Your Ref:
Our Ref: **A3255499**

3 July 2019

[redacted]

Environmental Protection Authority

Dear[redacted],

Thank you for your letter dated 31 May 2019 addressed to the Chief Executive of Bay of the Plenty Regional Council Fiona McTavish, requesting information relevant to the pending reassessment of methyl bromide (MB).

The use of MB requires consent in the Bay of Plenty region. Consents for use are held by a single company only, Genera Limited. This means much of Council's response in this document relates solely to Genera. While some of the response below may be perceived as negative, we believe it is important to recognise the progress made by Genera in the recapture of MB. Since 2014 Genera has led the way in researching and developing technology and achieving milestones not achieved elsewhere. Council officers are confident that Genera will be able to meet a future requirement for the recapture of almost all fumigation events, and will continue to improve the efficiency of their recapture technology.

The specific questions you had are responded to below.

1.a. Does the Bay of Plenty Regional Council set any specific controls for the management of MB fumigations under the Resource Management Act (RMA)?

The Bay of Plenty Regional Air Plan makes fumigation, including using MB, an activity requiring a consent under the RMA (a discretionary activity). Some other jurisdictions have plans with provisions that allow fumigation as a Permitted Activity (i.e. not requiring a consent) provided certain conditions are met.

Genera Limited currently holds two consents for fumigation in the Bay of Plenty Region; 62719 for fumigation primarily at the Port of Tauranga, and 63371 for fumigation across the wider Bay of Plenty. Consent 62719 was granted in May 2005 and is due to expire in April 2020, while consent 63371 was granted in April 2006 and is due to expire in December 2020. The current versions of the two consents are attached.

Significant changes were made to consent 62719 in May 2014, and two other variations have been made since. The consent also allows (via condition 5.C1) for changes to be made to the required recapture dates for various cargo types. Five written requests for a deferral of recapture dates have been made, with the latest one made in June 2019. Some of these requests have been approved, while some have been declined. The latest request is still being considered.

Objective ID:

The development of consents and their conditions provides an opportunity to introduce controls in terms of management practices, discharge limits, monitoring requirements and reporting provisions. Where multiple statutory provisions relate to an activity the most stringent provisions take precedence, so the conditions of consent do not over-ride the provisions of other statutes (unless the consent conditions are more stringent). Consent 62719 contains a condition that reads as follows:

> Notwithstanding conditions 5.1 to 5.6 the consent holder shall ensure that all provisions of the HSNO Act (as amended by the 2010 Environmental Risk Management Authority (ERMA) Decision referenced HRC08002, (now superseded by Environmental Protection Agency (EPA)) shall be complied with.

1.b. Have you accepted or set an alternate to the 5 ppm HSNO requirement in the enclosed space beneath sheets for when recapture is used? Do you have a view, as to what would be an acceptable alternative to you for the purposes of the RMA?

The Worker Exposure Standard (WES) referenced in Table C4 of the Environmental Risk Management Authority (ERMA) decision document HRC08002 (decision document) in relation to recapture technology was not considered achievable by the applicant at the time the consent review was undertaken in 2014. For this reason the corresponding figure of 5 ppm was not used in the consent. In the absence of any hard data on which to base recapture efficiency, consent 62719 simply required "effective recapture", without defining what this entails.

It is Council officers' view that a two pronged approach using a combination of the percentage of fumigations to be recaptured, coupled with a clear definition of recapture (e.g. a final concentration of fumigant in the enclosed space) is the best way to advance recapture. Council's experience leads us to the conclusion that a series of incremental milestones drives innovation keeping the industry motivated to improve . Without this imperative operators typically wait until the legislation requires action, as has occurred with the ERMA / EPA requirement with a ten year time frame without any intermediate targets. Although there has been considerable progress towards recapture within the Bay of Plenty, with now 100% of fumigated containers and more than 60% of log stacks having recapture applied, other jurisdictions such as NorthPort (where permitted activity status applies and so there is no statutory imperative) still have little or no recapture occurring despite the fumigator being the same in both cases.

