Update on Methyl Bromide Rule-Making

January 2020

AQC/EMC Meetings

Department of Environmental Quality

Agenda

- Review reason for rule-making
- Summarize rule-making activities to date
- Summarize comments received
- Discussion of averaging time
  - October and December SAB meetings
  - Modeling results of all policy options examined as a result of public comments and SAB feedback
- Discussion of potential next steps and process
- Updated fiscal analysis of policy options performed as a result of public comments and SAB feedback

Methyl Bromide – Log Fumigation Operations

Log export to Chinese markets requires:

- **Debarking; or**
- **Fumigation with methyl bromide.**

The Montreal Protocol banned the use of methyl bromide due to its ozone-depleting properties.

- **Quarantine and pre-shipment (QPS) treatment was exempted by the EPA's rulemaking authority in 2003.**

In 2018, NC experienced an increase in permit applications/inquiries from entities interested in using methyl bromide for fumigation of whole logs with bark.

Methyl Bromide – Log Fumigation Operations

Fumigation Process:

- **Logs are placed in a shipping container (or in a pile and tarped)**
- **Fumigant applied to logs inside container**
- **Left for residence time of ~36-72 hours.**

Aeration Process:

- **Doors are opened to vent to atmosphere.**

Fumigators must follow instructions on the label:

- **Buffer zones**
- **Buffer zone entry restrictions**
- **Respirator requirements**
- **Work time restrictions**

Methyl Bromide – Log Fumigation Operations

NC has 5 log fumigation facilities with Synthetic Minor permits. (only two are currently operating)

Current Permit Requirements:

- **Report 100% usage as emissions**
- **Reporting conditions**
- **Less than 10 tons per year limit to avoid major source classification.**

Methyl Bromide – Background

DAQ's concerns:

1. **Methyl Bromide is a Hazardous Air Pollutant (HAP).**
2. **The potential for *acute (short-term) & chronic (long-term) exposures*:**
   - **Methyl bromide is highly toxic and studies in humans indicate the lung may be severely injured by the acute inhalation exposures.**
   - **Acute and chronic inhalation of methyl bromide can lead to neurological effects in humans.**
3. **There are no federal or state air quality regulations to protect the public from these emissions.**
4. **Unlike many past agricultural uses, log fumigation facilities are comparable to an industrial point source, where large quantities of HAP are used and emitted in one spot on a year round basis.**

Methyl Bromide – Air Quality Rule-Making

Log Fumigation Regulatory Options Considered:

- **90% capture and control of methyl bromide during the aeration process**
- **Adding Acceptable Ambient Level (AAL) for methyl bromide and require modeling to demonstrate compliance**

Methyl Bromide – Air Quality Rule-Making

- **April 2019 – SAB recommendation**
  - **Range of Acceptable Ambient Levels (AALs)**
    - **0.002 mg/m3 lower bound**
    - **0.005 mg/m3 upper bound**
    - **24-hour averaging time**
    - **Basis: EPA's IRIS chronic RfC**

- **May 2019 – Environmental Management Commission (EMC)**
  - **Approves to proceed to public comment/hearing**
    - **0.005 mg/m3 (24-hr avg time) – based on upper bound value recommended by SAB.**
    - **0.078 mg/m3 (24-hr avg time) – minimal risk level (intermediate) from the April 2018 Draft for Public Comment Toxicological Profile for Bromomethane prepared by the Agency for Toxic Substances and Disease Registry (ATSDR)**

Methyl Bromide – Air Quality Rule-Making

- June 17 – August 30 – Public comment period on draft rules
- 2 public hearings
  - July 22 - Raleigh
  - July 23 - Wilmington
- 1468 comments received
- General agreement/support for rule and use of 0.005 mg/m3 RfC
- Matter of concern: 24-hr averaging time

Methyl Bromide – Air Quality Rule-Making

Averaging time rationale from April SAB recommendations:

- **Rapid adsorption and distribution to sensitive target organs following inhalation exposures.**
- **Steep inhalation exposure-effect curve.**
- **Potential for large segments of the human populations to have increased sensitivity to neurotoxic effects not captured by animal studies used to develop the RfC.**
- **Potential for delayed onset of adverse effects following exposures from a colorless, odorless gas.**

Methyl Bromide – Air Quality Rule-Making

Averaging time comments of concern:

- **Use a definition of chronic exposure that's consistent with the most up-to-date scientific methods**
- **A 24-hr averaging time is not supported for addressing chronic exposures.**
- **An annual averaging time is appropriate for application of a chronic RfC.**
- **California, New Jersey and other states use the chronic RfC of 0.005 mg/m3, but apply it using an annual averaging time. Those states also complement the chronic value with an acute value of 3.9 mg/m3.**

Methyl Bromide – Air Quality Rule-Making

Discussion of averaging time

Methyl Bromide – Air Quality Rule-Making

Discussion of averaging time

- **DAQ sought additional expert advice**
  - **Discussions with USEPA/ORD air quality toxicologist**
  - **SAB meeting on October 7, 2019**
  - **SAB meeting on December 2, 2019**

Methyl Bromide – Air Quality Rule-Making

Discussion of averaging time

- SAB meeting on October 7, 2019
  - Noted lack of site-specific exposure scenarios
  - Discussed concentration dependent vs. concentration-time dependent
  - Application of chronic RfC to address shorter term exposure scenarios
    - "…very protective… to overly protective"
  - Application of chronic RfC to longer term exposures makes sense
  - ATSDR contacted… not expecting revisions to their draft
  - Chronic value has "independent utility"
  - Not enough information to change prior recommendation or report
  - Risk management decision for the EMC

Methyl Bromide – Air Quality Rule-Making

Discussion of averaging time

- **SAB meeting on October 7, 2019…continued…**
  - **Considerations on this matter were related to toxicological endpoints and less about averaging time**
  - **Noted it would be ideal if there was an hourly averaging time to address acute effects**
  - **Concern for how high a number could be over a long averaging time compared to that of a shorter averaging time**
  - **The uncertainty and timeframe is up to the risk managers as to whether to proceed forward with the current information or to involve an acute value.**

Methyl Bromide – Air Quality Rule-Making

SAB meeting on December 2, 2019

- **DAQ provided:**
  - **Study & information that served as the basis for California's short-term acute value of 3.9 mg/m3 at a 1-hr averaging time.**

- **DAQ asked:**
  - **Thoughts on the adequacy of that information as the basis for an acute acceptable ambient level to pair with the already endorsed chronic acceptable ambient level (0.005 mg/m3) if it were set at an annual averaging time.**

Methyl Bromide – Air Quality Rule-Making

SAB meeting on December 2, 2019

- **SAB on the 1942 Watrous study that supported the CA 1-hr standard:**
  - **(1) there were shortcomings on its methodologies although clearly showing the dermal and neurological effects in humans;**
  - **(2) the exposures are poorly quantified with no statistics or quality control / quality assurance measures;**
  - **(3) the experimental procedures have advanced in recent years which makes it suspect for utilization in regulatory decision making; and**
  - **(4) there is not a confident no-observed-adverse-effect level for meaningful toxicological effects.**
- **Therefore, the SAB finds that the 1942 Watrous paper is suspect for exposure characterizations in regulatory decision-making.**

