Our Ref: **APP202804 – EDN (Ethanedinitrile)**

1 May 2020

Hazardous Substances
Environmental Protection Agency
Private Bay 63002, Waterloo Quay
Wellington 6140

via email EDN@epa.govt.nz

Dear Sir / Madam

APP202804 – EDN (Ethanedinitrile) – Bay of Plenty Regional Council's response to new information presented by the applicant

On 31 March 2020 the Decision-making Committee (DMC) issued Direction and Minute WGT011. This indicated that further information had been provided by the applicant ('the new information') and posted on the EPA website. It invited all parties to respond to the new information.

This letter presents the Bay of Plenty Regional Council response to the new information provided and should be read in the context of our earlier submission, comment and response dated 19 April 2018, 19 November 2018 and 8 March 2019 respectively.

Our response is presented corresponding to the 10 categories used in the Executive Summary of Draslovka's response to the WGTO10, dated 25 March 2020 ('**Draslovka's response'**) with an additional heading comprising miscellaneous items.

The key points of our response are:

i. The air dispersion modeling provided in the new information must be independently reviewed as there are some significant question marks around its validity.

ii. It is essential that an enforceable short term (10 -15 minute) exposure limit is established.

iii. Scrubbing / recapture may not be required provided that a 700 ppm end point can be reliably achieved through natural processes by the end of fumigation and prior to ventilation.

iv. It is important that the requirement for measuring and recording the concentration of EDN over time in the fumigated spaces, and prior to release, is prescribed in a sufficiently detailed way and that this data is made available to regulators for verification.

v. The proposed control that "*… ethanedinitrile should not be vented under very low wind speed conditions (less than 5 km/h) or under inversion conditions."* is an important and necessary control that must be retained.

vi. The explosive nature of EDN has not been adequately addressed.

vii. EDN should not be approved for ship fumigation.

viii. Any EDN approval must be conditional on independent verification that the new model of EDN meter is able to perform as claimed.

ix. All relevant data and information should be required to be made available to regulators, including Regional Councils and WorkSafe, if and when they request it.

Discussion

1. Air Dispersion Modeling (1 report)

The new modeling information presented should be subject to peer review, including the inputs and conclusions.

This modeling report states "*Although the modeling is based on hourly meteorological data, which is not suitable to estimate 10-minute modeled concentrations, it can be demonstrated that the AEGL-1 (10-minute standard) also will be achieved*…" (page 10), however the report provides no evidence for this claim.

This report states that "*To the extent possible, however, the modeling methods used in this report are consistent with the assumptions shown in the expert panel's joint statement issued on January 30, 2020…*" (page 16). It is not clear where this was not possible. The methods and assumptions are a critical determinant of the model results so these need to be clearly stated. It is also crucial that the assumptions are a fair representation of reality.

The modeling report assumes a constant rate of gas release over a fixed period, i.e. 1 hour for logs and 2 hours for a ship hold (Draslovka's response, page 35). In reality there is a much higher rate of fumigant release for the first 10-15 minutes which then tails off. Assuming a constant rate of release underestimates the spikes in concentration that may occur over this shorter interval.

The modeling report Table E1 incorrectly presents two values for AEGL-1 (1hour), the second of which should read AEGL (10 minutes).

The isopleth analyses presented as figures E-3, E-4 and E-5, all described as 'combined ship and log stack sources' show no discernible impact whatsoever of the ship source. Considering that the volume of fumigant for a ship is up to 50 x higher than a log stack it is difficult to accept that this is correct. In addition this is not consistent with other air dispersion modeling.

The modeling report states that '*Port of Tauranga measured PID records (2019) for methyl bromide'* (without producing any data) to claim that log stacks created higher measured 1-hour concentrations than ships. The Bay of Plenty Regional Council is sceptical of this claim for the following reasons:

a) There is a question mark over the reliability of the existing fumigator's monitoring data.
b) It is inconsistent with other air dispersion modeling results (carried out by members of the EPA expert panel for the reassessment of methyl bromide)
c) The reasons presented on page 27 and 28 don't stand up to scrutiny, for example one reason (number 4) given is that night time dispersion is similar to daytime conditions with relatively strong winds due to the '*high heat capacity of the port asphalt surface'*. Another reason (number 2) is based on the false assumption of a constant rate of fumigant release during the ventilation period.

2. Sensitivity Analysis (Appendix 2 of Draslovka's response)

This sensitivity analysis should also be subject to peer review.

There is considerable focus in this application on the 1 hour, 8 hour, and 24 hour exposure concentrations, yet it is clear that harm may result from exposure to EDN over a far lesser period.