Given that existing recapture technology appears to result in concentration of MB orders of magnitude higher being released to atmosphere than the 5 ppm envisaged by the EPA requirements set 10 years ago, it is appropriate to revise this level to something achievable. Based on evidence presented to Commissioners hearing BOPRC's recent Regional Air Plan Change (Plan Change 13), a recapture efficiency of 80% of the MB not absorbed by the timber being fumigated, is consistently achievable. This efficiency measure is proposed for inclusion in our Air Plan for land based fumigation events. 80% was also a figure used by STIMBR during a Radio New Zealand interview (23 May 2019). This 80% figure may however under-represent the potential efficacy of the recapture technology as Genera has reported (26 June 2019) on two independent field evaluations carried out on their recapture technology. The first found that 87% of the MB remaining in the headspace was destroyed within 8 hours. The second found that the Genera system 'eliminated' an "average of 95.0 +/- 2.8% of the MB from the headspace under each of three sheets after 2.5 hours."

A residual level of MB in the enclosed space following recapture and prior to release corresponding to an 85% recapture efficiency figure may be a reasonable starting point. However a series of incremental

efficiency milestones is required to ensure continued improvement over time. Further information about the final concentration currently achievable by Genera's proprietary recapture processes will become available very shortly, as Genera are required to produce a report examining this by 1 July 2019 (not available at the time of writing). This reporting became a requirement via the Fumigation Management Plan (FMP), required by the consent and finally approved on 1 May 2019. The FMP is available on request. Council suggests that requiring an increase in recapture efficiency at least every year, with a starting point concentration corresponding to 85% recapture, will keep driving innovation and achieve the desired goal over an acceptable time frame such as four years.

Even a relatively high recapture efficiency percentage still leaves a significant residual concentration in the enclosed space. For example, assuming a starting concentration of 20,500 ppm (80 g/m^3) and a nominal 85% recapture efficiency, this results in a theoretical residual amount of 15%, or the equivalent of 3075 ppm. The actual calculation is complicated by sorption (absorption and adsorption) into logs and timber (a portion which is unavailable for recapture). STIMBR has reported that approximately 50% of the applied methyl bromide is "absorbed into the logs or sawn timber". The theoretical calculation therefore becomes: 10,250 ppm x 15% = 1538 ppm MB released to atmosphere following recapture, in addition to the MB desorbing from the timber over time.

Achieving efficiency gains in recapture may become more difficult as the upper level (95% or more) is approached, due to the MB desorbing increasingly rapidly from timber as the concentration in the enclosed space reduces. Given that about 50% of MB is 'lost' to the logs, a 95% recapture figure still only relates to less than half of the introduced MB being recaptured.

As with the original ERMA approach, and the approach being proposed for EDN, a maximum concentration of MB that may be released to atmosphere following recapture (rather than a percentage) should be specified. This avoids the complications arising from different fumigation rates for different countries and products, different rates of sorption / desorption etc, and would make it easier for both the fumigator and the Regulator to verify compliance.

The controls required by the 2010 ERMA decision document for when recapture was used were based on the assumption that resulting MB concentrations would be no more than 5 ppm. Consequently when using recapture there was no longer any requirement specified for the following:

- A minimum buffer distance (16.6.17)
- Air quality monitoring (16.7.15)
- An annual report outlining the amount of MB used, the annual exposure level etc (16.8.3)
- Notification (16.9.3)

A significantly lesser level of recapture efficiency, resulting in a higher concentration of gas being released, means that consideration must be given to reinstating these controls.

It is also recommended that the EPA look into the claims of other companies (such as Nordiko) about their recapture technology to avoid any potential for anti-competitive behavior within the industry.

Number of fumigation events recaptured – as a percentage of the total number of fumigation events

It is important to distinguish between the percentage of (say) log fumigations which have recapture applied, and the efficiency of the fumigation recapture process. In Council's experience these two measures are often confused.

The consent refers to the number of fumigation "events" requiring recapture, expressed as a percentage of the total fumigations, by a series of date milestones. The consent does not differentiate between the size of a fumigation event so that a ship hold containing logs, using up to a tonne of MB, is treated by the consent holder for the purpose of deriving the recapture percentage as a single event, just the same as a log stack that uses 80kg or less (note that there may be up to five holds fumigated per ship resulting in up to 5000 kg used per ship). This type of anomaly in the wording of the consent conditions will be rectified when a replacement consent is sought later in 2019.