Methyl Bromide – Air Quality Rule-Making

SAB meeting on December 2, 2019

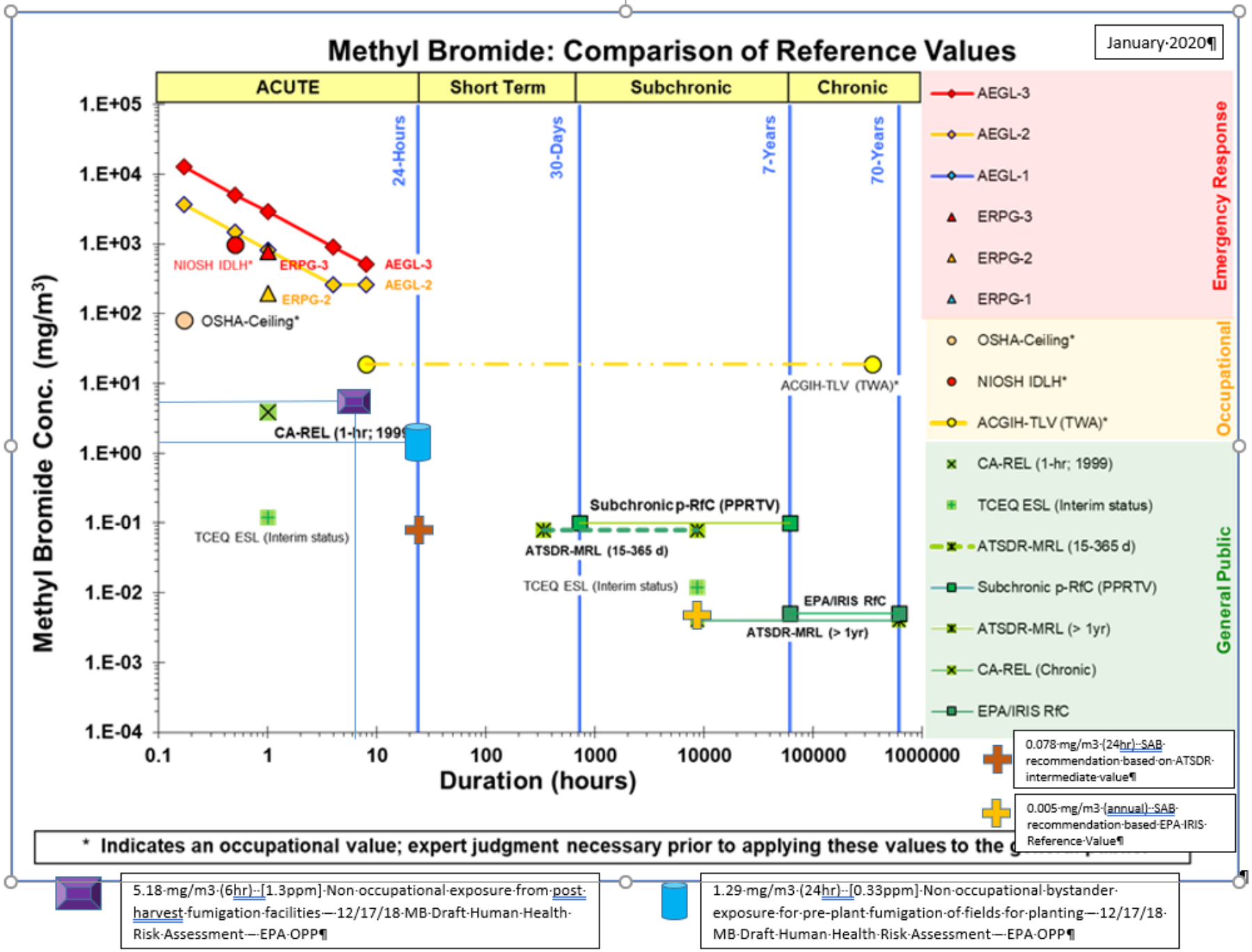
- **SAB on the derivation of the CA 1-hr standard:**
  - **(1) utilization of the Watrous paper as the driver was a concern;**
  - **(2) there were concerns about extrapolating the 2-hour exposure to a 1-hour exposure;**
  - **(3) there were concerns on the uncertainty factors that were applied; and**
  - **(4) there were concerns about there being no safety**

- **Concerns of the scientific adequacy of California's acute value in addition to the 1942 Watrous paper by which it was founded.**

Methyl Bromide – Air Quality Rule-Making

SAB meeting on December 2, 2019

- **SAB on the value of addressing acute exposure scenarios as well as chronic exposure scenarios:**
  - **(1) although there was not support for the 1942 Watrous paper or California's approach, a complementing acute value would have management utility;**
  - **(2) more tools will assist with management decisions;**
  - **(3) the chronic value initially recommended by the SAB will be retained, with acknowledgement that there is a need for an acute value;**
  - **(4) although not designed as a 24-hour average, the draft short-term ATSDR value of 0.078 mg/m^3 has potential to be utilized as the 24-hour value; and**
  - **(5) the 0.005 mg/m^3 value would be moved to an annual average that would be in concert with an accompanying short-term value**



Original chart that compares the various reference values for methyl bromide as provided by Dr. George Woodall, Toxicologist in the USEPA's Center for Public Health and Environmental Assessment within the Office of Research and Development. October 2019.

January 2020 DAQ edit to add the EPA OPP values in the purple rectangle and blue cylinder as well as the SAB 12/19 recommendations in the orange & yellow crosses.

Methyl Bromide – Modeling results

Stack Release Results Comparison - % AAL

Site Name	Aprox. Property Acreage	# Containers Modeled	% AAL 24-hour 0.005 mg/m3	% AAL 24-hour 0.078 mg/m3	% AAL annual 0.005 mg/m3	DAY % AAL annual 0.005 mg/m3	NIGHT % AAL annual 0.005 mg/m3	% AAL 1-hr 3.9 mg/m3
Chadbourn	20.4	[1 log piles]	1341%	86%	358%	122%	565%	41%
River Rd	2.15	1	450%	29%	169%	63%	322%	14%
Port	272	1	260%	17%	163%	68%	265%	8%
Flowers	22	1	766%	49%	281%	109%	471%	24%

1-hour and 24-hour Model Emissions Scenario:
Release occurs 1pm-2pm everyday w/ daily emissions based on max monthly fumigation records & assuming aeration occurred 15 days/month.

