



Review of EPA Update Report 2: Modified Reassessment of Methyl Bromide, APP203660 at the Port of Tauranga, Mount Maunganui Area (TMMA).

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1. Introduction and Overview

1.1 Background

In April 2021 ASG was engaged by the Environmental Protection Agency's (EPA) Decision Making Committee (DMC) Direction and Minute WGT023 of April 2021 to independently review Golder (Golder Associates NZ Limited) January 2021, Fumigation Mitigation Options Investigation Report, which was submitted to Ian Gear, Stakeholder in Methyl Bromide Reduction (STIMBR).

In this report Golder at the request of STIMBR was asked to review the modelling prepared by Todoroski Air Sciences (TAS) in December 2020 to assist with the development of mitigation options. Golder refined several input parameters for selected scenarios so a 100m buffer zone for log stacks could be achieved.

As part of the review of the Golder 2021 modelling and mitigation recommendations, TAS identified an error in the modelling information which resulted in an underestimation of the methyl bromide released. This error originated in TAS's 2020 modelling report on which the Golder mitigation recommendations relied on, and affects scenarios where recapture occurs for less than 100% of log stacks fumigated. In noting this error TAS and ASG identified that a correction factor of 2.43 could be applied to the Golder outputs to give an output consistent with the TAS modelling.

In the Direction and Minute WGT035, the DMC acknowledged the error and correction factor and requested that the EPA provide an update report which provided the figures in Tables 3-6 of the Golder 2021 report, scaled down by the correction factor of 2.43. The DMC have requested that ASG, TAS and Sullivan Environmental review EPA's correction factors.

A review of the EPA (2021) Updated Report is discussed in Section 2.

2. Review

Golder recommended three methods of mitigation to ensure that the 1-hour TEL was met at the 99.9th percentile at 100m from the log fumigation activity. The first mitigation method was an upper limit emission rate of 32.6 g/s between the hours of 7am – 9am and 3pm to 7pm, and 51.0 g/s between the hours of 9am and 3pm. The second mitigation option was based on 3 typical application dose rates and maximum upper limits to log stack volume sizes. The third mitigation option was limiting the maximum 1-hour dosage of methyl bromide. These three mitigation options put forward by Golder were modified by the error factor of 2.43 by the EPA. New tables on log stack volumes and maximum dosage rates are presented in the EPA 2021 Update Report. These are discussed below.

2.1 Golder Mitigation – Emission rates

Golder recommended three methods of mitigation to ensure that the 1-hour TEL was met at the 99.9th percentile at 100m from the log fumigation activity. The first mitigation method was an upper limit emission rate of 32.6 g/s between the hours of 7am – 9am and 3pm to 7pm, and 51.0 g/s between the hours of 9am and 3pm. Factoring in the acknowledged error of 2.43, these emissions would reduce to 13.1 g/s and 20.98 g/s. However, ASG in the review of the Golder 2021 mitigation study did not recommend this method as a mitigation as it was not robust enough. The reasons given were that; one, the emission rates were based on a single literature study and just a few case study events where there was large variability in the log sorption rates. Secondly, the computed emission rate in the field is different to the theoretical computed emission rate used in the modelling with unfounded assumptions with respect to the log sorption rates. The EPA 2021 Update Report has not included emission limits as a mitigation tool, which suggests to ASG that EPA are in agreement that emission limits are not a viable mitigation tool and compliance measure due to the reasoning provided.

2.2 Golder Mitigation – Dose rate vs Stack Volumes

In order to achieve the emission rates in Table 1 (Golder 2021 report), which would ensure that the methyl bromide 1-hour criterion at distances further than 100m was met, Golder determined the maximum volume of logs that could be ventilated each hour for three dose rates (42, 72 and 120 g/m³) for times from 7am-9am and 3pm-7pm, and from 9am to 3pm. For example, a 30% recapture rate on 80% of the logs stacks, the dose rate of 72 g/m³ would mean a maximum covered log stack volume of 4,200 m³ can be ventilated at 8am. Taking the error of 2.43 into account, EPA re-computed Golder Tables 3 and 4 presented the new lower scaled (by 2.43) values in their Tables 1 and 2. This means that the maximum log stack volume for the same example as above is now 1700 m³ instead of 4,200 m³. This computation has been consistently applied throughout Table 1 and 2, and sees a significant reduction in the maximum log stack volumes. However, it is important to point out that for a dose rate of 120 g/m³ and a typical log stack size of 60m x 6m x 5m (1,800 m³), the Applicant would not be able to ventilate a log pile at any time of the day unless 50% recapture could occur.

EPA in the Updated 2021 Report have considered using the log stack volumes and application rate as a compliance measure. EPA state that “*the reporting requirement controls would need to include*

records of log stack dimensions and volume so that any such maximum stack size control can be monitored for compliance”.