With regard to the percentage of fumigation "events" that are recaptured, it is difficult to see how the industry could "gear-up" in time for the October 2020 deadline as in most other locations apart from the Bay of Plenty no recapture is currently practiced, despite the fact that this deadline has been in place for almost 10 years. The time required to construct and commission the number of units required, while continuing to recover the amount of fumigant required by the Genera consent in the Bay of Plenty, now presents a significant logistical hurdle.

With that in mind a series of ambitious targets and milestones make sense from a practical perspective. It is relevant that in the Bay of Plenty the amount of recapture achieved (expressed as a percentage of total fumigation events) has increased from 25% in May 2017 to 70% in May 2019.

Genera have reported that recapture of MB from the fumigation of ship holds is problematic and cannot be treated the same as land based log recapture. Ship hold fumigation is preferred by log exporters over individual row fumigation as it offers significant operational efficiencies and cost savings. Recapture from ships will however require significant investment to resolve, according to the fumigator, however given the volume of MB used in each ship hold this issue needs to be resolved promptly. Monitoring results associated with the venting of ship holds following fumigation have resulted in some theoretical exceedances of both consent and EPA boundary limits (refer to later comments on MB versus 'total volatile organic compounds' (TVOC) results).

If a series of targets are set for the percentage of fumigation events recaptured, it is essential that a standardised size is introduced for what is considered a fumigation event. How the percentage is calculated and verified also needs to be precisely defined. Without this there is a risk of parties "gaming" the situation to the detriment of those in the industry who are operating in good faith. The credibility of the fumigation industry, and by association log exporters, will come under increasing scrutiny over time.

It is essential that independent testing of system performance is conducted, preferably by a central government agency, to provide credibility to the industries self-auditing. Open access to the information, including that contained within the existing trials conducted by STIMBR, would also help to dispel any doubts within the wider community about the veracity of what is being achieved and what could be achieved in future.

2. What is your experience with the rate of compliance of MB fumigations to the current HSNO, HSWA and RMA controls?

Bay of Plenty Regional Council comments below are limited to our investigation of compliance with RMA controls and the one company that has consent for carrying out fumigation in the Bay of Plenty. Where we have come across information that might be of interest to other statutory agencies, such as WorkSafe, we have provided them with the details. Notwithstanding the condition in the consent referencing all provisions of the HSNO Act, Council considers that it is up to the relevant lead agency to assess a situation for themselves and make a determination about further action. For example, shown in Appendix 1 is a recent email sent to WorkSafe regarding the need for a shorter (or instantaneous) exposure limit other than a 1hr, 8hr or 24hr average concentration. Sending the email is the limit of our involvement and we respect the right for WorkSafe to hold an alternative view on this issue.

In recent months Council has witnessed some improvement in environmental compliance by the consented fumigator in our region, Genera Ltd. With the review of consent 62719 in May 2014 considerably tighter controls were imposed in relation to management, monitoring and reporting. This has provided a step-wise change in our ability to undertake compliance activities and to require improvements. Council's approach to compliance is always to initially try and work with the consent holder to meet their statutory requirements. To this end most non-compliance (depending on its seriousness) is dealt with via direct officer contact, followed up by a formal warning or letter. If non-compliance persists, Council action escalates through the statutory tools of an Abatement Notice, an Infringement Notice (a fine) and sometimes higher level enforcement such as an enforcement order or prosecution. In some circumstances where non-compliance is of a serious nature with demonstrable environmental consequences, higher level enforcement tools may be employed immediately.

Appendix 2 contains a table showing the enforcement actions Council has taken with Genera over the past few years. There are currently six abatement notices which remain in force, a further four notices have been (or will be) withdrawn now that the FMP has been approved by Council . The types of non-compliance encountered range from relatively simple situations involving fumigation area management such as signage, through to non-notification of fumigation events for ship holds, and assumed exceedances of boundary concentrations of fumigant based on volatile organic compound (VOC) measurements.

3. What is your experience with the process of recapture and the efficiency of the recapture techniques you have observed and/or regulated?