Annual Model Emissions Scenario: 10 tpy modeled across every hour or the year (i.e., 8760 hr/yr).

Methyl Bromide

Updated fiscal analysis of policy options performed as a result of public comments and SAB feedback

Methyl Bromide

Evaluated Three Potential AAL Options in the Fiscal Note

- **Original Proposal**
  - **0.005 mg/m^3 with 24-hour averaging time**
- **Addendum to Fiscal Note**
  - **0.078 mg/m^3 with 24-hour averaging time**
  - **Paired AAL of 0.078 mg/m^3 24-hour & 0.005 mg/m^3 annual**

Methyl Bromide – Fiscal Analysis Addendum

Compliance Options	*Total Cost, 2-Year NPV (Millions)*[1]	*Currently Operating Facilities Cost, 2-Year NPV (Millions)*[2]	*Number of People Who May Benefit (based on the 4 operating permitted facilities only)*
Original Proposal - 24-hour 0.005 mg/m^3 AAL			
Install Control Technology	$2.02	$1.16	149,717
Ship Logs Out of State	$2.89	$2.24	149,717
Debarking	$1.55	$0.885	149,717
Additional AAL Options			
24-hour 0.078 mg/m^3 AAL, Install Fan & Stack System	$0.469	$0.236	6,304
Annual 0.005 mg/m^3 and 24-hour 0.078 mg/m^3 AALs, Install Fan & Stack System			
Low Cost Range - Current production levels with no lost revenue	$0.469	$0.236	6,304
High Cost Range - Includes potential lost revenue from limiting production at higher levels	$2.54	$2.30	6,304

Methyl Bromide – Fiscal Note Comments

- **Relocation of fumigation activities**
  - **China prohibits import of softwoods from SC and VA**
    - **USDA data shows that SC and VA exported $13.7 and $38.3 million respectively of "Wood in the Rough" to China in 2018**
    - **North Carolina exported $61.6 million**
- **Job loss implications**
  - **Forestry product companies and truckers affected**
    - **Fiscal Note includes job losses by fumigators**
    - **Includes trucking costs**
    - **Assumes forest product companies unaffected**

Methyl Bromide – Fiscal Note Comments

- **Use of USDA land lease cost data for additional land option**
- **Did not include building roads, utilities cost, zoning laws, and additional real estate purchases**
  - **Reviewed industrial real estate lease data, and other costs**
  - **Estimated annual cost for additional land to be $855,000**
  - **Fiscal Note estimated $318,000**
  - **This compliance option was evaluated but not determined to be one of the Most Likely Options in Fiscal Note**

Methyl Bromide

Discussion of potential next steps and process

Methyl Bromide – Air Quality Rule-Making

In light of the comments and information received since the close of the comment period… DAQ recommends:

- **Continue the rule-making process**

- **Add a risk management option for EMC consideration**
  - **0.005mg/m3 annual average, paired with 0.078 mg/m3 24-hr average.**