ASG has some concerns using log stack volumes and application rate as a measure for compliance. These concerns are as follows;

- 1) The results of EPA Table 2 for a 120g/m³ application rate will not allow a ‘current’ typical log stack of 1,800 m³ be ventilated unless 50% recapture occurred. This is unpractical, the only way the Applicant can apply 120 g/m³ of methyl bromide to log stacks at the current recapture rate of 30% is to have significantly smaller log piles. This will require a fundamental structural change to the way log piles are stored and stacked at the Port. ASG is of the opinion that placing compliance on log size volumes is unnecessarily restrictive and unpractical at this stage, especially when restricting the maximum dosage is a much more robust mitigation measure (see Section 2.3).
- 2) Tables 3 and 4 in the Golder report (Tables 1 and 2 in the EPA report) were developed to support the upper limit emission rates of Table 1. ASG believes these tables are still useful but only as a means to provide supportive guidance on volume sizes and application rates.
- 3) Since the computation of log stack volumes depends on the computed emission rate from dispersion modelling (and its assumptions) which is different to those log volumes computed in the field. It is hard to see how log stack volume can be an effective regulated mitigation tool.
- 4) Further, computing log stack volumes is a rough estimate only and the computation is dependent on the percent of recapture to each log stack and the number of logs recaptured. Therefore, ASG is not convinced mitigation based on log stack volume is a robust compliance tool.

2.3 Golder Mitigation – Mass Dose

As well as develop tables on emission rate upper limits and log stack volumes. Golder also presented the same information but, on a mass dosed basis. These values were presented in Table 5 and 6 of the 2021 Golder Report and were developed by multiplying the dose rate by the unrounded volumes in Golder Tables 3 and 4, respectively. EPA (2021) in their Updated Report recomputed the Golder values of Table 5 and 6 by rescaling the values by the error of 2.43, and presented them in Tables 3 and 4 for 7am to 9am, 3pm to 7pm and from 9am to 3pm, respectively. The new maximum dosage rates in kilograms now range from 113 kg for 30% recapture for 50% of stacks recaptured to 190 kg for 50% recapture for 99% of stacks recaptured for the period 7am to 9am and 3pm to 7pm. For the middle of the day (9am to 3pm) the maximum dosage ranged from 177 kg (30% recapture for 50% of all log stacks) to 299 kg for 50% recapture for 99% of all stacks.

These numbers are significantly lower than the those initially recommended by Golder and are now much lower than the 450 kg per hour cap initially modelled by Golder in the 2019 modelling and are much more consistent with the WorkSafe monitoring program.

Therefore, ASG recommends limiting the maximum dosage per hour as a compliance tool for the following reasons;

- The Applicant can control and can record exactly how much dosage is applied. Further, the dosage can be easily controlled and regulated.
- By setting the limits on maximum dosage means that confusion between the different methods of computing emission rates and log stack volumes which will give different answers can be avoided.
- By limiting the compliance to the maximum dosage (rather than to the log stack volumes and application rates as well) gives the Applicant flexibility to plan ahead with respect to log pile volume sizes and the necessary structural changes that are likely to be required on the Port to accommodate the new dosage limits.

In addition, smaller log pile volume sizes are recommended as smaller log piles will take a smaller dose which will reduce the amount of methyl bromide released to the atmosphere. Further, ASG still recommends slow removal of individual tarps and a 5-minute interval between tarp removals which will further reduce the emissions.

When considering compliance measures it is important to point out that the TAS modelling has not considered ventilations from multiple stack locations, nor modelled the hour-to-hour residual methyl bromide left in the air between fumigations. In other words, the TAS modelling has not considered the cumulative impacts. Therefore, the current proposed maximum 1-hour dosage limits apply to a single location on the port only. The Golder 2019 model did consider simultaneous fumigations of up to 4 log stack locations on the Port, and, the results suggested that more than one location with the same dosage limit may be possible, if the log stack locations are far enough apart. Sullivan also looked at cumulative effects. Further consideration may need to be undertaken before the 1-hour dosage limit can be applied simultaneously to another location on the port.

In summary, ASG supports the following mitigation measures for compliance with the 1-hour TEL at the Port boundary for log stacks.

For log stacks:

- Limiting the maximum dosage per hour as per EPA (2021) Tables 3 and 4.
- Fumigations to occur during the day between 7 am and 7pm.
- Log stacks should be fumigated individually with 5 minutes interval between log stack fumigations (to prevent short term peaks).
- Log stack tarps should be removed slowly especially the first withdrawal of the first third of the tarp (to prevent short term peaks).
- Smaller log stack volumes.
- Circular buffer distances may be too conservative, buffer distances based on isopleth contours will be more reasonable.

Capping the maximum dosage rate and distance¹ based 'buffer zones' are two conservative mitigation tools that can easily managed.

¹ Dispersion model based 'buffer distances' are conservative as the model gradually and lineally reduces the concentration with distance.