MAUL FOSTER ALONGI

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November 15, 2021
Project No. 8006.67.01

Max Hueftle, P.E., BCEE
Lane Regional Air Protection Agency
1010 Main Street
Springfield, OR 97477

Re: Emissions Test Report Data Review and Explanation

Dear Max:

J.H. Baxter & Co. (Baxter) owns and operates a wood preserving facility located at 3494 Roosevelt Blvd. in Eugene, Oregon 97402 (the facility). Baxter retained Bison Engineering, Inc. (Bison) to conduct source testing on the ammoniacal copper zinc arsenate (ACZA) scrubber exhaust stack, in addition to verifying directional airflow on the vapor phase carbon (VPC) unit ventilation system, per the Lane Regional Air Protection Agency (LRAPA) letter sent to the facility on January 7, 2021. Bison completed the testing campaign on September 15-16, 2021. The ACZA source test results are summarized in the attached table.

As you will note in reviewing this report, a full set of data measurements were not collected during the crack-and-vac treatment step for Run 1. MFA believes that this does not affect the validity of the test and that emissions from the crack-and-vac treatment step can be characterized using the available data.

The crack-and-vac treatment step is the last step in the treatment process. During crack-and-vac, the retort door is opened to allow for ambient air to be drawn into the retort and pulled across the treated wood bundles by the vacuum pump. This allows the treated wood bundles to begin cooling inside the retort while collected vapors are routed to the ACZA scrubber for emissions control. The crack-and-vac treatment step has a consistent flowrate representative of the vacuum pump capacity when pulling with minimal resistance; other treatment steps have intermittent or no flow at all. For example, the vacuum and conditioning treatment steps will have moderate initial flowrates that gradually decrease to essentially no flow as the retort void volume is evacuated. Once the retort void volume is fully evacuated, the ACZA scrubber stack exhaust flowrate will drop to near zero. For this reason, the average flowrate for the crack-and-vac treatment step is much higher than the flowrate observed for other treatment steps as can be seen in the raw data measurements in the final test report appendices.

Bison collected two flowrate measurements during the crack-and-vac treatment step during Run 2 on September 16, 2021 at 16:40 and 17:07 as shown in the final test report. MFA assumes the flowrate measurements collected by Bison during Run 2 will be representative of Run 1 due to the fact that the flowrate is dictated by the vacuum pump and the same vacuum pump

operated under the same conditions in both runs. Therefore, MFA proposes to use the average flowrate measurement from Run 2 (296 cubic feet per minute) as a surrogate for Run 1. MFA also proposes to use the maximum measured ammonia concentration during Run 1 as a surrogate for the crack-and-vac treatment step. This is considered to be overly conservative as the purpose of the crack-and-vac treatment step is to cool the treated wood bundle leading to a lower potential for volatilization of ammonia over time. As shown in the attached table, the overall test average emission factor on a treated wood basis and treating solution usage basis is 0.016 pounds of ammonia emitted per cubic foot of treated wood, and 0.016 pounds of ammonia emitted per gallon of treating solution used, respectively.

As described in the final test report, the results of the directional airflow assessment for work tank nos. 2 and 7, and recovery tank nos. 26 and 27, were inconclusive. EPA Method 204 was not designed for, and cannot be used to, conclusively evaluate the capture efficiency of an open-air hood placed over a tank vent. While the method can show where there is clear capture, an inconclusive Method 204 under these circumstances demonstrates nothing. Nonetheless, Baxter is in the process of making improvements that will likely increase suction and capture efficiency of these tank vent hoods that include, but are not limited to, adjusting the proximity of each tank vent hood to the tank roof vent opening and erecting additional plastic sheeting and/or shrouding around the vent hood opening to prevent interference from wind cross-drafts. These measures will further enhance the performance of the VPC unit ventilation system. During the next round of stack testing tentatively scheduled for early December, these tank vents can be further assessed.

MFA looks forward to continued collaboration with LRAPA. If you have any questions or require clarifying information about the contents of this letter or the final test report, please contact me at (971) 254-8077.

