WAITE HEINDEL
Environmental Management

August 15, 2024

Mr. John Gay
Casella Waste Systems, Inc.
1855 VT Route 100
Hyde Park, VT 05655

Re: May 2024 Water Quality Sampling, and
Analysis of Trends and Standards Exceedances
NEWSVT Landfills
Coventry, Vermont

Dear Joe:

Enclosed please find the results of the May 2024 water quality sampling round conducted at the NEWSVT Landfills in Coventry, Vermont in accordance with Conditions 67, 68, 69, 70 and 71 of the *Solid Waste Management Facility Certification,* "Solid Waste Cert.", effective October 12, 2018 and amended February 13, 2023 [leachate AST PFAS pre-treatment approval] and February 28, 2023 [Underdrain Outlet Phase 3 PFAS pre-treatment approval, and addition of MW-K1 to the semi-annual water quality monitoring plan].

Sampling was conducted by Wendy Shellito, Waite-Heindel Environmental Management (WHEM) Project Scientist, Chandler Noyes, WHEM Project Scientist, Christopher Page, WHEM Project Scientist and Cameron Coleburn, WHEM Staff Scientist. Groundwater, surface water, underdrain and leachate samples were collected between 5/6/2024 through 5/21/2024. Refer to the map of water quality sampling locations on page 2 of Appendix 1.

Between the previous sampling event in October 2024 and this current May 2024 sampling event, solid waste was being placed in Phase VI Cell 1. Leachate from all lined areas was being actively managed.

Reporting of results is in accordance with Condition 83 of the Solid Waste Cert. Excel files of groundwater quality and statistical evaluations will be provided separately.

Method(s) of Reporting Trends in Water Quality Data: This report describes recent trends in the water quality results. Trends are stated for the four broad categories of indicator parameters, inorganics [including metals], volatile organics, and PFAS [perfluoro- and poly-fluoroalkyl substances].

Trends are stated two ways:

- In each category, the trends in concentrations are estimated by visually comparing the values for this current round of sampling to the previous round of sampling [as agreed by K. Kathan, VTDEC Solid Waste Program, 3/03/2015);

- Five-year trends in groundwater concentrations are visually estimated from the graphs, only for parameters which exceed GESs for at least half of the latest 5-year period [per approved updated Water Quality Monitoring Program, 2/14/2019]. The 5-year period for this current report is the period from May 2019 to May 2024. Select graphs show less than 5 years of data, because that is all that is available.

Refer to the summary table of trends on pages 4-6 of Appendix 1; individual parameter graphs are in the detailed summary tables later in Appendix 1.

DEC Comments on Water Quality Report Regarding Previous Sampling Round:

The VTDEC Solid Waste Program ("SWP") issued a letter dated February 20, 2024, regarding the October 2023 Semi-Annual Water Quality Report. A copy of this letter is included on page 3 Appendix 1. This letter stated the following:

- *The Solid Waste Program has reviewed the report and determined the sampling event satisfies Conditions 68-71 for the Facility's 2018 certification. There are no questions or comments at this time.*

I. GROUNDWATER

All monitoring wells were successfully sampled in May 2024 via WHEM's low-flow sampling SOP with the exception of the three non-potable water supply wells, which were grab-sampled as usual, one monitoring well with insufficient water (G-27S) and one monitoring well obstructed with tubing (G-26BR). The low-flow tubing obstructing monitoring well G-26BR will be removed and sampled as soon as possible. The results for this well will be addressed in a separate letter. As per the SOP, all monitoring wells were field measured for depth to water; and temperature, specific conductance, dissolved oxygen (DO), pH, oxidation reduction potential (ORP) and turbidity readings were obtained until readings stabilized (or after one hour of data collection; whichever comes first), and samples were then collected. See summary tables in Appendix 1 and individual laboratory reports in Appendix 2. For a summary of recent trends, see Appendix 1, page 4; for tables showing standards exceedances in the May 2024 sampling round, see Appendix 1, pages 7-9; for a map of the most recent three rounds of PFAS results, see Appendix 1, page 322.

