[redacted]

From: Stefan Browning [redacted]
Sent: Saturday, 29 June 2019 3:41 pm
To: EDN
Subject: RE: New documents published for EDN 18 June 2019
Attachments: EDN CONCERNS EDN + H2O.pptx

Kia ora EDN DMC

I represented Tauranga Moana Fumigation Action Group at the Rotorua hearing, and as a Soil & Health Association National Council member have taken over the EDN issue from their spokesperson who presented at the Wellington hearing and is now on maternity leave.

I would like all correspondence for both organisations to be directly emailed to me at;

[redacted]

Or for any hard copy

Steffan Browning
[redacted]

And telephone [redacted]

Comment to the minute of the DMC 14 June :

https://epa.govt.nz/assets/FileAPI/hsno-ar/APP202804/c82d340e58/APP202804-DMWGT008_Direction_and-Minute_18Jun19.pdf

We note;
13. The DMC invites comment on this new information from parties to the process, no later than 2 July 2019, 10 working days following it being made publicly available.

EDN + H2O = HCN

In response please find attached a PowerPoint "EDN Concerns EDN + H2O" which addresses an aspect that appears to be marginalized or overlooked by the applicant in its information, that of the nature of EDN once subject to moisture becomes hydrogen cyanide (HCN), including within the logs, and which has important associated risks.

Liquid phase hydrogen cyanide appears to now be overlooked in information from the applicant and Genera.

Moisture in condensation under tarpaulins/covers, and in adjacent surface water, and within logs should be tested, and considerations of where the contaminated moisture goes, as in runoff, and for the life of the log, bark debris, sawn product etc until full desorption occurs, does not appear to be covered. Fumigations are not stopped due to wet weather and or log conditions either but wet weather does not appear to feature in EDN models or trials.

In the trials EDN and HCN off gassing appears to be delayed and pockets of unvented fumigant gases appears to be expected being variable and potentially difficult to allow for. HCN requires a temperature of 26.7°C to volatalise as a gas with minor variation due to barometric pressure. The range of temperatures at fumigation facilities throughout New Zealand and throughout the year make EDN, and by default hydrogen cyanide, less predictable a fumigant to manage than methyl bromide, which does not have a liquid form once released from the cylinder in most circumstances, as it volatises at 3°C.

The EPA has previously made a decision on an application by Genera for a 'Determination of a substance under Section 26 of the Hazardous Substances and New Organisms Act 1996 ("the Act")' on Bluefume. The EPA decision 12 March 2019 for Bluefume which is Hydrogen cyanide:
Hazardous Classification: Unable to be determined
Approval status: Does not match an existing HSNO approval
https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP203738/4544eb4b3a/APP203738-Final-Decision.pdf
https://www.epa.govt.nz/assets/FileAPI/hsno-ar/APP203738/df2816b0c7/APP203738-Final-Application-Form.pdf

A question arises whether the Dravloska EDN application is effectively intended also for Hydrogen cyanide? It would appear that a full application or assessment of hydrogen cyanide as a fumigant for logs, including its longevity in fumigated logs and timber products and waste material such as bark and soil debris on and off site, runoff off into aquatic environments, and the risks to those handling those products and materials, would be appropriate ahead of any possible approval for EDN.

The STIMBR funded research *Quantification of hydrogen cyanide as a potential decomposition product of ethanedinitrile during pine log fumigation*, appears to lack real fumigation condition moisture variables.
https://link.springer.com/article/10.1186/s40490-018-0114-x

This industry funded science result appears to have removed the need for testing for hydrogen cyanide in subsequent EDN log stack trials, which appear not to have addressed the reality of metabolism of EDN to hydrogen cyanide and varied fumigation conditions. Monitoring for EDN should always have included HCN.

Log Stack Trials

A concern for both Soil & Health and TMFAG is the fumigation under tents/covers/tarpaulins due to the risk of unexpected release of fumigant, whether it be methyl bromide, EDN or other dangerous compound. The covers used in the EDN log stack trial at Kinleith could have been expected to be in optimum condition to ensure the best results possible for those involved, but the leakage discovered through monitoring, required repairs, and shows continuing risks of fumigation under flexible covers rather than in purpose built fumigation facilities, and shows a need for more generous buffer zones if this form of fumigation is to be accepted for EDN, than those safety margins currently proposed. Some covers are shredded or removed through weather events at each of the fumigating port sites each year meaning instantaneous release.