Sincerely,
Maul Foster & Alongi, Inc.

Brian Snuffer Zukas, PE
Project Engineer
Attachments: Limitations
Table

cc: Georgia Baxter, J.H. Baxter & Co.
Tom Wood, Stoel Rives
Chad Darby, Maul Foster & Alongi, Inc.

# LIMITATIONS

The services undertaken in completing this letter were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This letter is solely for the use and information of our client unless otherwise noted. Any reliance on this letter by a third party is at such party's sole risk.

Opinions and recommendations contained in this letter apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this letter.

# TABLE

# Table 1
## Updated ACZA Scrubber Ammonia Source Test Results
## J.H. Baxter & Co.—Eugene, Oregon

| Treatment Step Description | Treatment Step No. | Start [1] (hh:mm) | End [1] (hh:mm) | Total [1] (hh:mm) | Step Length (hr) | Step Length (min) | Flowrate | Ammonia Concentration | Hourly Ammonia Emission Rate (lb/hr) | Ammonia Emissions Rate per Period (lb/period) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Source Test Run 1** | | | | | | | | | | |
| Vacuum | 2 | 07:05 | 09:35 | 02:30 | 2.5 | 150 | 6.82 (acfm) [a] | 6,097.87 (ppmvw) [2] | 0.11 [c] | 0.27 [d] |
| Fill Retort and Heat Solution | 3 | 09:35 | 10:20 | 00:45 | 0.75 | 45 | 22.7 (acfm) [a] | 5,183.01 (ppmvw) [2] | 0.31 [c] | 0.23 [d] |
| Vacuum | 6 | 13:45 | 16:45 | 03:00 | 3 | 180 | 5.68 (acfm) [a] | 8,344.26 (ppmvw) [2] | 0.12 [c] | 0.37 [d] |
| Final Vacuum | 8 | 16:55 | 19:55 | 03:00 | 3 | 180 | 5.68 (acfm) [a] | 7,771.09 (ppmvw) [2] | 0.12 [c] | 0.35 [d] |
| Crack-and-vac | 9 | 19:55 | 20:55 | 01:00 | 1 | 60 | 296 (dscfm) [3] | 9,163.97 (ppmvd) [4] | 7.07 [e] | 7.07 [d] |
| | | | | | | | | **Updated Total =** | **7.07** [5] | **8.29** [6] |
| | | | | | | | | **Updated emission factor—treated wood (lb/ft³) =** | **--** | **0.022** [f] |
| | | | | | | | | **Updated emission factor—treating solution (lb/gal) =** | **--** | **0.019** [g] |
| **Source Test Run 2** | | | | | | | | | | |
| Vacuum | 1 | 06:00 | 08:30 | 02:30 | 2.5 | 150 | 6.82 (acfm) [a] | 1,453.27 (ppmvw) [2] | 0.026 [c] | 0.065 [d] |
| Fill Retort and Heat Solution | 2 | 08:30 | 09:30 | 01:00 | 1 | 60 | 17.1 (acfm) [a] | 402.16 (ppmvw) [2] | 0.018 [c] | 0.018 [d] |
| Vacuum | 5 | 11:00 | 14:00 | 03:00 | 3 | 180 | 5.68 (acfm) [a] | 4,599.07 (ppmvw) [2] | 0.068 [c] | 0.21 [d] |
| Final Vacuum | 7 | 14:10 | 16:10 | 02:00 | 2 | 120 | 8.53 (acfm) [a] | 5,256.94 (ppmvw) [2] | 0.12 [c] | 0.24 [d] |
| Crack-and-vac | 8 | 16:10 | 17:10 | 01:00 | 1 | 60 | 296 (dscfm) [2] | 4,458.57 (ppmvd) [2] | 3.44 [e] | 3.44 [d] |
| | | | | | | | | **Total =** | **3.44** [5] | **3.97** [6] |
| | | | | | | | | **Emission factor—treated wood (lb/ft³) =** | **--** | **0.010** [f] |
| | | | | | | | | **Emission factor—treating solution (lb/gal) =** | **--** | **0.013** [g] |
| **OVERALL TEST AVERAGE** | | | | | | | | | | |
| | | | | | | | | **Overall Test Average Totals =** | **5.25** [7] | **6.13** [7] |
| | | | | | | | | **Average Emission factor—treated wood (lb/ft³) =** | **--** | **0.0160** [7] |
| | | | | | | | | **Average Emission factor—treating solution (lb/gal) =** | **--** | **0.0161** [7] |

