Memorandum

To: Michael Lannan, Tech Environmental
Matthew Riegert, Tech Environmental

Date: May 27, 2022

Project #: 73087.00

From: Jason Ross, P.E., Director of Noise and Vibration
Lizzy Duffy, Noise Analyst

Re: Response to Comments from Tech Environmental Review of BMS Noise Study

Tech Environmental has reviewed materials provided by Bristol-Myers Squibb (BMS) including VHB's "Bristol-Myers Squibb Central Utility Building Equipment Expansion" Noise Assessment dated May 2022 and a Sound Barrier/Mitigation Concept Plan dated May 11, 2022. This memorandum provides additional information and responses to the comments provided by Tech Environmental.

VHB kindly requests clarification from Tech Environmental on which specific issues must be resolved and resubmitted to obtain a complete approval record and which issues are provided as guidance for potential future permit applications.

Reference Sound Levels Comment: This comment requests clarification on which sources were modeled based on sound level measurements at the facility versus manufacturer specifications.

As stated on page 14 of the Noise Assessment, sound emissions of the existing and proposed Marley NC Class Cooling Towers, pumps, and the existing Caterpillar 2500kW emergency generators were based on manufacturer specifications. The sound power level emissions from the manufacturer specifications are included in the Appendix. To clarify, this is the only equipment at the BMS facility that was modeled based on manufacturer specifications. All other equipment is modeled based on sound levels measured at the facility.

Emergency Generator Emissions Comment: This comment indicates that the 2500kW emergency generators are presented in both Table A1 and manufacturer specifications in the Appendix and describes two different sound levels reported in the specifications. Additionally, the comment refers to Table A1 which includes a sound power level of 87 dBA for both the generator's mechanical source and exhaust source.

The sound power level for the exhaust including the silencer is reported correctly in Table A1 as 87 dBA. The sound power level of the mechanical source including the enclosure is modeled correctly at 80.5 dBA, but is not reflected correctly in Table A1. Table A1 will be updated accordingly.

The sound power level of the exhaust source is based on CATs manufacturer data included in the Appendix for operation of the generator at 100% load at a distance of 6.6 feet. The noise reduction from the silencer is presented in Table A2 of the Appendix and is based on the PK-EI-20-DBISO silencer manufacturer data included in the Appendix.

The sound power level of the mechanical source is based on CATs manufacturer data included in the Appendix for operation of the generator at 100% load at a distance of 3.3 feet. The noise reduction from the enclosure is 45 dBA based on the specification included in the Appendix for the Pritchard Brown Weatherproof Enclosure. Although this specification also references achieving a sound level of 60 dBA at 50 feet, this is assumed to either be a general statement that is not specific to the CAT generator mechanical sound emissions and/or is referencing more of a guaranteed level not to exceed. VHB believes that using the actual generator manufacturer specifications for mechanical noise and the noise reduction specification of the enclosure is a more accurate sound modeling input.

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Building 131 (LOC)-Extension Equipment Comment: This comment requests that VHB review the modeling sources and the measurement results of the large AHU that were conducted on 4/13/2022 and observed by Tech Environmental.

As requested by Tech Environmental VHB has reviewed the measurement data, photos, and videos of the AHU. The measurements were conducted at a distance of 1 meter from the equipment with a reading of 76 dBA (Leq). Photos of the measurement location show that the microphone was located at a distance of 1 meter from the equipment. The video taken during the measurements indicate the sound is tonal and the amplitude is modulating and that there was a brief startup period where sound levels were higher, but that the more sustained and constant sound level was lower. These same characteristics are observed in the sound level measurement data. VHB believes that the measurements conducted and supporting documentation validate the measurement and modeling results.

Quantities of Sources Comment: This comment requests further insight into the number of pieces of equipment that were operating during the site visits on 4/13/2022 and 4/25/2022 and were measured for input to the model compared to the total equipment at the facility.

As indicated in this comment, VHB modeled two of the four emergency generators. The emergency generators at the facility are only operated briefly for operational checks and under emergency conditions. The generators were not operating during the site visits. BMS has indicated that a maximum of two generators would operate at any given time and that there are four generators at the facility for redundancy.