The log stack trial reported in the new information was not fully representative of real time conditions or fumigation practices as carried out in New Zealand ports by Genera as stated.
Efficacy of ethanedinitrile (EDN) as a fumigant for export logs
'The tarpaulin was removed in one-fourth increments at a time to avoid a sudden release of EDN into the atmosphere. Removal of the tarpaulin by quarters over time is a standard fumigation practice used for commercial fumigations of export logs with MB. Tarpaulin removal in the EDN confirmatory tests generally was accomplished over a period of 15-30 min'.

Other members of Tauranga Moana Fumigation Action Group and myself have witnessed fumigation tarpaulins being removed by Genera staff on multiple occasions, and never have they been removed as slowly as suggested in this report. My experience is that they are removed within anything as short as a minute to a minute and a half, just as long as the winch winds the tarpaulin in, not hesitating as described. This alone removes confidence in the science and test results from research supplied for this application.

https://epa.govt.nz/assets/FileAPI/hsno-ar/APP202804/d36c434dd5/Further_information_Efficacy_Data_June_2019.pdf

We note that STIMBR was able to coordinate logs, a venue and equipment for the EDN log stack trials, but has blocked the same for a methyl bromide recapture trial using the Nordiko carbon filter system unless STIMBR could have Nordiko sign a non-disclosure agreement. Nordiko wanted all information and observations to be freely available and with a range of stakeholders to be present. The technology and filter waste disposal for log stack

fumigant recapture exists for methyl bromide, and is used for container fumigation in New Zealand, but STIMBR members are resistant for recapture for their own economic reasons. STIMBR have also not acknowledged other fumigant scrub technology that they are aware of in Australia which appears to be close to trialing. Fully independent and open monitoring and data collection is required to give confidence in trial results.

Regards

Steffan Browning

[redacted]

From: EDN <EDN@epa.govt.nz>
Sent: Tuesday, June 18, 2019 2:41 PM
Subject: New documents published for EDN 18 June 2019

Good afternoon,

New documents published for EDN

EPA has published below documents on EPA website. Please use the link APP202804 to access these documents.

APP202804-DMWGT008_Direction_and Minute_18Jun19
Further_information_Efficacy_Data_June_2019
Further_information_Environmental_and_Worker_Exposure_data_ June_2019
Further_information_Overview_EDN_Data_from_International_Studies_15_May_2019
New_information_EDN trial_South Korea-summary presentation
New_information_EDN_Certificate_of_Pesticide_Registration_South Korea
New_information_First_Trial_Results_EDN_ Used_for_Forest_Protection_in_the_Czech_Republic_2017
New_information_PFR_Update_Completed_EDN_Laboratory_Efficacy_Research
New_information_Preliminary_trials_of_EDN_fumigation_for_eradication_of_Bursaphelenchus_xylophilus_and_its_vector_2016
New_information_Presentation-Commercial Fumigations of Wood in Czech Forests-First Experiences 86m3
New_information_Presentation-Commercial Fumigations of Wood in Czech Forests-First Experiences-1496m3
New_information_Russian-EDN-timber-study

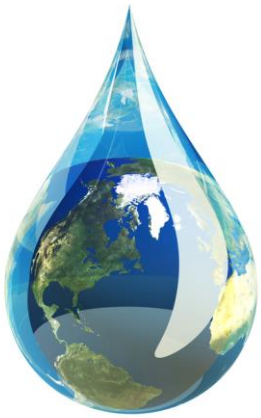
Kind regards,

[redacted]
Administrator, Hazardous Substances Applications

[redacted]

Environmental Protection Authority
Te Mana Rauhī Taiao

Follow us on Facebook, Twitter and LinkedIn.

EDN +  = HCN

EDN LOG FUMIGATIONS …..

ARE THEY AS SAFE AS IS BEING CLAIMED?