Appendix 2 of Draslovka's response states that *"The Acute Exposure Guideline Limit (AELG) values established by the National Advisory Committee (NAC) AEGL for hazardous substances in 2014 appear to be the most relevant values when predicting the likelihood of health effects that can be anticipated in persons entering margins of exposure for 1 hour."*

Values have been developed elsewhere for high-priority, acutely toxic chemicals that are applicable for exposure over periods ranging from 10 minutes to 8 hours. Finland, France, Germany and Switzerland have all set a limit of 10 ppm as a '15 minute average value', and Finland has even used 10 ppm as a ceiling value (Table 3 of the EPA Science memo, July 2018).

It is noted that the Appendix 2 Sensitivity Analysis describes level 2 AEGL values for EDN as being *'≥2 but <8.3ppm'* (page 3), and the EPA Science memo states that "*the AEGL threshold value of concern ranges from 2.5 ppm (10 min exposure)…"*

It is vital that an enforceable short term acute exposure limit is established to protect the health of fumigators, Port workers and the public.

3. USA Worker Safety Trials (3 reports)

No comment

4. Justification for not using Scrubbing, Destruction or Recapture Equipment (1 report)

This report states that *"Ventilation only to commence once the concentration under the tarpaulin averages 1000 ppm*" as a proposed control (page 1) yet other aspects of the application refer to a requested final concentration of 700 ppm (e.g. Table 3.1 of Draslovka's response). In Draslovka's response they request that 700 ppm be "*set as the concentration of EDN under the tarpaulin prior to ventilation"* (page 56).

Whether or not scrubbing is required is determined by the extent to which the concentration of gas is reduced 'naturally' prior to ventilation. If the final concentration at completion of fumigation is sufficiently low then no recapture is required.

Any EDN approval must include a requirement for the measurement and verification of the final concentrations within each fumigated space prior to ventilation, as per WorkSafe's proposed control shown in table 3.1 in Draslovka's response. This measurement data must be available to regulators in order to confirm compliance with the stipulated maximum concentration.

<u>Specific comments on the 'Justification' report</u>

a) the average concentrations under the tarpaulin are used to determine risk, rather than worst case;
b) on page 9 the 24 hour average concentrations are simply derived using two spot samples, and assume zero readings for the rest of the time rather than using any further sampling.

c) there is no information provided about the quantity of EDN used for ship hold fumigation, or whether fumigation in transit, such as is carried out for phosphine fumigation, is an option.

Appendix 2 (the Australian trial)

1. This showed a much higher concentration at the bottom of the stacks compared to the top (in some cases 4x higher). This reinforces the importance of a clear protocol (including sampling locations under the stack) for measuring the concentration of gas remaining in the enclosed spaces prior to release.

   Table 1 and Table 4.10 in Draslovka's response discussing the field studies, make no reference to the height at which the sampling was carried out.

2. Shows that scrubbing reduced the EDN concentration down to an average concentration of 194 ppm after 12 hours (Table 6).

5. Updated information on EDN's registration status globally (Section 3.2 of Draslovka's response)

No comment

6. Seabirds found near Ports (Section 4.6 of the Summary Document)

No comment

7. Movement of air at Ports (Section 4.7 of Draslovka's response)

Draslovka's response seeks to remove the proposed EPA requirement that "*Atmospheric conditions should be monitored and ethanedinitrile should not be vented under very low wind speed conditions (less than 5 km/h) or under inversion conditions."* (page 4, Draslovka's response).

The Bay of Plenty Regional Council considers that this is an important and necessary control because under these conditions the direction and speed of movement of the gas is often very unpredictable and therefore more dangerous for both the Port workers and the general public. It is also very difficult in these circumstances to know where 'downwind' is in order to position the monitors.

It is useful to refer to how agrichemicals are required to be managed in low wind speed conditions, since agrichemicals are similarly, or in many cases less toxic (when inhaled) than EDN. The '*Management of Agrichemicals' NZS 8409:2004* was developed to ensure that agrichemicals are used in a safe, responsive and effective manner, while minimising any adverse effects on the environment or human and animal health. Table G1 of this New Zealand Standard presents a 'Potential drift hazard scale' with wind speed zero or less than 1 metre per second corresponding to a high hazard. Inversion layer conditions are also identified as a high hazard.

As such section 5.3.4.2 of the New Zealand Standard requires that application shall not occur "… *in calm (zero wind) conditions, or when the drift movement direction cannot be determined, or when inversion conditions exist or may arise following application".* These requirements should

apply even more so to toxic gases such as EDN, since the chemical remain in the air typically longer than agrichemicals which are generally applied as a mist rather than a gas.

