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DEPARTMENT OF ECOLOGY

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March 3, 2015

Mr. Toraj Ghofrani, P.E.
King County Department of Natural Resources and Parks
Solid Waste Division
201 S Jackson Street, Suite 701
Seattle, Washington 98104

Re: Cedar Hills Regional Landfill, East Perched Zones Remedial Investigation and Feasibility Study Work Plan, December 2014

Dear Mr. Ghofrani:

King County Solid Waste Division (KCSWD) submitted a draft Remedial Investigation and Feasibility Study (RI/FS) workplan for the Cedar Hills Regional Landfill East Perched Zone for Ecology's opinion in December 2014. The draft RI/FS Work Plan describes independent remedial actions KCSWD is conducting at the Cedar Hills Regional Landfill (CHRL) under WAC 173-340-515 Independent remedial actions.

This letter provides Ecology's opinion. We are providing this opinion under the authority of the Chapter 173-340 WAC Model Toxics Control Act (MTCA) and Chapter 70.105D RCW. Ecology's opinions for independent remedial actions are advisory only, and are not official comments, endorsements, or approvals for the proposed work.

This opinion is based on an analysis of whether the draft RI/FS Work Plan outlines a scope of work that will provide the data needed to complete a RI/FS that meets the substantive requirements of MTCA, Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC (collectively "substantive requirements of MTCA").

This opinion applies only to the Site described below. The Site is defined by the nature and extent of contamination associated with releases of hazardous substances to the environment as presented in:

1. East Main Hill Perched Zones Technical Memorandum, Cedar Hills Regional Landfill, prepared for King County Department of Natural resources and Parks, Solid Waste Division, prepared by Aspect Consulting, LLC, October 22, 2010.
2. Groundwater monitoring reports from the 1980s to the present, showing exceedances of contaminant levels set by Chapter 173-200 WAC Water Quality Standards for Ground Waters of the State of Washington.

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D0.40(4). The opinion is advisory only and not binding on Ecology.

Ecology's Waste 2 Resources Program has reviewed the following information regarding your proposed remedial action:

1. Cedar Hills Regional Landfill, Environmental Control Systems Modifications Project, Contract No. E00286E12, *East Perched Zones Remedial Investigation and Feasibility Study Work Plan*, Agency Review Draft, prepared by Aspect Consulting, LLC, December 2014.
2. Cedar Hills Regional Landfill, Environmental Control Systems Modifications Project, Contract No. E00286E12, *Data Gaps Report*, prepared by AECOM Technical Services, Inc., January 13, 2015.

Based on a review of the documents listed above, Ecology is providing the following opinions:

Work Plan Text, Tables, and Figures

1. Pg 8, 3.1.4.2 Northeast Shallow Perched Zone, third sentence: It looks, from Figure 6, that Stream 3 moves east-southeast.
2. Pg 11, 3.3.4 Other Utilities, second sentence: For clarity, because "Passage Point" is the current name of the facility, we suggest editing the sentence to read "...it was associated with the facility currently known as "Passage Point."
3. Pg 15, 5.1.1 Groundwater, second sentence: The number 38 seems low for a 28 year time span. Even if routine quarterly sampling only occurred for half of the time span, the number of sampling events should be 76.

4. Pg 17, 5.1.4 Soil Gas: Use of “soil gas” and “landfill gas” is confusing. It seems the work plan uses the term “soil gas” when analyzed for VOCs and “landfill gas” when analyzed for methane, CO₂, and O₂, yet it’s the same gas at the same locations. We suggest the document define how these terms are being used.
5. Pg 18, first full sentence at top of page starting “Because ...”: Please explain why MH-46N is more representative of east side leachate than P2. What mixed inflows are present at P2?
6. Pg 21, last bullet: Should it be “North” or “Northeast” instead of “East”?
In addition to the perimeter collector, the utility drawings indicate perforated leachate collection pipes between the landfill and the North Perimeter Collector at CO11 and CO12B, passing through native soil. The potential for leachate releases from these perforated pipes should also be considered.
7. Pg 22, 6.2.1 Landfill Gas, third paragraph, third sentence: The reference to Figure 13 when discussing VOCs in landfill gas is confusing because that figure shows groundwater VOC concentrations and not LFG VOC concentrations.
8. Pg 23, second full sentence at top of page: Could stable chloride concentrations indicate there is a continuing source? The historic source could be gone, yet elevated chloride continues at lower levels because of an ongoing source.
9. Pg 23, first full paragraph, second sentence: If leachate impacts have dissipated in the MW-47 vicinity, what is the explanation for the slightly elevated chloride at EW-14 and -15? How much is “slightly”?
10. Pg 23, 6.2.2.1 North Perimeter Leachate Collector – East Branch Source and Pathways, first paragraph: Please provide more information about the original purpose of this collector. If its purpose was to control shallow groundwater, was that because the groundwater was suspected or known to be contaminated with leachate?
11. Pg 23, 6.2.2.1 North Perimeter Leachate Collector – East Branch Source and Pathways, second paragraph, item 1: What is meant by “3-foot trench liner”? The paragraph above item 1 says the liner went 1.5 feet up the sidewalls.
12. Pg 27, last paragraph, last two sentences: Were the constituents for which MDLs exceeded corresponding PSLs added to the list of preliminary COPCs?
13. Pg 32, RI Activity table, first row (“Wellhead ...”): The Activity Duration column is blank. Is this item included in the 2 weeks duration for the activities listed above it on the previous page?
14. Pg 32-33, 8.2.1.1 Groundwater: One sampling event might not provide sufficient data for groundwater quality. Wet and dry season sampling might be a better alternative.