"It should be noted that since ethanedinitrile and other cyanide based compounds and nitriles (e.g. hydrogen cyanide, sodium cyanide) have the same mode of action, it is considered acceptable to read-across test data between these compounds.

All cyanides and nitriles contain a cyanide functional group within their chemical structure and are toxic when they release the CN- anion. As such, in the absence of test data for ethanedinitrile, the ecotoxicity of hydrogen cyanide and sodium cyanide is predicted to be very similar to that of ethanedinitrile.

It should also be noted that whilst the mode of action is similar from a toxicological point of view, the compounds differ quite considerably in their physical and chemical characteristics. For example, ethanedinitrile is a gas, hydrogen cyanide is a liquid and sodium cyanide is a solid."

NZ EPA

SCIENCE MEMO APP202804 – EDN

Substance database ID: 49330

July 2018

ACRONYMS

TWA	Time weighted average occupational exposure limit
STEL	Short term permissible exposure level
IDLH	Immediately Dangerous to Life or Health
EDN	Ethanedinitrile, cyanogen
HCN	Hydrogen cyanide
PH3	Phosphine
MB	Methyl bromide
SF	Sulfuryl flouride
EL	Explosive limit
PPM	Parts Per Million
LD50	Median Lethal Dose

CHEMICAL FACTS

EDN (Cyanogen)

- EDN has no global warming or ozone depletion impacts.
- EDN is highly attracted to water.
- EDN is highly soluble in water (45g/100ml) (45% w/w).
- EDN exists as a gas at temperature above -37 deg C.
- EDN in contact with moisture will react as follows

  N=C-C=N + H-O-H → H-O-C=N + H-C=N

  to yield one hydrogen cyanide (HCN) molecule and one hydrogen cyanate (HOCN) molecule.
- EDN penetrates rapidly and easily into timber.
- EDN is used as a rocket fuel and missile propellant.

CHEMICAL FACTS

HCN (Hydrogen cyanide)

- HCN has no global warming or ozone depletion impacts.
- HCN atmospheric half life is ~1- 5 years.
- HCN is a naturally occurring gas (natural production and sequestration cycles).
- HCN exists as a liquid at temperatures above -13.2 deg C, and as a gas above 26 deg C.
- HCN is a Chemical warfare agent with military code AC.
- HCN (aqueous) requires acid / alkali conditions to slowly break down from liquid phase HCN to formic acid and ammonia, the process can be hastened by heating.

OBSERVATIONS – TOXICITY RISKS

- Both chemicals are acutely toxic to humans.
- Both chemicals are acutely toxic to aquatic life, may cause long term adverse affects on aquatic environment.
- HCN liquid phase (aqueous) presents a high risk of introduction to terrestrial and aquatic systems.
- Contact risks of HCN poisoning have been addressed only for fumigators and bystanders, all downstream handlers, processors and users of the timber are not aware of risks involved in HCN gas desorption from, and or HCN liquid contact with the logs / bark.
- The principal features of the toxicity profile for cyanide are its high acute toxicity by all routes of administration, with a very steep and rate-dependent dose–effect curve, and chronic toxicity.

OBSERVATIONS – TOXICITY RISKS

- In humans, whereas slight effects occur at exposure levels of **20 – 40 mg/m3 (17.8 – 35.6 ppm)**

  50 – 60 mg/m3 (44.5 – 53.4 ppm) can be tolerated without immediate or late effects for 20 mins to 1 hr.

  120 – 150 mg/m3 (106.8 – 133.5 ppm) may lead to death after 30 mins – 1 hr.

  150 mg/m3 (133.5 ppm) is likely to be fatal within 30 mins.

  200 mg/m3 (178 ppm) is likely to be fatal after 10 mins, and

  300 mg/m3 (267 ppm) is immediately fatal.
- The average absorbed dose at the time of death has been estimated at **1.4 mg/kg body weight** (calculated as hydrogen cyanide).