8. Flammability (Section 4.10 of Draslovka's response)

A parallel is drawn in this section of between the flammability of EDN and that of methyl bromide. However methyl bromide is considerable more flammable, as it is only flammable in the presence of a high energy ignition source and has even been used as an industrial fire extinguishing agent in the past.

This report section discusses the potential for logs or dried timber to spontaneously combust. It also examines the flammability of EDN yet there is no direct reference to the risk of an explosion despite this being a significant risk. EDN is very clearly a potentially explosive gas between the concentrations of 6.45 to 14.3% by volume, the lower (LEL) and upper explosive limit (UEL) respectively (Draslovka's response, s.4.1.) There is also an inconsistency with this data and that in the Linde Fumigas manual which that states "*Ethanedinitrile is a flammable gas with its flammability range in air 3.9 vol % (LEL) – 32 vol% (UEL) at 15 °C*." It describes EDN as being extremely flammable (EDN™ FUMIGAS. Manual for fumigation, Linde Gases Division, Germany).

This Linde manual goes on to say that *"The risk of exposure to gases like ethanedinitrile… and the risk of explosive atmosphere creation are the most obvious and important issues to manage".* Draslovka's response acknowledges that some bulk carriers may have electrical fittings in the hold which could provide an ignition source for an explosion. A mitigation proposed is that the Ship's Master be asked "*to remove the fuse for any electrical fittings fitted in the hold…"* (s.4.1). This does not seem a sufficiently robust and reliable mitigation measure given the scale of the hazard.

For this reason, and due to the relatively large quantities of fumigant used for fumigation on ships with the associated human health risk, the Bay of Plenty Regional Council opposes any approval being provided for the use of EDN for fumigating ship holds. It is also noted that the fumigation of ships did not form part of the original application.

9. EDN Monitors (Section 5.1 of Draslovka's response)

At the time of the original 2018 hearing on the EDN application, the monitors available were unable to provide the complete range of monitoring required to ensure the safe use of EDN, particularly at the lower end of the range. The MSA Ultima meter, which weighs about 1.5 kg measures EDN down to 1ppm, albeit with an error range of +/- 2ppm and without any datalogging capability. Now progress has been made on the development of a new meter, the Dräger X-am® 5100, which is stated to have a range of 0-50 ppm with an error of +/- 0.5ppm (Table 5.1 of Draslovka's response), and which "*continues to be refined for use*."

Accurate monitoring capability to ensure the safety of workers and the public is of critical importance. Any approval for the use of EDN must therefore be conditional on independent verification that the new model of EDN meter is able to perform as claimed, and that it is commercially available at a reasonable price.

10. EDN Stewardship Programme (Section 5.2 of Draslovka's response)

No comment.

11. Miscellaneous

Sampling locations

There must be unambiguous requirements regarding where and how to sample to demonstrate compliance with established limits. Where the downwind buffer edge corresponds to over water sampling should be required at the nearest convenient point on land.

Buffer distances

There appears to be an error in Table 3.4 of Draslovka's response, where it states that that WorkSafe have proposed a 20m buffer zone for the public. In-fact the minimum buffer zone distance proposed by WorkSafe is 50m, however in some circumstances it is required to be even greater (page 6, WorkSafe Safe Work Instrument, consultation document, Feb 2020). It is correctly shown in Table 3.1 of Draslovka's response.

It is interesting that in Russia, where the dose rate (50g/m3) is less than half that what is proposed by Draslovka for NZ (120g/m3), the required buffer zone distance is 200 m between the object of fumigation and adjacent residential areas and/or continually inhabited industrial areas (Draslovka's response, page 22).

The Regional Council recommends that any 'adaptive management' approach (s.6) to review buffer distances (as proposed by the applicant) be treated with caution. Monitors are very often located in the 'wrong' location to detect the plume associated with fumigant ventilation due to variable and unpredictable wind conditions, and monitors themselves have different degrees of accuracy and rely on correct calibration etc. We'd prefer to see robust models developed and validated which are then used to set appropriate buffer distances.

If the EPA was considering an adaptive management approach based on the fumigator's reporting it is worth reviewing the annual reports for the Port of Tauranga sites prepared by the fumigator (available on the EPA website) where they state that for each of the available seven year periods (2011 to 2016), they never detected any methyl bromide at the site boundary. This is clearly at odds with more recent independent boundary monitoring and independent air dispersion modeling.

I trust you will find these comments useful. Don't hesitate to contact us if you require clarification of any of these points.

Yours sincerely

Senior Regulatory Project Officer