15. Pg 35, second and third bullets: Ecology recommends sampling the shallow screen interval at the two ATC gas probes. These probes are nearest to the Passage Point facility where women and children are housed. If VOCs are present in the area of Passage Point, shallow gas data is better than using deep data and applying an attenuation factor.
16. Pg 36, sentence near top of page beginning, "A soil gas sample will be collected ...": Consider using a smaller Summa canister. According to Blayne Hartman, Ph.D., the volume of soil gas withdrawn is an important issue influencing the integrity and composition of soil gas samples. "The larger the quantity of soil gas withdrawn, the greater the uncertainty about the exact location from which the soil vapor came.... In addition, large purge volumes can create vacuum conditions that cause contaminant partitioning from the soil into the soil gas.... Lastly, the larger the sample volume required, the larger and more complex the sample collection system required (e.g., vacuum pumps, larger sample containers)." (Hartman, 2002) According to Hartman, laboratories can get detection limits for VOCs of 0.2 to 0.5 ppbv with only 300 cc of sample using method TO-15. (Hartman, 2004)

Hartman, 2002, Blayne Hartman, Ph.D., *How to Collect Reliable Soil-Gas Data for Risk-Based Applications, Part 1: Active Soil-Gas Method*, LUSTLine Bulletin 42, October 2002. <http://www.hartmaneg.com/wp-content/uploads/2013/11/L142.Soil-Vapor-Methods.pdf>

Hartman, 2004, Blayne Hartman, Ph.D., *How to Collect Reliable Soil-Gas Data for Risk Based Applications – Specifically Vapor Intrusion, Part 3 – Answers to Frequently Asked Questions*, LUSTLine Bulletin 48, November 2004. <http://www.hartmaneg.com/wp-content/uploads/2013/11/LL48-Soil-Vapor-Methods-Part3-.pdf>

17. Pg 36, 8.2.1.5 Leachate, first sentence: This is the first time MH-17N and FS-3 are mentioned. Please provide a description of these sampling locations, including where they are located (refer to a figure) and what drains into them.
18. Pg 36, 8.2.1.5 Leachate, fourth bullet: Please explain the "truncated list". Table A-5 seems to indicate the list of analyses for water and leachate samples is the same.
19. Pg 38, 9.1.5 Develop and Screen Cleanup Alternatives, second sentence: Ecology has not made this determination. A landfill owner going through the MTCA process must develop and evaluate cleanup alternatives. While the result may be that it is impractical to move or treat the contents of a landfill, each site needs to be evaluated in accordance with the MTCA process.
20. Pg 38, 9.1.5 Develop and Screen Cleanup Alternatives, third sentence: Chapter 173-304 WAC is an ARAR for landfill closure. It is not a model remedy or presumptive remedy. Also, note that chapter 173-304 WAC is the minimum required for closure, if closure is part of the cleanup action.