OBSERVATIONS – TOXICITY RISKS

- Downstream processing such as milling, seasoning and burning of treated logs or log by-products may expose workers or individuals to HCN (liquid or gas phases), and or other irritating, corrosive or toxic compounds.
- Downstream use of EDN fumigated timber / bark products associated with physical contact, food production, preparation or consumption may present a health risk to consumers.
- Suggested gas release levels for the un-tarping of log stacks (recommended level <700 ppm) is 600 ppm greater than the 100 ppm levels indicated on other safety data sheets for the same chemical, and may expose workers to an unacceptable risk to health/life.

OBSERVATIONS – EXPLOSION RISKS

- Both HCN and EDN gaseous phase will react violently when exposed to strong oxidisers.
- Un-stabilised hydrocyanic acid (HCN aqueous phase) may polymerize spontaneously with explosive violence. Flashback along vapour trail may occur. The explosion hazard is severe when this material is exposed to heat, flame, or oxidizers.
- At stated concentrations the gas / air mixtures for both gases carry the risk of severe explosion.
- In situations where a gas cylinder is the gas source, the cylinder will rocket and rupture (explode).
- Maximum dose rates as per report were stated between 110 and 150 g/m3 adjusted to 50% log stack volumes, this gives an initial log stack air concentration of 220 – 300 g/m3. According to industry standards, commercial log stack volumes are ~70% on average, this would result in an initial air concentration of 308 – 420 g/m3 at the time of introduction to the fumigation space. All the above dosage rates would result in air concentrations well above the lower explosion limit (LEL) for EDN.

OBSERVATIONS – OTHER RISKS

- Reputational and trade risks are ‘on the line’ for the timber industry and for the country as a provider of ‘çlean & green’ products.
- Many forests in New Zealand are certified by the Forest Stewardship Council (FSC). The FSC certificate requires forest managers to minimise the amount of highly hazardous chemicals used, It is stated that ‘EDN is seen as a way to decrease the use of highly hazardous chemicals’ – is this really an accurate statement in light of the above information and the below matrix?
- Credibility Risk - inconsistencies between reports, and even within reports do not engender confidence as to the accuracy of information being put forward for consideration and decision making. EPA scientific assessment of reports provided for EDN registration purposes refer to the overall poor quality of data provided.

OBSERVATIONS – REPORT OMMISSIONS

- Testing for HCN liquid phase (aqueous) appears to have been completely overlooked throughout all reports submitted to NZ authorities. *This is a serious and far reaching knowledge and information void that compromises the validity and scientific integrity of the supplied data and report findings*, and has the potential to severely impact on environmental and human health and safety.
- The log volume values used to calculate initial EDN and HCN gas concentrations are substantially lower than actual log volumes achieved in commercial log stacks. The resultant underestimation of log stack gas concentrations substantially increases the risk of catastrophic explosion, loss of life, environmental damage, and potential trade restriction due to port infrastructure damage and or a crippled / sunken vessel at berth.

RECOMMENDATIONS

- Further fully independent testing and analysis be conducted on a full size log stack treated at proposed maximum application rates to obtain real and meaningful data as would apply to future commercial fumigations if EDN were to be approved for such purposes.
- Such testing should include assessment of Hydrogen cyanide (aqueous) levels resident within treated logs, and the down line risks posed to human health and safety and the environment.

QUICK REFERENCE TABLES

	COMPARATIVE CHEMICAL SAFETY TABLE				
	EDN	HCN	PH3	MB	SF
TWA (ppm)	10	10	0.3	5	5
STEL (ppm)	not set	not set	1	20	10
IDLH (ppm)	50	50	50	250	200
EL (%) (lower)	6.45 (3.9*)	5.6	1.8	n/a** (10*)	n/a
EL (%) (upper)	14.3 (32*)	40	98	n/a** (16*)	n/a

- There is a significant amount conflicting SDS information regarding the flammability of Ethanedinitrile (EDN) and Methyl bromide (MB), so both positions have been recorded with alternate values in (brackets).

** Current MB maximum dosage rates for log fumigations, MB would not attain the minimum EL values required to cause fire or explosion. Also, in giving consideration to the flash point of MB (194 ^{o}C) in comparison to other common flammable / combustible substances such as petrol and diesel fuels, MB appears to fall into the combustible category more so than flammable.