Groundwater samples were analyzed by Endyne, Inc., of Williston, Vermont, or their sub-contracted certified laboratories, for landfill indicator parameters, inorganic compounds, and volatile organic compounds (VOCs). All PFAS samples were analyzed by Alpha Analytical, AKA Pace Laboratory.

Various QA/QC samples (trip blanks, duplicates, and equipment blank samples) are collected throughout sampling. All QA/QC sample results were either an acceptable duplicate match and/or non-detected for VOCs and PFAS, indicating acceptable sampling and laboratory procedures in the May 2024 sampling round. See Section IV for details.

A. UP-GRADIENT OR CROSS-GRADIENT OF LINED AND UNLINED LANDFILLS (17 MONITORING WELLS)

Based on groundwater elevations and the map of groundwater flow directions in May 2024 (see this report's section VII on pages 29-30, and the map on pages 1-2 of Appendix 1), there are seventeen (17) wells that provide information on the up-gradient, or cross-gradient groundwater at this site: 409, 705, 706, BRW-3S, BRW-3D, BRW-4S, BRW-5S, E-3, G-7D, G-9D, G-10DR, G-11D, G-26BR, G-26D, DW-21 Office, DW-36516 St. Onge House & Barn (2005), and DW-30616 Maintenance Shop. In May 2024, sixteen (16) of these wells were successfully sampled. Monitoring well G-26BR had the low-flow tubing obstructing the well, which will be removed and sampled as soon as possible. The results for this well will be addressed in a separate letter.

Trends in Up-gradient or Cross-gradient Groundwater Quality Results, May 2024: Trends in the May 2024 groundwater water quality results were evaluated as explained above, and are summarized below:

Indicator parameters showed *downward trends* in 409, 706, BRW-3S, BRW-4S, BRW-5S, E-3, G-10DR, G-11D, DW-21 Office and DW-30616 Maintenance; *upward trends* in 705, BRW-3D, G-7D, G-9D, and DW-36516 (St. Onge House and Barn (2005); and *mixed trends* in G-26D; G-26BR has not yet been sampled, as explained above.

Inorganic compounds including Metals showed *downward trends* in 409, 705, 706, BRW-4S, E-3 and DW-21 Office; *upward trends* in BRW-3S, BRW-3D, BRW-5S, G-9D, G-10DR, G-11D, G-26D, DW-36516 (St. Onge House and Barn (2005) and DW-30616 Maintenance; and *mixed trends* in G-7D; G-26BR has not yet been sampled, as explained above.

VOCs were all non-detected in up-gradient or cross gradient monitoring wells, as is generally typical.

PFAS were sampled in the following wells from this group: BRW-3S, BRW-3D, BRW-4S and BRW-5S. BRW-5S showed *upward trends*, and BRW-3S, BRW-3D and BRW-4S were non-detected for PFAS, as is generally typical. See below for discussions within each well summary.

Summaries of Groundwater Results Up-gradient or Cross-gradient of Lined and Unlined Landfills, from individual monitoring wells:

409: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

705: In general, indicator parameters trended up, and metals trended down in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- One indicator parameter was detected at its highest concentration in the past 5-year range:
  - Sodium, Total [36.0 mg/L]; it is routinely detected and has no GES.
- All metals and other indicator parameters are within their past 5-year ranges.
- Total Arsenic, Total Manganese and Total Iron declined to within the past 5-year ranges, after being detected at their highest concentrations in the past 5-year ranges last round.
- VOC were non-detected in this well, as usual.
- PFAS analysis is not required.

706: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- Total Arsenic, Total Iron, Total Chloride and Total Sodium declined to within the past 5-year ranges, after being detected at their highest concentrations in the past 5-year ranges last round.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

BRW-3S: In general, indicator parameters trended down, and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- Total Sodium declined to within the past 5-year range, after being detected at its highest concentration in the past 5-year range last round.
- VOCs were non-detected in this well, as usual.
- PFAS: the sum of the five VT-regulated PFAS continued to be non-detected, as usual.

