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December 22, 2023

Ms. Heather Kuoppamaki
Environmental Engineer
Oregon Department of Environmental Quality
Cleaner Air Oregon
700 NE Multnomah Street, Suite 600
Portland, OR 97232

via email: Heather.Kuoppamaki@deq.oregon.gov

Re: Ecolube Recovery AQ Source Number 26-3021
Revised CAO Emissions Inventory - Tank Emissions

Dear Ms. Kuoppamaki:

On behalf of Ecolube Recovery (ELR) we are submitting a revised Cleaner Air Oregon Air Toxics Emissions Inventory (ATEI) and Level 3 Risk Assessment. This submission incorporates revised tank emissions based on the comments and requests for update in DEQ's letter dated November 9, 2023, along with some additional changes determined while preparing these revised emissions. EcoLube previously communicated to DEQ in a letter on November 14, 2023 responses to two of the three requests, and they are incorporated in this response for completeness.

> *DEQ Request 1. Please update the emission factor calculations both "annual – chronic" and "max daily – acute" for the TANKS and TANKS_CONTROLLED TEUs by using the methodology described in EPA AP42 Chapter 7, Section 7.1.4 "Speciation Methodology" to determine the emission rate of each component of the tank vapors using Raoult's Law.*

The speciation methodology in AP-42, Section 7.1.4 is based on the principle that the liquid composition is related to the vapor composition based on Raoult's Law, which states that the mole fraction of the component in the liquid (x_i) multiplied by the vapor pressure of the pure component (at the average daily liquid surface temperature) (P) is equal to the partial pressure (P_i) of that component. The vapor pressure of each component is calculated based on Antoine's equation and corresponding coefficients found in the supporting tables and other technical references.

For the ELR tanks to maintain as much flexibility as possible, the tanks have been divided into two categories, those that handle light ends or distillate, and those that do not. The "Distillate" profile is based on the liquid composition sampling results previously provided for "Light Ends", while the "Non-Distillate" profile is based on the liquid composition sampling results previously provided for all other samples. The liquid compositions that are the basis for the vapor speciation are provided below:

CAS #	Component	Distillate Weight % in Liquid Phase	Non-Distillate Weight % in Liquid Phase
00091-57-6	2-Methyl naphthalene	0.2860%	0%
00091-20-3	Naphthalene	0.1660%	0%
00108-95-2	Phenol	0%	0.0035%
00095-48-7	Cresols (mixture), including m-cresol, o-cresol, p-cresol	0%	0.0013%
00071-43-2	Benzene	0.0232%	0.0039%
00100-41-4	Ethyl benzene	0.0589%	0.0148%
00098-82-8	Isopropylbenzene (Cumene)	0.0122%	0%
00108-88-3	Toluene	0.2090%	0.0508%
00110-54-3	Hexane	0.0345%	0.0057%
00108-38-3	Xylene (mixture), including m-xylene, o-xylene, p-xylene	0.3480%	0.0815%
07783-06-4	Hydrogen sulfide	0.0170%	0%

These components, however, do not account for the entire liquid composition, which is primarily comprised of various base oils, longer chain alkanes and alkenes, and other non-toxic air contaminants. For this remainder, the composition is estimated to be split between two petroleum products, No. 2 fuel oil (diesel) and jet naphtha (JP-4), from AP-42, Chapter 7, Table 7.1-2. These liquids are used to achieve the appropriate range of vapor pressure correlating to the measured samples analyzed and results submitted previously (Att. E). The various tanks at the facility are estimated to have a maximum vapor pressure ranging from 0.6 psia to 1.1 psia based on the sampling results previously provided in the original Attachment E, and the compositions described above result in calculated vapor pressure ranging from 0.63 psia up to 1.11 psia for distillate, and from 0.56 psia up to 1.0 psia for non-distillate. These calculated vapor pressures agree well with the sampled vapor pressures and demonstrate that the split of the base oil components used is a good approximation.

For each month, the vapor speciation tables calculate the pure component vapor pressures based on the monthly temperature, and then apply Raoult's Law to determine the corresponding vapor weight fraction. The maximum vapor weight fraction from any month for each component is calculated and applied for the annual emissions factors, shown below:

CAS #	TAC	Distillate Weight % in Vapor Phase	Non-Distillate Weight % in Vapor Phase
00091-57-6	2-Methyl naphthalene	0.00031%	0%
00091-20-3	Naphthalene	0.00072%	0%
00108-95-2	Phenol	0%	0.000018%
00095-48-7	Cresols (mixture), including m-cresol, o-cresol, p-cresol	0%	0.000004%
00071-43-2	Benzene	0.043%	0.0067%
00100-41-4	Ethyl benzene	0.010%	0.0024%
00098-82-8	Isopropylbenzene (Cumene)	0.0010%	0%
00108-88-3	Toluene	0.11%	0.026%
00110-54-3	Hexane	0.10%	0.016%