Council's experience is limited to the only regionally consented operator, Genera Limited.

In the Bay of Plenty most on-Port fumigation can be separated into the broad categories of "containers" and "logs / timber". Genera predominantly use a carbon based scrubber for recapture from containers, and use their proprietary liquid recapture system for logs and timber. The volume of MB required for fumigating containers is often only around 5 kg, whereas for log rows 80 - 100kg of MB is not uncommon.

The efficacy of recapture is not prescribed in the consent conditions although it does need to be "effective". For containers, it is relatively straight forward to assess how well the recapture system is working by using a meter on the exhaust gases to assess how much MB remains. This information needs to be combined with the levels left in the container when the doors are opened. Council staff

assessment of carbon based container recapture showed that the air exiting the scrubber typically only has background levels of MB present (<5 ppm). 100% of all fumigated containers have required recapture since April 2018.

Turning to "logs / timber", consent 62719 has a different set of target percentages and dates for compliance. Since November 2018 Genera have been required to recapture 60% of the log fumigations. The "efficacy" of recapture for logs under sheets is less certain than for containers. Information provided to Council indicates that recapture of 80% of the MB remaining in the enclosed space under sheets following sorption into logs is consistently achievable. At the time of writing, Genera have stated that there are some significant logistical/technical problems with recapture from ship holds requiring the development of specialised equipment. One trial conducted by Genera of ship hold recapture achieved a 50% recapture rate over 6 hours, while a further two trials were relatively unsuccessful .

Genera have trialed other types of recapture technology, however Council is not privy to the details of the systems or their efficiency, so the company would be best placed to advise on what they have tested and how well it has worked.

While an activated carbon system has been successfully used for recapture from containerised cargo, this technology is unproven on log stacks under sheets or ship holds. Activated carbon systems have been used overseas for recapturing from bulk cargo, such as grains in silos, however there haven't been any trials that we are aware of on logs. One of the concerns raised with activated carbon systems is the ultimate disposal of the material with MB bound to it, which currently gets disposed of to landfill.

Council consider that the following variables all influence the effectiveness of Genera's recapture process for any one recapture event:

1. The time that the recapture unit operates, recycling MB, before eventually the tarpaulin is removed
2. The degree to which ducting draws MB evenly from the fumigated stack (configuration of ducting)
3. The concentration under the tarpaulin
4. The "freshness" of the liquor used in the recapture process
5. The size of the recapture unit in relation to the volume of volume of MB available
6. The speed with which the MB gas is recirculated through the scrubber.

The resulting variability makes extrapolating the results of any trial to every day fumigation and recapture events difficult.

4. If the recapture control definition were to change as a result of this reassessment, please can you expand on how the issues you raised in your letter of 13 June 2018 would impact the health of neighbours, and your ability to regulate MB fumigations under the RMA?

In our letter we provided a number of examples of controls that were either proving unworkable or inadequate. Some of these have been previously mentioned, such as the removal of controls (e.g. the need for a buffer) when recapture is used. Another is the lack of clarity around the required monitoring locations, particularly when the wind direction is such that downwind from the ventilation is over water. The consent holder's interpretation of the consent in this case, based on their reading of the ERMA decision document (s.16.7.4) was that they could monitor MB levels at the Port boundary, up to 90

degrees to the wind direction, which in some cases is well over a kilometre away. This was not consistent with Council's view and the matter has since been resolved through the FMP.

Another important aspect which affects the ability of any regulator to carry out their statutory function is that of being fully informed by the fumigator. It is important that there is a requirement in place which enables regulators to obtain all necessary information, and to be advised of certain events, e.g. ship fumigation. Without good knowledge of the timing and location of fumigation events in advance, any air monitoring has very limited value.

Notification of neighbours of nearby fumigation activity is obviously critical to enable them to take any action that they believe may be necessary. Under the existing EPA decision document controls no notification is necessary if recapture is applied (at the defined level).

5. Do you have any other issues when regulating MB fumigations specific to log stacks, containers and/or ship holds?

Ports present a particularly challenging environment for regulating any activity, due to the numerous hazards present and the area over which the activity is spread.