BRW-3D: In general, indicator parameters and metals trended up in May 2024 compared to the previous round. Notable:

- One metal exceeded its GES, at its highest concentration in the past 5-year range:
  - Arsenic, Dissolved [32.8 ug/L] [GES = 10 ug/L]. The May 2024 concentration is above the GES, as is typical; Graph: 5-year trends are stable.
- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Arsenic, Total [31.1 ug/L] [GES = 10 ug/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trends are stable.
- All other metals and indicator parameters are within their past 5-year ranges.
- Total Sodium declined to within the past 5-year range, after being detected at its highest concentration in the past 5-year range last round.
- VOCs were non-detected in this well, as usual.
- PFAS: the sum of the five VT-regulated PFAS continued to be non-detected, as usual.

BRW-4S: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and other indicator parameters are within their past 5-year ranges.
- VOC were non-detected in this well, as usual.
- PFAS: the sum of the five VT-regulated PFAS continued to be non-detected, as usual.

BRW-5S: In general, indicator parameters trended down, and metals trended up in May 2024, compared to the previous rounds. Notable:

- Two metals are tied at their highest concentrations in the past 5-year ranges:
  - Chloride, Total [11.0 mg/L]; it is routinely detected and has no GES;
  - Iron, Total [19.0 mg/L]; it is routinely detected and has no GES.
- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Manganese, Total [0.900 mg/L] and Dissolved [0.780 mg/L] [GES = 0.300 mg/L]. The May 2024 concentrations are within the past 5-year ranges; Graph: 5-year trends are stable.
- All other metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS: The sum of the five VT-regulated PFAS [4.37 ng/L] [GES = 20 ng/L] is below the GES as is typical when it is sporadically detected; it trended up in May 2024 compared to October 2023.

E-3: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Manganese, Total [0.360 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trend is mixed.
- All other metals and indicator parameters are within their past 5-year ranges.

- VOCs were non-detected in this well, as is typical in their 5-year range in all but October 2019.
- PFAS analysis is not required.

G-7D: In general, indicator parameters trended up, and metals were mixed in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as has been typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

G-9D: In general, indicator parameters and metals trended up in May 2024 compared to the previous round. Notable:

- One metal was detected at its highest concentration in the past 5-year range, and has been verified by the laboratory as correct:
  - Arsenic, Dissolved [104.0 mg/L] [GES = 10 ug/L]. The May 2024 concentration exceeds the GES, as is typical; Graph: 5-year trend is recently up;
- Two metals exceeded their GES, as is generally typically in the past 5-year ranges:
  - Arsenic, Total [22.8 ug/L] [GES = 10 ug/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year is recently up;
  - Manganese, Total [1.20 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is within the past 5-year range.
- All other metals and indicator parameters are within their past 5-year ranges.
- Dissolved Manganese and Total Chloride declined to within their past 5-year ranges, after being detected at their highest concentrations in the past 5-year ranges last round.
- VOCs were non-detected in this well, as is typical in their 5-year ranges in all but May 2023.
- PFAS analysis is not required.

G-10DR: In general, indicator parameters trended down, and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as has been typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- Arsenic, Dissolved declined to within its past 5-year range, after being detected at its highest concentration in the past 5-year range last round.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

G-11D: In general, indicator parameters trended down, and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as has been typical in their past 5-year ranges.
- Three metals were detected at their highest concentrations in the 5-year ranges:
  - Chloride, Total [25.0 mg/L]; it is routinely detected and has no GES;
  - Iron, Dissolved [0.170 mg/L]; it is routinely detected and has no GES:
  - Manganese, Dissolved [0.200 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is below the GES, as is typical within the past 5-year range.
- All other metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

G-26BR: This monitoring well had the low-flow tubing obstructing the well, which will be removed and sampled as soon as possible. The results for this well will be addressed in a separate letter.