NOTES:

(a) Flowrate (ft³/min) = (total retort void space [ft³]) / (step length [min])

Total retort void space (ft³) = 1,023 (b)

(b) Total retort void space (ft³) = (retort volume [ft³]) - (volume of treated wood [ft³])

Retort volume (ft³) = 1,407 (1)

Volume of treated wood (ft³) = 384 (1)

(c) Hourly ammonia emissions rate (lb/hr) = (ammonia concentration [ppmvw] / $10^6$) x (ambient pressure [atm]) x (flowrate [acfm]) x (60 min/hr) x (ammonia molecular weight [lb/lb-mol]) / (universal gas constant [atm-ft³/lb-mol-R]) / (ambient temperature [°F] + 459.67)

Ambient pressure (atm) = 1

Ammonia molecular weight (lb/lb-mol) = 17.031

Universal gas constant (atm-ft³/lb-mol-R) = 0.73024

Ambient temperature (°F) = 77

(d) Ammonia emissions rate per period (lb/period) = (step length [hr/period]) x (hourly ammonia emissions rate [lb/hr])

(e) Hourly ammonia emissions rate (lb/hr) = (ammonia concentration [ppmvd] / $10^6$) x (ambient pressure [atm]) x (flowrate [dscfm]) x (60 min/hr) x (ammonia molecular weight [lb/lb-mol]) / (universal gas constant [atm-ft³/lb-mol-R]) / (ambient temperature [°F] + 459.67)

Ambient pressure (atm) = 1

Ammonia molecular weight (lb/lb-mol) = 17.031

Universal gas constant (atm-ft³/lb-mol-R) = 0.73024

Ambient temperature (°F) = 77

(f) Emission factor—treated wood basis (lb/ft³) = (ammonia emissions rate per period [lb/period) / (wood treated during each run [ft³/period])

Wood treated during run 1 (ft³/period) = 384 (1)

Wood treated during run 2 (ft³/period) = 384 (1)

(g) Emission factor—treating solution basis (lb/gal) = (ammonia emissions rate per period [lb/period) / (treating solution used during each run [gal/period])

Treating solution used during run 1 (gal/period) = 436 (1)

Treating solution used during run 2 (gal/period) = 299 (1)

REFERENCES:

(1) Information provided by J.H. Baxter & Co.

(2) Emissions Test Report prepared by Bison Engineering, Inc. dated November 15, 2021. Represents the average measured concentration over the treatment step. During the crack-and-vac treatment step, the retort is cracked open allowing for ambient air to be pulled across the charge inside the retort. This results in a continuous flowrate to the ACZA scrubber which is not observed with the other treatment steps. Therefore, Bison collected two flowrate measurements during the run 2 crack-and-vac treatment step and the average is presented above.

(3) Bison Engineering, Inc. did not collect process data during the crack-and-vac treatment step for run 1 due to a miscommunication between sampling personnel and Baxter staff. Assumes the average measured flowrate during the run 2 crack-and-vac treatment step as representative.

(4) Bison Engineering, Inc. did not collect process data during the crack-and-vac treatment step for run 1 due to a miscommunication between sampling personnel and Baxter staff. Conservatively assumes the maximum measured concentration during run 1 (see step 8, final vacuum at 16:58:50) as a surrogate.

(5) Value represents the maximum hourly emission rate since the treatment steps cannot overlap.

(6) Value represents the sum total for each run.

(7) Value represents the overall source test average between runs 1 and 2.