00108-38-3	Xylene (mixture), including m-xylene, o-xylene, p-xylene	0.053%	0.012%
07783-06-4	Hydrogen sulfide	6.62%	0%

For short-term emissions, the worse-case temperature of 95 °F (based on the TCEQ short-term tank filling emissions guidance) was used to calculate the pure component vapor pressures, and the subsequent vapor weight percentages were calculated for distillate and non-distillate, shown below:

CAS #	TAC	Distillate Weight % in Vapor Phase	Non-Distillate Weight % in Vapor Phase
00091-57-6	2-Methyl naphthalene	0.00063%	0%
00091-20-3	Naphthalene	0.0013%	0%
00108-95-2	Phenol	0%	0.000038%
00095-48-7	Cresols (mixture), including m-cresol, o-cresol, p-cresol	0%	0.000009%
00071-43-2	Benzene	0.050%	0.0077%
00100-41-4	Ethyl benzene	0.014%	0.0033%
00098-82-8	Isopropylbenzene (Cumene)	0.0015%	0%
00108-88-3	Toluene	0.14%	0.032%
00110-54-3	Hexane	0.11%	0.018%
00108-38-3	Xylene (mixture), including m-xylene, o-xylene, p-xylene	0.073%	0.016%
07783-06-4	Hydrogen sulfide	4.75%	0%

These vapor speciations are then applied to the tank volatile emissions at the ELR facility. These have previously been calculated and submitted as Attachment H, but during the preparation of this submission, a few changes were made to the tank emissions, summarized below:

- Tanks JAIL-11, CT-5, CT-6, SO-1 and SO-2 were inadvertently not included in the previous tank inventory but are included with this submittal.
- Tanks UO-1, UO-2, UO-3, UO-4, UO-5 and UO-6 are controlled with a carbon system that was not previously accounted for in the tank emissions. The revised emissions included with this submittal account for these controls.

The only tanks that are used for distillate are controlled by carbon systems, though they may hold other products as well (Tanks WLE-1, PF2, Tk 30, UO-1, UO-2, UO-3, UO-4, UO-5, UO-6). The uncontrolled tanks do not handle distillate but can handle a variety of other materials. Based on this, the uncontrolled tank emissions use the non-distillate vapor speciation described above, as well as tanks AF-1 and IT 100-2, which are controlled but not used for distillate. The controlled tanks use the distillate vapor speciation with a 90% control efficiency applied, except for Tanks AF-1 and IT 100-2 that are non-distillate.

One tank at the facility is heated, AF-1, the asphalt flux tank. This tank was sampled previously for the presence of toxic air contaminants, all of which were non-detect. To be conservative, however, this tank is still assumed to have the same vapor speciation as the other non-distillate tanks.

DEQ Request 2. Please update P_{va} value for Tank 220-2 the Short-term Tank Emission Calculations from Filling to match the value listed in Attachment H of the Emission Inventory Supporting Information for EcoLube Recovery LLC.

DEQ is correct that the P_{va} value for Tank 220-2 should have been 1.0 psia instead of 0.8 psia. This was simply a mistake, and the revised emissions inventory incorporates this correction.

DEQ Request 3. Please confirm the status of Tank 220-1. Details regarding this tank are included in the supporting calculations for provided in the Emission Inventory Supporting Information, but emissions from this tank are not included in the tank summary.

Tank 220-1 has been out of service more recently, but it is still present and will likely be used in the future. The tank should be included in the emissions inventory and has been incorporated into this submittal, using the same methodology of the other uncontrolled tanks.

In summary, included with this submittal is a revised version of the annual tank calculations for VOCs, Attachment H, which includes the tanks that were inadvertently missed previously. Included are revised short-term tank VOC emissions, which include the additional tanks and account for the carbon control on the UO-1 – UO-6 tanks. Also, a revised Attachment B, which includes the vapor weight calculations for both the distillate and non-distillate profiles, as well as the toxic air contaminant calculations for annual and daily emissions based on these vapor speciations. These emissions are also included in a revised AQ520 form.

Sincerely,

Travis Quarles
Vice President, Bridgewater Group

cc: J.R Giska, DEQ
Steve Mortensen, ELR
Kent Norville, Bridgewater Group
Eric Spencer, ELR

Enclosures: Revised Attachment H Tank VOC Calculations (electronic file)
Revised Short-term Tank VOC Emissions (electronic file)
Revised Attachment B Supporting Calculations (electronic file)
Revised AQ520 Form (electronic file)