G-26D: In general, indicator parameters were mixed, and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as has been typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

DW-21 (Office; bedrock non-potable water supply well): In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- Total Sodium declined to within the past 5-year range, after being detected at its highest concentration in the past 5-year range last round.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

DW-36516 (St. Onge House and Barn; 2005 bedrock water supply well): In general, indicator parameters and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their 5-year ranges.
- VOCs were non-detected in this well, as is typical in their 5-year ranges in all but May 2023.
- PFAS analysis is not required.

DW-30616 Maintenance Shop: In general, indicator parameters trended down, and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

B. BETWEEN LINED AND UNLINED LANDFILLS (1 WELL)

There is one compliance monitoring well (MW-F1) between the lined and unlined landfills. Trends in the May 2024 groundwater water quality results were evaluated as explained on page 1, and are summarized below:

FI: In general, indicator parameters were mixed, and metals and VOCs trended down in May 2024 compared to the previous round. Notable:

- Two metals exceeded their GESs, as has been typical in the past 5-year ranges:
  - Arsenic, Total [14.1 ug/L] [GES = 10 ug/L]. The May 2024 concentration is above the GES, as is typical within the past 5-year range; Graph: 5-year trend is up;
  - Manganese, Total [7.0 mg/L] and Dissolved [7.3 mg/L] [GES = 0.300 mg/L]. The May 2024 concentrations are within the past 5-year range; Graph: 5-year trends are recently stable.
- All other metals and indicator parameters are within their past 5-year ranges.
- Dissolved Arsenic and Dissolved Iron declined to within their past 5-year ranges after being detected at their highest concentrations in the past 5-year ranges last round.
- All VOCs are within their past 5-year ranges, with no GES exceedance or new detections.
- PFAS analysis is not required.

C. DOWN-GRADIENT OF UNLINED AREAS A AND B (9 MONITORING WELLS)

Based on groundwater elevations and the map of groundwater flow directions in May 2024 (see this report's section VII on pages 29-30, and the maps on pages 1-2 of Appendix 1), and based on the September 2014 evaluation of groundwater flow directions beneath and within Unlined Areas A & B, there are nine (9) wells that provide information down-gradient of Unlined Areas A & B at this site: 412R, A1, B1, BRW-1, BRW-2R, D1R, D2, P2R-R and P8 (possibly). In May 2024, all nine (9) wells were successfully sampled.

Trends in Water Quality Results, May 2024: Trends in the May 2024 groundwater water quality results were evaluated as explained on page 1, and are summarized below:

Indicator parameters showed *downward trends* in 412R, A1, BRW-1, BRW-2R and D2; *upward trends* in B1, P2R-R and P8; and *mixed trends* in D1R.

Inorganic compounds including Metals, showed *downward trends* in 412R, BRW-1 and P2R-R; *upward trends* in A1, BRW-2R, D2 and P8; and *mixed trends* in B1 and D1R.

VOCs were non-detected in 412R, B1, BRW-1, BRW-2R and D1R; and *upward trends* were noted in A1, D2, P2R-R and P8.

PFAS was sampled in the following wells from this group: BRW-1, BRW-2R and P2R-R. P2R-R showed the clear presence of PFAS; this is not unexpected, given its location only about 20 ft from Unlined Area A. An *upward trend* in PFAS was noted in P2R-R. BRW-1 and BRW-2R were non-detected in May 2024, as has been the case since PFAS sampling began. See below for discussions within each well summary.