The ventilation of vessels following fumigation, while at berth ("alongside") is not something that is allowed in other jurisdictions overseas that Council officers have had contact with. We have concluded that this is due to the potential for very high concentrations of MB to be released when ship holds are initially opened to vent the fumigant. Ship hold fumigations often use in excess of 3000 kg of MB and Council is aware of at least one which involved the use of 5000kg of MB, whereas a log stack typically uses around 80 - 100kg, depending on size. Currently there are no special requirements in terms of monitoring and management that relate to ship hold fumigation and this requires attention.

Last year there was an incident at the Port of Tauranga involving several stevedores believing that they were exposed to MB and going to hospital as a result. Council carried out an investigation (report available on request) and it became apparent that blood test results are crucial in order to prove a link between MB exposure and any symptoms. It also became apparent that there was not a sufficient level of understanding in the medical profession, or industry, about the need for timely and repeated blood testing, nor of the analytes to test for. MB and its break down products is metabolised in the body relatively quickly, and also the levels of bromine can be influenced by a number of other factors, such as the amount of seafood in one's diet, hence the need for follow up testing.

One issue we have faced is getting information from the consent holder on the actual concentration of MB in the atmosphere downwind from venting. Monitoring for MB is generally carried out using a photoionisation device (PID) however these devices measure any VOC present therefore, theoretically at least, a high reading could be caused by any VOC, and not necessarily just MB. Where Genera have recorded elevated PID readings at the Port boundary, they have argued that there is no evidence the TEL (tolerable exposure limit) has been breached due to other potential sources of VOCs. We have attempted to address this through the use of evacuated canisters however their application is limited; not only are they costly (over $600 per test) but also they can typically only obtain an average reading over a period of an hour or more. The location, timing and magnitude of any potential boundary exceedance is unpredictable, so knowing when to commence the use of such a canister is difficult

Obtaining ready and timely access to the fumigation areas safely for compliance assessments is an on-going issue for Council staff. For this reason we are currently investigating the use of remote cameras.

Genera staff are often under significant pressure by other Port users to restore access to areas closed off for fumigation, who may not see the importance of maintaining the exclusion areas.

6. Does the Bay of Plenty Regional Council have any other information relating to the controls on the use of MB which may facilitate the evaluation and consideration of this application?

Council is particularly concerned about the potential for those on the Port not associated with fumigation activities (i.e. occupational bystanders) to be affected by discharges of MB when it is released to air. Currently exposure of this group of individuals is theoretically limited by the 8 hour average Worker Exposure Standard (WES) of 5 ppm of MB. The public at or beyond the boundary are protected by the Tolerable Exposure Limit (TEL) 1ppm of MB averaged over one hour.

Our concern is that these averages, particularly the 8 hour average, does not adequately protect people from potentially very high exposure levels over a short period, as the longer term average may not be exceeded. Some other jurisdictions overseas also have a single sample "not to be exceeded" number for human health protection, in addition to a STEL (short term exposure limit).

In terms of Council's ability to regulate under the RMA, the constraints imposed on the use of MB by the EPA and WorkSafe will have a significant bearing on the Council's ability to regulate MB use in the BOP region. Our experience is that applicants, and submitters in support of applications such as industry lobby groups, will regard requirements set by National Statutory agencies as the bottom line (most stringent) level of control. This makes it difficult for a Council to argue for more stringent requirements, regardless of community concerns or potential impacts on the environment (including people), where a lesser standard has been set nationally.

Staff consider that it is essential that the EPA has comprehensive and independent information with which to make decisions around reassessments. Council remain concerned that there is generally no independent testing by the EPA to verify the accuracy of the results presented by an applicant, or to determine the extent to which the information represents a realistic "in the field" scenario. Council strongly believes that the precautionary principle should be applied when dealing with extremely toxic substances, particularly MB which is odourless, colourless and used in such large quantities over relatively small areas in the proximity of both workers and the general public.

Yours sincerely,

[redacted]

[redacted]

[redacted]

Appendix 1: Recent email to WorkSafe regarding methyl bromide exposure limits

From: [redacted]

Subject: WorkSafe - Methyl Bromide exposure limits - STEL

Hi [redacted],

As you know I have previously expressed my concern about the lack of an enforceable short-term exposure limit (WES-STEL - Workplace Exposure Standard Short Term Exposure Limit) for methyl bromide.