21. Pg 39, 9.1.5.2 Detailed Screening and Analysis of Alternatives, second paragraph, second sentence: WAC 173-340-710(7)(c) says, "For solid waste landfills, the solid waste closure requirements in chapter 173-304 WAC shall be minimum requirements for cleanup actions conducted under this chapter." The closure requirements in chapter 173-304 WAC are found in WAC 173-304-460(3)(e) and pertain to the final cover design.
The starting point for the alternatives development and screening should be the remedial action objectives that come from the RI findings. A reasonable range of cleanup action alternatives should be developed that address the remedial action objectives. If the alternatives include cover improvement, it may be appropriate to use WAC 173-304-460(3)(e) as an ARAR.
22. Pg 40, 10.1 Schedule, second paragraph: What is the standard turn-around time for the TO-15 analysis laboratory?
23. Table 1 Summary of EPZ Explorations: MW – 23 is a dry well and should be decommission and replaced.
24. Table 7 Preliminary Groundwater Screening Criteria and Method Detection Limits: We could not confirm some of the criteria listed in the column for WAC 246-290-310 MCLs. Please provide a citation for the values listed for:
 - Bromodichloromethane
 - Bromoform
 - Chloroform
 - Dibromochloromethane
 - Methylene chloride
25. Table 9 Preliminary COPCs, Landfill Gas column: Is the "s" a typo?
26. Table 10 Data Gaps and RI Work Element Cross-Reference: Data gap for Groundwater should include abandonment of dry wells and drilling new wells. Also cleaning and purging some of EW series wells.
27. Figure 2: The four blue patches extending from Area 6 to the South Solid Waste Area are not current features and for clarity, should be removed.
28. 5a; 5b; 5c requires corrections - namely an explanation to the occurrence of groundwater table. 5a should be divided in segments for clarity.
29. Figure 6, does not have a date and year when the contours were compiled. Elevation values for the wells that were measured for groundwater levels should also be given on the map. That also pertains for figure 7; wells monitoring regional aquifer should have elevation values and date.
30. Figure 8: The additional Groundwater Extraction wells that were not dry should be included in the site model. The dates of sampling are 2009; 2013 data from the same year will be

better evidence of methane concentration and occurrence. The screen elevation for each well should be added. The same applies for figure 10.

31. Figure 11: It is not clear what are dates from which data was obtained in all wells except EW7 (2007). Screen elevation should be included (top of the screen and length). The same comment applies to Figure 12.
32. Figure 13: the dates differ for data included on the map, see comment 4. Screen elevations need to be added. Groundwater Extraction wells screen elevation varies from north to east. The same comments apply to figure 14 and in figure 15. Why were extraction wells EW9;10;11;12;13 not sampled for VOC's.
33. Figure 16: The map for metals in the regional aquifer includes data from year 2014 which is 7 years later than data for metals in perched zones. Screen elevations for each well should be added on the map.

Appendix A – Sampling and Analysis Plan

1. Please number the pages.
2. 2.1.2.1 Passive Diffusion Sampling: Please include a brief discussion in the SAP or the Work Plan about passive diffusion sampling – what it is, its advantages, and why you are trying it.
3. Soil Gas Sampling: See comment 16 above about the Summa canister size.
4. Page 3 Groundwater Monitoring Parameters; At which point background values for metals As; Fe; Mg; Chl; will be established.
5. Page 6 Well Inspection: Groundwater Extraction well EW series should be inspected to determine if cleaning or additional renovation is needed before sampling.
6. Table A-4: For soil gas, the table lists a 1-L Summa canister. This is not consistent with other parts of this work plan.
7. Figure A-2: Where is the secondary water level locations discussed in the text?
8. Figure A-3; Wells: EW -9, EW-10, EW-11, EW-12, and EW13 excluded, add explanation why. Add screen elevations for each well that will be sampled. The same for the figure A-4.

Appendix C: Individual Constituent Extent Maps

1. Figure C-1; Wells with detection are mostly EW series, sampled in 2007, except EB-6 data from 2014. It is not clear in what year the remaining wells on the map (non detect) were sampled.

2. Figures: C-1 to C- 19 should have screen elevations included for the wells shown on the figures. The date of sampling should be added on the map for each well, some are missing, for example: not detect wells.
3. Figure C-3; Some monitoring wells date is from "below the screen" orange circle, no value is given. Date of sampling event is not indicted either. Include missing information on the map at each figure where it is missing.
4. Figure C-15, repetitious of Figure 13. Figure C-16 is the same data as in Figure 14.

Appendix D: Time Series Concentration Plots for Selected Monitoring Wells

1. Figure 1 and 2; Explain why MW-27 is compared to MW-29 and MW-30, also why Alkalinity values are average.

Appendix E: Existing Infrastructure

1. Figure E-2, Leachate System Map: Several of the leachate lines are shown with long dashes, which, according to the legend, means the line type (solid or perforated) is not specified. It is concerning that King County does not know if leachate lines, such as the forcemain from PS-2 to MH-15 or the line from MHL to PS2, are solid or perforated. Please show these as solid or perforated. If there is doubt, a task to determine their status should be added to the RI.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Please contact us with any questions you have about our comments. We would be happy to meet with you if that would be helpful. Our contact information is below.

Sincerely,



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