Summaries of Groundwater Results Downgradient of Unlined Areas A&B, from individual monitoring wells:

412R: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- Two metals were detected at their highest concentrations in the past 5-year ranges:
  - Chloride, Total [29.0 mg/L]; it is routinely detected and has no GES;
  - Iron, Dissolved [13.0 mg/L]; it is routinely detected and has no GES.
- Two metals exceeded their GESs, as has been typical in the past 5-year ranges:
  - Arsenic, Dissolved [14.0 ug/L] [GES = 10 ug/L]. The May 2024 concentration is above the GES, as is typical within the past 5-year range; Graph: 5-year trend is stable;
  - Manganese, Dissolved [0.800 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trend is stable.
- One indicator parameter was detected at its highest concentration in the past 5-year range:
  - Sodium, Total [16.0 mg/L]; it is routinely detected and has no GES.
- All other metals and other indicator parameters are within their past 5-year ranges.
- Total Arsenic, Total Manganese and Total Iron were back within their 5-year ranges after being detected at their highest concentrations in their 5-year ranges last round.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

A1: In general, indicator parameters trended down, and metals and VOCs trended up in May 2024 compared to the previous round. Notable:

- Two metals were detected at their highest concentrations in the past 5-year ranges:
  - Manganese, Dissolved [0.740 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration exceeds the GES, as is typical; Graph: 5-year trend is up;
  - Iron, Total [8.7 mg/L] and Dissolved [8.0 mg/L]; it is routinely detected and has no GES.
- Two metals exceeded their GESs, as has been typical in the past 5-year ranges:
  - Arsenic, Total [13.1 ug/L], and Arsenic Dissolved [12.5 ug/L] [GES = 10 ug/L]. The May 2024 concentrations are within the past 5-year range; Graph: 5-year trends are down;
  - Manganese, Total [0.780 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trend is up.
- All other metals and indicator parameters are within their past 5-year ranges.
- No VOCs exceeded GESs, as is generally typical in their past 5-year ranges; there were no new detections.
- PFAS analysis is not required.

B1: In general, indicator parameters trended up, and metals were mixed in May 2024 compared to the previous round. Notable:

- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Arsenic, Total [18.7 ug/L] and Dissolved [17.7 mg/L] [GES = 10 ug/L]. The May 2024 concentrations are within the past 5-year range; Graph: 5-year trends are stable.
- Two indicator parameters were detected at their highest concentrations in the past 5-year ranges:
  - Sodium, Total [8.6 mg/L]; it is routinely detected and has no GES;
  - Specific Conductivity [283 us/cm]; it has no GES.
- All other metals and other indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

BRW-1: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- Two metals were detected at their highest concentrations in the past 5-year ranges:
  - Arsenic, Dissolved [5.6 ug/L] [GES = 10 ug/L]. The May 2024 concentrations is below the GES, as is typical within the past 5-year range;
  - Iron, Dissolved [41.0 mg/L]; it is routinely detected and has no GES.
- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Manganese, Total [1.20 mg/L] and Dissolved [1.00 mg/L] [GES = 0.300 mg/L]. The May 2024 concentrations are within the past 5-year range; Graph: 5-year trends are stable.
- All other metals and indicator parameters are within their past 5-year ranges.
- Total Chloride, Total Arsenic, Total Iron and Total Sodium were back within their 5-year ranges after being detected at their highest concentrations in their 5-year ranges last round.
- VOCs were non-detected in this well, as usual.
- PFAS: the sum of the five VT-regulated PFAS continued to be non-detected, as usual.

BRW-2R: In general, indicator parameters trended down, and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- Total Manganese and COD were back within their 5-year ranges after being detected at their highest concentrations in their 5-year ranges last round.
- VOCs were non-detected in this well, as usual.
- PFAS: the sum of the five VT-regulated PFAS continued to be non-detected, as usual.

D1R: In general, indicator parameters and metals were mixed in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as has sporadically occurred over their past 5-year ranges.
- Arsenic [Total and Dissolved] concentrations continued their decline below the GES since October 2021; their trends are up then down.
- One indicator parameter continues to be detected at its highest concentration in the past 5-year range:
  - Sodium, Total [14.0 mg/L]; it is routinely detected and has no GES.
- All metals and other indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

D2: In general, indicator parameters trended down, and metals and VOCs trended up in May 2024 compared to the previous round. Notable:

- One metal was detected at its highest concentration in the past 5-year range:
  - Nickel, Total [502 ug/L]; and Dissolved [544 ug/L] [GES = 100 ug/L]. The May 2024 concentrations exceed the GES, as is typical within the past 5-year range; Graph: 5-year trends are up.
- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Arsenic, Total [5,670 ug/L] and Dissolved [5,480 ug/L] [GES = 10.0 ug/L]. The May 2024 concentrations are within the past 5-year range; Graph: 5-year trends are stable;
- All other metals and indicator parameters are within their past 5-year range.
- Total Chloride and Total Sodium were back within their 5-year ranges after being detected at their highest concentrations in their 5-year ranges last round.
- Two VOCs exceeded their GESs, as has been typical in the past 5-year ranges:
  - Acetone [8,620 ug/L; GES = 950 ug/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trend is stable;
  - 2-butanone [13,100 ug/L; GES = 511 ug/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trend is stable.
- All other VOCs are within their past 5-year ranges, with no new detections.
- T-Butanol was back within its 5-year range after being detected at its highest concentration in its 5-year ranges last round.
- PFAS analysis is not required.

P2R-R: In general, indicator parameters, VOCs and PFAS trended up, and metals trended down in May 2024 compared to the previous round. Notable:

- Two metals exceeded their GESs, as has been typical in the past 5-year ranges:
  - Arsenic, Total [71.5 ug/L] and Dissolved [67.5 ug/L] [GES = 10 ug/L]. The May 2024 concentrations are within the past 5-year ranges, after Total Arsenic was detected at its highest concentration in the past 5-year range last round; Graph: 5-year trend is down;
  - Manganese, Total [0.390 mg/L] [GES = 0.310 mg/L]. The May 2024 concentrations are within the past 5-year range; Graph: 5-year trend is down.

- Two indicator parameters were detected at their highest concentrations in the past 5-year ranges:
  - Sodium, Total [170 mg/L]; it is routinely detected and has no GES;
  - Specific Conductivity [1,704 us/cm]; it has no GES.
- All other metals and other indicator parameters are within their past 5-year ranges.
- All VOCs are within their past 5-year ranges, with no GES exceedances and no new detections.
- PFAS: The sum of the five VT-regulated PFAS [85.3 ng/L] [GES = 20 ng/L] exceeded the GES as is typical. The sum trended up to its highest concentration in the past 5-year range in May 2024 compared to October 2023; Graph: 5-year trend is down.

MW-P8: In general, indicator parameters, metals and VOCs trended up in May 2024 compared to the previous round. Notable:

- Two metals were detected at their highest concentrations in the past 5-year ranges:
  - Manganese, Total [6.50 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration exceeds the GES, as is typical within the past 5-year range; Graph: 5-year trends are mixed.
  - Iron, Total [34.0 mg/L]; it is routinely detected and has no GES.
- Two metals exceeded their GESs, as has been typical in the past 5-year ranges:
  - Arsenic, Total [13.4 ug/L] [GES = 10 ug/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trend is down;
  - Manganese, Dissolved [5.80 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trends are mixed.
- Two indicator parameters were detected at their highest concentrations in the past 5-year ranges:
  - COD [79.0 mg/L]; it is routinely detected and has no GES;
  - Sodium, Total [37.0 mg/L]; it is routinely detected and has no GES.
- All other metals and other indicator parameters are within their past 5-year ranges.
- One VOC was detected, and at its highest concentration in the past 5-year range:
  - Diethyl Ether [7.7 ug/L]; it has been detected only once in the past 5-year range and has no GES.
- All other VOCs were non-detected in this well, as is typical in their past 5-year ranges.
- PFAS analysis is not required.