The CUB (Building 140) has two York AHUs and two Mario Coil AHUs; however, only one of each was modeled (ID 4 & ID 8) because only one of each was observed to operate during the site visit. BMS has indicated that is a typical operating condition of the facility and that modeling one of each unit is a representative condition. Two of the eight remaining exhaust fans on the CUB (Building 140) were running at the time when the CUB rooftop equipment was measured during the site visit on 4/13/2022. The two AHUs (ID 4 and ID 8) were the main noise sources on the CUB during the monitoring period.

During the measurement period of the CMB (Building 210) on 4/13/2022, there was only one noise source present. That was the single vent stack (ID 19). No other equipment was running at the time of the measurement period for the CMB.

During the visit on 04/13/2022, VHB and Tech Environmental were unable to access the roof of the Warehouse building. VHB and Tech were able to enter the building and observe that there were no signs of lab equipment, refrigeration, air handling systems, or large pieces of mechanical equipment for the building. The Warehouse building was mostly used for storage with open-aired shelving. While there are three pieces of mechanical equipment on the roof, the Warehouse Expansion (accessed on 4/25/2022), adjacent to the Warehouse building includes mechanical equipment for storage of products manufactured by BMS. Air handling units, exhaust fans, refrigeration equipment, etc. were all observed on the roof of the Warehouse Expansion. Because of the type of storage and purpose the Warehouse Expansion serves for BMS versus the Warehouse building, the Warehouse building was not prioritized in the inclusion of the normal operating condition model.

During the two site visits, VHB's purpose was to investigate and measure only the equipment that was running at the time of accessing of the different rooftops on the BMS campus. Timing and order of accessing building roofs was determine by the BMS guide. The equipment included in the Noise Assessment model was only the equipment running during time of access. Below address the concerns about certain buildings with more mechanical equipment than represented in the model.

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- The LOC (Building 131) was visited on 4/13/2022. During that time, eight measurements were taken at all the operating equipment. Two of the measurements (ID 14 and 15), were modeled twice because two of the same equipment (based on model numbers and manufacturers) were running at that time. BMS uses redundancy systems in order to operate efficiently. The other equipment in question were not running, thus not modeled. This roof also has a parapet that ranges from 4' to 6' in places. The sound emissions from the mechanical equipment resulted in contours of 50 dBA next to the building. There are two penthouses on the roof of the LOC. For future noise analyzes, the penthouse equipment should be measured.
- The BDB (Building 231) was visited on 4/13/2022 and 4/25/2022. VHB conducted measurements twice at the building rooftop to compare measurement data representing the two of the nine tall stacks on the rooftop. During both visits, two stacks were operating only. During the 4/13 visit, one measurement was taken to represent one of the two stacks. On 4/25, two measurements were taken at the top of the stack with one measurement at the grazing angle. For the other equipment on the rooftop, VHB conducted seven other measurements to capture the mechanical sound equipment running at that time on 4/13. During that visit, the main noise source was the group of five exhaust fans (ID 22 and 24). Great care was taken to accurately measure the sound emissions coming from these five exhaust fans by conducting two additional measurements taken at different distances from the equipment. No other equipment was running during either site visit except what was included in the Noise Assessment model.
- The LSCC (Building 110) was one of the main priorities in conducting an additional site visit on the 25th of April. During the first visit on 4/13, the upper roof was accessed and VHB conducted six measurements to represent the running equipment. At that time, VHB and Tech investigated other places where additional measurements were needed. This included the louvers on the east and west side of the LSCC building, and the three lower roofs. On the 25th of April, VHB conducted 14 measurements of equipment that were operating on the three different roofs of the LSCC. An additional five measurements were conducted for the louvers on the LSCC building. On the three lower roofs, VHB only measured the equipment that was running at the time to capture the typical operating noise conditions of the LSCC. The LSCC does have an extensive roof racking system for piping along the southern lower roof of the building. That equipment blocks the view of five of the ten operating refrigeration equipment below it. One measurement was taken for those five pieces of equipment because the equipment had the same make and model number.
- The CTF (Building 310) roof was accessed on the 13th of April in 2022. The aerials used in the figures are dated 10/06/2021 from Nearmap. The CTF was under construction at that time. These items and debris on the CTF roof from the construction were not observed during the field visit. This roof includes seven vents, three of them were operating and measured by VHB. There were also 11 short exhaust stacks/vents that are on the roof. None were operating at the time of roof access. The measured operating building mechanical equipment was assumed to be the normal operating condition.