) Human plasma and milk

Triclosan has been shown to be present in human plasma and milk at concentrations that are well correlated to the use of personal care products containing triclosan. Whereas an Australian study suggests that the exposure to triclosan among different groups of the Australian population is relatively homogenous.

These Australian blood datasets were compared with previous measurements of triclosan concentrations in human plasma from Sweden, where the use of triclosan is expected to be low due to consumer advisories. The triclosan concentrations were a factor of 2 higher in Australian serum than in Swedish plasma.

In a 2006 Swedish study, plasma and milk were sampled from 36 mothers and analyzed for triclosan. Nine of the mothers used toothpaste, deodorant or soap containing triclosan. Triclosan and/or its metabolites were omnipresent in the analyzed plasma and milk.

The concentrations were higher in both plasma and milk from the mothers who used personal care products containing triclosan than in the mothers who did not. This showed that personal care products containing triclosan were the dominant, but not the only source of systemic exposure to triclosan. The concentrations were significantly higher in plasma than in milk, indicating that infant exposure to triclosan via breast milk is much less than the dose in the mother.

Decision 4.5:

Comments noted. No specific variation requested.

NICNAS comments 4.5:

(i) Triclosan was detected in Australian breast milk samples at very low levels despite its use in a number of consumer products. The recommended concentration cut-off for cosmetics and personal care products will further reduce consumer exposure to triclosan.

NICNAS will prepare a plain English Information Sheet on the findings of the assessment after finalisation of the report. The MSDS and labels of triclosan will provide risk phrases indicating hazards of the chemical and personal protective equipment recommended for workers using triclosan in the workplace.

Cosmetics, personal care products and other consumer products in Australia contain triclosan concentrations below the hazardous classification cut-off level for eye and skin irritation (NOHSC, 2004). Contact dermatitis related to triclosan was only observed in <1% of the immuno-compromised individuals who visited dermatological clinics. Recommendation 4 for scheduling of triclosan in the SUSDP, if implemented, will result in label signal headings for consumer products containing triclosan concentrations above the recommended concentration limits to warn consumers.

If information on triclosan in imported articles becomes available, NICNAS will consider an assessment of the new information (see last dot point of Secondary Notification circumstances).

(ii) Triclosan levels detected in Australian breast milk samples were highly variable (0.016 to 19 ng/g of milk). Information on participants were not gathered as part of the Australian breast milk study (see page 419 of the Report) and therefore the relation of triclosan levels in breast milk to use of consumer products containing triclosan could not be determined.

Request 4.6:

Triclosan's endocrine disrupting potential needs further investigation. The chemical structure of triclosan closely resembles certain estrogens and one study suggests that triclosan is weakly androgenic, causing changes in fin length and sex ratios in fish.

Triclosan can affect the thyroid gland, significantly altering frog metamorphosis at exposure levels equivalent to those currently found in the environment and human tissues. The researchers conclude that triclosan may represent a potential health risk to human hormone action as well.

Decision 4.6:

Comments noted. No specific variation requested.

NICNAS comments 4.6:

The data available on the potential for triclosan to be an endocrine disruptor are equivocal. However, this will be reassessed if additional data becomes available.

5. Department of Health, Western Australia

Request 5.1:

In Tables 8.6 and 8.10, the combined body burdens that are totaled at the end of each table and represented as all exposure scenarios combined, do not tally with the individual results for the individual exposure scenarios. The results all differ by less than 1 $\mu\text{g}/\text{kg bw}/\text{day}$.

In Table 8.10, the exposure scenario given for breast milk is provided as less than one year of age for a combined body burden 3.04 $\mu\text{g}/\text{kg bw}/\text{day}$. Table 8.9 provides body burdens for breast milk at various ages, specifically, 1, 2, 3 and 4 months. The body burden for one month is given as 3.04 $\mu\text{g}/\text{kg bw}/\text{day}$. Tables 8.9 and 8.10 are therefore inconsistent in reporting the data. To be consistent with Table 8.9, table 8.10 for breast milk should therefore read under age, 1 to 4 months and under combined body burden tally the results in table 8.9.

Decision 5.1:

Variations approved.

Table 8.6: Last row combined body burden 193.7 – 577.4 was amended to 194.34 – 578.04 and MOE 206.5 – 69.3 was amended to 205.8 – 69.2.

Table 8:10: Combined body burden at age <1 year for breast milk was amended to 9.82 $\mu\text{g}/\text{kg}$ bw/d and MOE was amended to 4073.

Table 8:10: Combined body burden from all sources of exposure 95.44, 104.77 and 70.58 were amended to 108.12, 105.23 and 71.0 $\mu\text{g}/\text{kg}$ bw/d, and MOE 395, 380 and 564 were amended to 370, 382 and 563.