D. DOWN-GRADIENT OF LINED LANDFILLS, AND NOT IMPACTED BY UNLINED AREAS A & B (11 WELLS)

Based on groundwater elevations and the map of groundwater flow directions in May 2024 (see this report's section VII on pages 29-30, and the map on page 2 of Appendix 1), and based on the September 2014 evaluation of groundwater flow directions beneath and within Unlined Areas A & B, there are eleven (11) wells that provide information on the down-gradient area of the lined landfills, and which are not impacted by Unlined areas A & B: 103, 703, 805MR, E1, E2, G-12BR, G-12S, G-27D, G-27S, P6 (possibly) and K1. In May 2024, ten (10) of these eleven (11) wells were successfully sampled; G-27S had insufficient water to sample, as often occurs. MW-K1 was added to the semi-annual water quality monitoring plan due to the solid waste permit amendment for the treatment of PFAS below Underdrain Outlet Phase 3.

Monitoring well 805M was located close to the newly constructed leachate treatment building, so the VT SWMP approved its replacement as 805MR a short distance away. It was installed in September 2023 approximately 59 ft northwest of former 805M. This location is in a similar assumed groundwater flowpath and hydrogeologic setting as 805M, it is out of the way of the leachate building's entrance and driveway, and it is away from the various activities on the flat bench.

Trends in Groundwater Quality Results Down-gradient of Lined Landfills, May 2024: Trends in the May 2024 groundwater water quality results were evaluated as explained on page 1, and are summarized below:

Indicator parameters showed *downward trends* in 103, E1, G-12S, G-27D, P6 and K1; *upward trends* in E2 and G-12BR; and *mixed trends* in 703. G-27S had insufficient water to sample and since 805MR was sampled for the second time, trends cannot yet be determined.

Inorganic compounds including Metals, showed *downward trends* in E1, G-12S, P6 and K1; *upward trends* in 103, 703, E2 and G-12BR; and *mixed trends* in G-27D. G-27S had insufficient water to sample and since 805MR was sampled for the second time, trends cannot yet be determined.

VOCs showed *downward trends* in 103. All other down-gradient monitoring wells were non-detected, as usual. G-27S had insufficient water to sample and since 805MR was sampled for the second time, trends cannot yet be determined.

PFAS was sampled in the following wells from this group: E1, E2, G-12S, P6 and K1. An *upward trend* was noted in E1 and E2 and a downward trend to non-detected was noted in K1. The sums of the five VT-regulated PFAS in E1 and E2 were below the GES and were non-detected G-12S P6 and K1, as is typical.

Summaries of Groundwater Results Down-gradient of Lined Landfills, from individual monitoring wells:

103: In general, indicator parameters and VOCs trended down, and metals trended up in May 2024 compared to the previous round. Notable:

- Two metals were detected at their highest concentrations in the past 5-year ranges:
  - Chloride, Total [26.0 mg/L]; it is routinely detected and has no GES;
  - Iron Total 1.10 mg/L]; it is routinely detected and has no GES;
- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Manganese, Total [0.620 mg/L] and Dissolved [0.450 mg/L] [GES = 0.300 mg/L]. The May 2024 concentrations are within the past 5-year ranges; Graph: 5-year trends are up.
- All other metals and indicator parameters are within their past 5-year ranges.
- One VOC continues to be detected as is typical in the past 5-year range:
  - Tetrahydrofuran [27.7 mg/L]; it has been routinely detected since October 2020 and has no GES; it is back within the 5-year range after being detected at its highest concentration in the 5-year range last round.
- All other VOCs were non-detected in this well, as is typical in their past 5-year ranges.
- PFAS analysis is not required.

703: In general, indicator parameters were mixed, and metals trended up in May 2024 compared to the previous round. Notable:

- Two metals were detected at their highest concentrations in the past 5-year ranges:
  - Manganese, Total [4.800 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is above the GES, as is typical within the past 5-year range; Graph: 5-year trend is generally up;
  - Lead Total [1.0 ug/L] [GES = 15 ug/L]; it is only sporadically detected and is below the GES.
- One indicator parameter was detected at its highest concentration in the past 5-year range:
  - Specific Conductivity [399 us/cm]; it has no GES.

