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MEMORANDUM

TO: Steve Teel and Kaia Petersen (Washington State Department of Ecology)

FROM: Patrick Hsieh and Tasya Gray (DOF)

CC: Keith Lund and William Beck (Stericycle), Steve Drumheller (Harris Group)

DATE: July 18, 2016

SUBJECT: Vapor Mitigation System Design Response to Comments, Stericycle Tacoma Facility

Dalton, Olmsted, and Fuglevand (DOF) has provided this memorandum in support of Stericycle's construction of the Soil Vapor Mitigation System (SVMS) for the Lab Pack Building at the Tacoma facility. The Washington Department of Ecology (Ecology) provided comments on June 28, 2016, on the suggested SVMS outline provided in the Vapor Mitigation System Preliminary Design Overview, Stericycle Tacoma Facility (June 10, 2016, DOF). The purpose of this memorandum is to respond to the June 28, comments and provide the detailed design to Ecology for review. The design documents are attached in Appendix A, Mitigation Design and Installation Plan. Comments are addressed below.

RESPONSE TO COMMENTS

Per Ecology's June 28, 2016 comments, the SVMS will be installed under the 6 rooms that are fully enclosed (Rooms 110 through 115, Drawing A1.0, Appendix A). An active depressurization system will be installed including a liner, ventilation piping, blower, and controls.

Stericycle's proposed design meets or exceeds Ecology requirements, responses to specific comments are below. Ecology's comments are in *Italics* with Stericycle responses following.

1. *The specified vapor barrier must be continuous across all enclosed rooms. Any plumbing, conduit, support columns, or other penetrations that are required to come through the barrier must be sealed.*

The barrier will be continuous underneath all 6 rooms and will be installed under grade beams, piping and trench drains as shown in Drawings ENV-0 through ENV-5, Appendix A. Electrical conduit will be installed above grade throughout the building

and the electrical service line will daylight outside the building the electrical conduit shall penetrate the exterior wall of the mechanical room (Room 115) and not in the sub slab.

2. *The vapor barrier material must be compatible with and resist degradation from known contaminants.*

The proposed vapor barrier (Absolute Barrier® X-Series X40BAL) is a 40 millimeter High Density Polyethylene (HDPE) plastic with an inner core of EVOH barrier resin, designed as a barrier against odors, methane, radon, and VOCs. The chemically resistant material provides consistent thickness and delivers high installation performance in the field.

3. *For areas outside of the vapor barrier, the design should be consistent with methane hazard mitigation standards for buildings with natural ventilation provided in an information bulletin provided by the City of Los Angeles Department of Building and Safety (attached).*

The remainder of the building has sufficient open area to meet Method B of the information bulletin provided by the City of Los Angeles Building Code (LABC) Document NO. P/BC 2014-102. Trench Dams will be installed for below grade utilities per Detail 8 of the LABC Document.

4. *In addition to ASTM E2435-05 cited in the memo, ASTM standards E1643-11[1] and E1745-11[2] should be reviewed and implemented as applicable to the selected vapor mitigation product.*

The additional ASTM standards have been reviewed and will be implemented as part of the proposed mitigation system.

5. *The active depressurization system must establish a radius of influence beyond the footprint of the vapor barrier.*

The proposed mitigation system is designed to provide an ROI that exceeds the footprint of the vapor barrier. The selected blower is able to attain more than the expected vacuum and flow rate to recover more than 20 pore volumes of the surrounding subgrade materials per day. Backup calculations are provided in Appendix A.

6. *A non-woven geotextile should be placed directly under the vapor barrier. Installation of the geotextile is an industry standard during the installation of vapor barrier in new construction where contaminated vapors are a perceived risk. The purpose of the geotextile is precautionary as it provides a cushioning layer during the vapor barrier installation and subsequent concrete pour to help prevent*

against accidental rips and tears in the liner which may not be evident during inspection.

The proposed SVMS shall include a non-woven geotextile (AGRUTEX 321) below the liner to provide a cushion between the liner and the subgrade/capillary break material.

7. *A non-woven geotextile should be installed below the capillary break material. This geotextile will protect the capillary break material from being mixed with the finer-grained backfill/native soil underneath. Without this geotextile layer, fine grain particles will enter the capillary break aggregate and reduce the matrix porosity and thus the ability of vapors to move laterally throughout the subslab portion of the building foot print. The impact of the materials mixing will worsen over time.*

The proposed SVMS shall also include an additional layer of AGRUTEX 321 between the subgrade rock/capillary break material and the standard backfill to prevent entrainment of fines into the subgrade.

8. *The Mitigation Design and Installation Plan should include:*

    a. *Ventilation piping layout showing radius of influence and basis.*
    b. *Civil construction details depicting the vapor barrier and ventilation piping in relation to slab footings, supports, and trench drains.*
    c. *Details about the blower and exhaust system including vapor monitoring points.*

These details are provided as requested. Please see the Mitigation Design and Installation plan in Appendix A.

9. *Discharging contaminated vapors to air may be subject to review and permitting by the Puget Sound Clean Air Agency (PSCAA) per RCW 70.94. Stericycle should contact PSCAA to determine if a notice of intent or air discharge permit is required for this vapor mitigation system based on the elevated levels of contaminants observed in prior monitoring events and modeled discharged concentrations. The discharge may be de minimis or otherwise exempt.*

PSCAA regulations were reviewed and emissions were estimated per WAC 173-460-150 using the maximum soil vapor concentrations reported in the Soil Vapor Sampling Report, Stericycle Tacoma Facility (May 13, 2016, Amec Foster Wheeler). All emissions estimates for specific contaminants were several orders of magnitude below the de minimis limits and the total of the toxic air contaminants was estimated to be less than 1 pound per year, well under the 1,000 pound threshold (Regulation I, 6.03(c) (94).) Backup calculations are provided in Appendix B.

10. If configuration of the Lab Pack Building changes and rooms with open sidewalls are enclosed, additional vapor mitigation measures will be necessary.

Stericycle will provide additional vapor mitigation measures, if necessary. These could be incorporated into the existing system or new independent SVMS could be installed.

REFERENCES

Amec Foster Wheeler, Soil Vapor Sampling Report, Stericycle Tacoma Facility (May 13, 2016

ASTM E1643-11 Standard Practices for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

ASTM E1745-11 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

DOF, Vapor Mitigation System Preliminary Design Overview, Stericycle Tacoma Facility, June 10, 2016

Puget Sound Clean Air Agency (PSCAA) Regulation I

Washington State Department of Ecology, email from Kaia Petersen including attachment: Ecology comments on Vapor Mitigation System Preliminary Design Overview, June 28, 2016