Methyl Bromide – Air Quality Rule-Making

Suggested Process

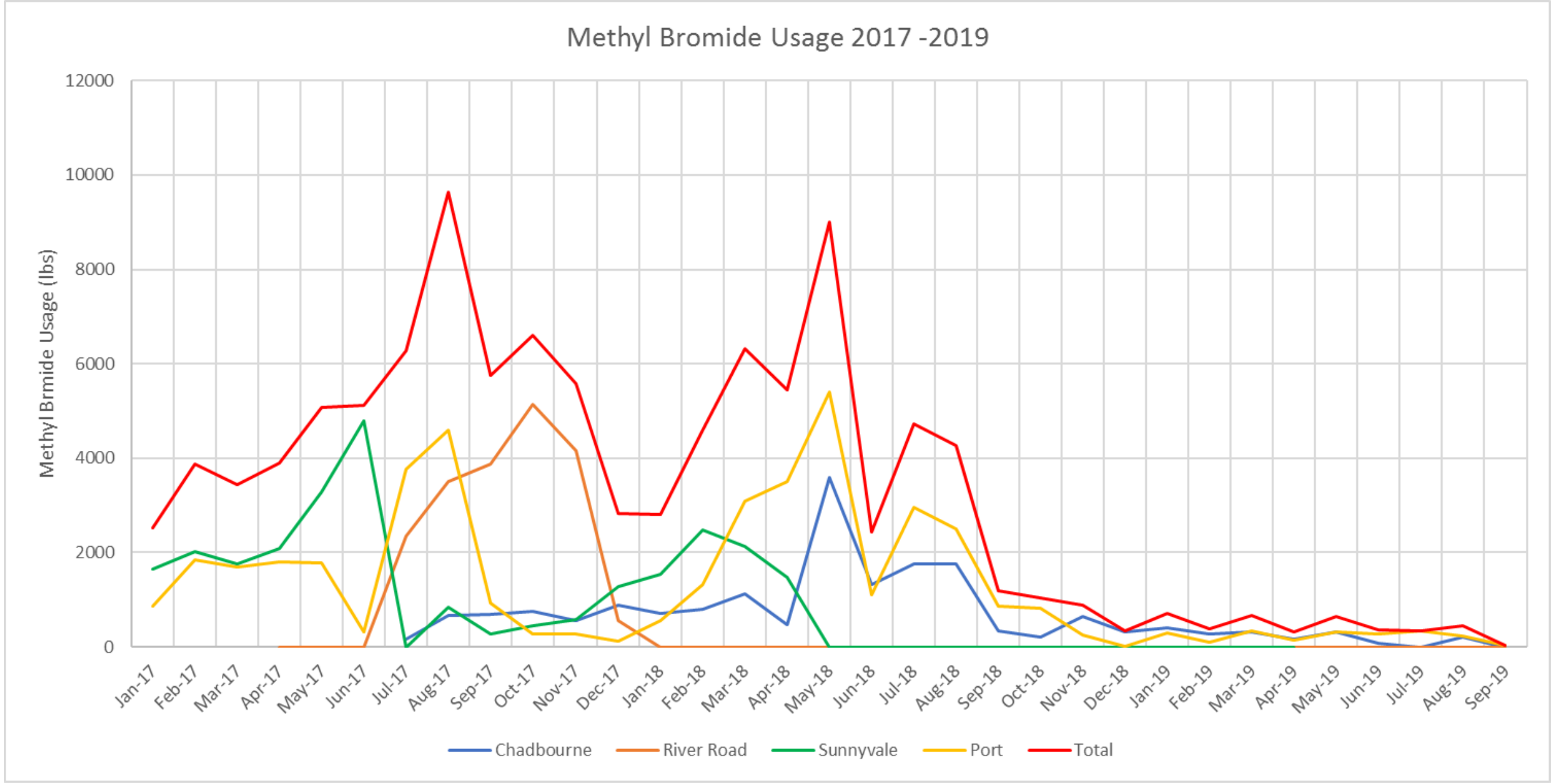
- **Bring amended draft rule and fiscal note that includes this additional option to January EMC.**

- **Request to proceed to public comment/hearing at January EMC**
  - **All comments received during the first comment period will be part of the record.**
- **When the Hearing Record comes back to the EMC (May 2020), comments will have been taken on the following options:**
  1. **0.005 mg/m3 24-hr averaging time**
  2. **0.078 mg/m3 24-hr averaging time**
  3. **0.005 mg/m3 annual averaging time, paired with 0.078 mg/m3 24-hr averaging time**

Methyl Bromide – Air Quality Rule-Making

Potential Process - schedule

- **January 8** — **AQC – information item**
- **January 9** — **EMC – action item – request to proceed to public hearing**
- **January 10** — **File w/ OAH**
- **Feb 2 - April 3** — **Comment period**
- **May 14** — **EMC final action**
- **June** — **RRC**
- **July 1** — **Potential effective date**


Methyl Bromide Usage 2017 -2019
Methyl Brmide Usage (lbs)
12000
10000
8000
6000
4000
2000
0
Jan-17
Feb-17
Mar-17
Apr-17
May-17
Jun-17
Jul-17
Aug-17
Sep-17
Oct-17
Nov-17
Dec-17
Jan-18
Feb-18
Mar-18
Apr-18
May-18
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Jul-18
Aug-18
Sep-18
Oct-18
Nov-18
Dec-18
Jan-19
Feb-19
Mar-19
Apr-19
May-19
Jun-19
Jul-19
Aug-19
Sep-19
Chadbourne
River Road
Sunnyvale
Port
Total