I remain concerned about this and have summarised some relevant information below:

1. "*Some WES are designed to prevent the development of ill health after long-term exposure (WES-TWA), others to reduce the possibility of acute effects (WES-Ceiling, WES-EL, WES-STEL)*" – page 10, WorkSafe WES-BEI 10th Ed (attached), 2018.
   In other words, the 8-hour WES is there to prevent ill health resulting from long term exposure, while the 'WES-Ceiling', WES-EL and WES-STEL are there to reduce the possibility of acute effects.

2. According to the EPA (reference imbedded), "*Studies in humans indicate that the lung may be severely injured by the acute (short-term) inhalation of methyl bromide. Acute and chronic (long-term) inhalation of methyl bromide can lead to neurological effects in humans".*

3. The WES-BEI document refers to a WES-STEL, as follows:
   Transient increases in workers' exposure levels may exceed three times the value of the WES-TWA level for no more than 15 minutes at a time, on no more than four occasions spaced one hour apart during a workday, and under no circumstances should they exceed five times the value of the WES-TWA level (page 62).

   These derived value are consistent with the UK limits (attached) however, because these are not enforceable (in NZ), this information is not routinely gathered / calculated by the fumigator, nor is it compared to a standard, since it is regarded as optional rather than mandatory.

Methyl Bromide monitoring

I don't consider that the risks, particularly from the acute effects of methyl bromide exposure, are adequately managed. As you know, the focus of current methyl bromide monitoring in the Bay of Plenty is to ensure compliance with an 8–hour average figure for workers (WES), and a 1-hour average (TEL) for boundary monitoring.

The Port of Tauranga's H&S Bulletin (attached) describes a positive monitoring initiative by the Port, although the objective of gaining *"an assurance that port workers were not being exposed to unacceptable levels of methyl bromide*" cannot be met through the 8-hour TWA alone, for the reasons described above. We believe that incorporating the WES-BEI STEL will address this gap and help prevent future acute harm to workers.

The Bay of Plenty Regional Council therefore formally requests that WorkSafe introduces a mandatory STEL for methyl bromide.

Can you please ensure this email is passed on to the appropriate people within WorkSafe?

Appendix 2: Table outlining recent enforcement action

Enforcement option	Reason for notice	Date of issue	Status	Reason for withdrawing notice
Formal warning letter	Failing to submit Emergency Response Plans	15 June 2016	Current	
Formal warning letter	Insufficient and incorrect signage	24 March 2017	Current	
Formal warning letter	Failing to notify Council in advance of a ship hold fumigation	21 March 2019	Current	
Abatement notice 2016/AO23	Failing to notify Council in advance of a ship hold fumigation	27 April 2016	Current	
Abatement notice RA18-00041	Failing to monitor downwind while venting MB	10 July 2018	Withdrawn	Fumigation management plan approved 1 May 2019
Abatement notice RA18-00042	Failing to submit a plan depicting the areas where fumigation is to be limited to	10 July 2018	Withdrawn	Fumigation management plan approved 1 May 2019
Abatement notice RA18-00043	Fumigating log stacks within 100m of the Port of Tauranga boundary.	10 July 2018	Withdrawn	Fumigation management plan approved 1 May 2019
Abatement notice RA18-00045	Failing to advise the Council within 24 hours of any complaint	10 July 2018	Current	
Abatement notice RA18-00046	Fumigating grain in a ship hold in the Port of Tauranga	17 August 2018	To be withdrawn	
Abatement notice RA18-00078	Discharging methyl bromide at or beyond the boundary of the Port of Tauranga in excess of the 1ppm TEL.	5 November 2018	Current	
Abatement notice RA18-00083	Venting methyl bromide during the hours of	5 November 2018	Current	

	darkness without actively monitoring gas levels			
Abatement notice RA17-00102	Fumigating log stacks within 100 m of the Port of Tauranga boundary.	23 November 2017	Current	
Abatement notice RA17-00104	Signage and cones did not remain in place for at least 15 minutes following a log stack being vented.	4 December 2017	Current	