# CORRESPONDENCE/MEMORANDUM

State of Wisconsin

DATE: April 25, 2022 FILE REF: 02-13-000849

TO: Refuse Hideaway Landfill file

FROM: Cindy Koepke – DNR project manager CJK

SUBJECT: Documentation of changes to the combined landfill gas and leachate collection system

BACKGROUND:
One of the remedial actions for the Refuse Hideaway Landfill is to "operate and maintain the existing gas/leachate collection system."[1] As originally constructed in 1991, this combined system collected leachate from 8 of the 13 gas/leachate wells and used a flare to burn the collected landfill gas. DNR hired contractors for regular operation & maintenance (and repairs as needed). In recent years, due to waste settlement affecting the conveyance lines and the age of the equipment, the gas/leachate system became inoperable. In 2020-2021, DNR undertook a major construction project to repair and upgrade the landfill control systems, including the gas/leachate system.

RECENT CHANGES TO LEACHATE COLLECTION
In 2019, a DNR contractor thoroughly evaluated the condition of all aspects of the landfill remedy, including the gas/leachate collection system. Wells GW-1 and GW-2 previously had less than 6 feet of leachate in them and did not have pumps; however, in 2019, these wells had 14 feet of leachate. Pumps were added to these two wells, and the pumps were replaced in all previously pumping wells. Presently 11 of the 13 gas/leachate wells are pumped for leachate collection.

RECENT CHANGES TO LANDFILL GAS COLLECTION
As the landfill aged, it produced less gas, leading to operational changes in the landfill gas system (such as cycling the blower and switching to a flare that operated at a lower methane concentration). The network of perimeter gas probes at Refuse Hideaway shows that gas is now primarily produced in the southwestern and eastern portions of the landfill. This new technical information and a goal of keeping the landfill gas collection system operating without frequent shutdowns led the DNR to switch from a combustion system to a blower with a passive vent when during the 2020-2021 repairs.

Data from samples of the passive vent effluent show that the landfill meets air quality requirements [2]without operating a flare (see attached spreadsheet).

DOCUMENTATION OF REPAIRS AND UPGRADES TO LEACHATE/LANDFILL GAS SYSTEM
DNR's oversight contractor prepared a documentation report covering the 2020-2021 repairs to the landfill. Operation and maintenance of the new and upgraded systems is covered in the Spring 2022 update of the Operations and Maintenance Manual.

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[1] EPA Superfund Record of Decision: Refuse Hideaway Landfill, Middleton WI, 6/28/1995, PB95-964109, EPA/ROD/R0S-95/281, published February 1996

[2] For federal hazardous air pollutants, no single pollutant can exceed 10 tons/year, and the total combined cannot exceed 25 tons/year. For state hazardous air conditions, the amount needs to be less than 25% of Table A, column (c) in NR 445.

| Pollutant | Sample Concentration (ppbv) | Molecular Weight (lb/lb*mol) | Landfill Gas Flow Rate (standard cubic feet/minute) | ft^3/(lb*mol) | Minutes/ hour | Maximum Theoretical Emissions (lb/hr) | State/Federal HAP | Emissions from Stacks <25 ft | Emissions if Fugitive <25 ft | Unit |
|---|---|---|---|---|---|---|---|---|---|---|
| carbon disulfide | 0.77 | 76.12 | 187 | 379 | 60 | 1.74E-06 | | 1.67E+00 | 4.18E-01 | |
| chlorobenzene | 16 | 112.56 | 187 | 379 | 60 | 5.33E-05 | | 2.47 | 6.18E-01 | lb/hr |
| chlorethane | 5.5 | 65.42 | 187 | 379 | 60 | 1.07E-05 | | 14.2 | 3.55E+00 | |
| chloroform | 0.41 | 119.38 | 187 | 379 | 60 | 1.45E-06 | | 2.62 | 6.55E-01 | |
| 1 4 dichlorobenzene | 2.8 | 147.01 | 187 | 379 | 60 | 1.22E-05 | | 162 | 4.05E+01 | |
| 1 1 DCA | 1.3 | 98.96 | 187 | 379 | 60 | 3.81E-06 | | 21.7 | 5.43E+00 | |
| 1 1 DCE | 0.33 | 96.95 | 187 | 379 | 60 | 9.47E-07 | | 1.06 | 2.65E-01 | |
| ethylbenzene | 45 | 106.17 | 187 | 379 | 60 | 1.41E-04 | | 23.3 | 5.83E+00 | |
| n hexane | 52 | 86.18 | 187 | 379 | 60 | 1.33E-04 | | 9.47 | 2.37E+00 | |
| PCE | 2.5 | 165.83 | 187 | 379 | 60 | 1.23E-05 | | 9.11 | 2.28E+00 | |
| TCE | 5.1 | 131.29 | 187 | 379 | 60 | 1.98E-05 | | 14.4 | 3.60E+00 | |
| vinyl chloride | 130 | 62.5 | 187 | 379 | 60 | 2.41E-04 | | 202 | 5.05E+01 | lb/yr |
| xylene, o- | 20 | 106.17 | 187 | 379 | 60 | 6.29E-05 | | 23.3 | 5.83E+00 | |
| m,p-xylene | 87 | 106.17 | 187 | 379 | 60 | 2.73E-04 | | 23.3 | 5.83E+00 | |
| Freon 22 (chlorodifluoromet | 95 | 86.47 | 187 | 379 | 60 | 2.43E-04 | | 8884381 | 2.22E+06 | lb/yr |
| 1 2 DCE total | 45 | 96.94 | 187 | 379 | 60 | 1.29E-04 | | 2.17 | 5.43E-01 | |
| hydrogen sulfide | 3077 | 34.1 | 187.00 | 379 | 60 | 3.11E-03 | | 0.749 | 1.87E-01 | |

total per 4.45E-03
total per 38.94
Without hydrogen sulfide, it's 11.74 lb/yr total of all
VC per yr = 2.11 lbs
Freon 22
per yr = 2.13
lbs

(example calculation below)

1,1,1-Trichloroethane (71-55-6)

Molecular Weight: 133.41 $\frac{lb}{lb-mol}$

Concentration in Inlet Gas: 0.48 $ppm_v$

Control Efficiency (combustion in LFG engines): 98.0%

$$MTE = \frac{\frac{0.48\ parts_{TCE}}{1{,}000{,}000\ parts_{LFG}} \times 2{,}496 \frac{scf_{LFG}}{min} \times 60 \frac{min}{hr} \times 133.41 \frac{lb}{lb-mol}}{379 \frac{ft^3}{lb-mol}} = 0.025 \frac{lb_{TCE}}{hr}; 0.11 \frac{ton_{TCE}}{yr}$$