- All other metals and other indicator parameters are within their past 5-year ranges.
- Total iron decreased back within the 5-year range after being detected at its highest concentration in the 5-year range last round.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

805MR: Since this well was sampled for the first time in May 2024, trends cannot yet be determined. Notable:

- One metal exceeded its GES:
  - Arsenic, Total [16.5 ug/L] and Dissolved [15.9 ug/L] [GES = 10.0 ug/L]. The May 2024 concentrations are similar when compared to monitoring well 805M.
- VOCs were non-detected.
- PFAS analysis is not required.

E1: In general, indicator parameters and metals trended down, and PFAS trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- Total Sodium decreased to within its 5-year range, after being detected at its highest concentration in the 5-year range last round.
- VOCs were non-detected in this well, as usual.
- PFAS: The sum of the five VT-regulated PFAS [6.67 ng/L] [GES = 20 ng/L] was far below the GES. The sum trended up to its highest concentration in the past 5-year range in May 2024 compared to October 2023.

E2: In general, indicator parameters, metals and PFAS trended up in May 2024 compared to the previous round. Notable:

- One metal was detected at its highest concentration in the past 5-year range:
  - Chloride, Total [3.5 mg/L]; it is routinely detected and has no GES;
- No metals exceeded their GESs, for the first time in their past 5-year ranges.
- All other metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS: The sum of the five VT-regulated PFAS [1.93 ng/L] [GES = 20 ng/L] was far below the GES. The sum trended up to its highest concentration in the past 5-year range in May 2024 compared to October 2023. This is only the second detection since analysis began in 2018.

G-12BR: In general, indicator parameters and metals trended up in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- One indicator parameter continues to be detected at its highest concentration in the past 5-year range:
  - Sodium, Total [3.5 mg/L]; it is routinely detected and has no GES.
- All metals and other indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

G-12S: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their past 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS: the sum of the five VT-regulated PFAS continued to be non-detected.

G-27D: In general, indicator parameters trended down, and metals were mixed in May 2024 compared to the previous round. Notable:

- No metals exceeded their GESs, as is typical in their past 5-year ranges.
- All metals and indicator parameters are within their 5-year ranges.
- VOCs were non-detected in this well, as usual.
- PFAS analysis is not required.

G-27S: Due to insufficient water, this well could not be sampled.

P6: In general, indicator parameters and metals trended down in May 2024 compared to the previous round. Notable:

- One metal exceeded its GES, as has been typical in the past 5-year range:
  - Manganese, Total [0.640 mg/L] [GES = 0.300 mg/L]. The May 2024 concentration is within the past 5-year range; Graph: 5-year trend is mixed.
- All other metals and indicator parameters are within their past 5-year ranges.
- Total Sodium decreased to within its 5-year range, after being detected at its highest concentration in the 5-year range last round.
- VOCs were non-detected in this well, as usual.
- PFAS: the sum of the five VT-regulated PFAS continued to be non-detected, as usual.

K1: This monitoring well was added to the semi-annual monitoring plan per the February 28, 2023, solid waste permit amendment, and will be included in all future semi-annual sampling events. In general, indicator parameters, metals and PFAS trended down in May 2024 compared to the previous round. Notable:

- Two metals exceeded their GESs, as had been typical when this well was sampled in 2020, then again last round. This could be partially due to the relative high turbidity of the sample collected for analysis, with a value of 225.2 NTU:
  - Arsenic, Total [17.8 ug/L] and Dissolved [12.6 ug/L] [GES = 10 ug/L]. The May 2024 concentrations are within the 2020 and May 2023 ranges; Graphs: 3-year trends are down;
  - Manganese, Total [0.410 mg/L] [GES = 0.420 mg/L]. The May 2024 concentration are within the 2020 and May 2023 ranges; Graph: 3-year trends are down.
- All other metals and indicator parameters are within the 2020 and May 2023 ranges.
- COD decreased to within its 2020 ranges, after being detected at its highest concentration last round.
- VOCs were non-detected in this well, is typical, with the exception of one detection in 2020.
- PFAS: The sum of the five VT-regulated PFAS trended down to non-detected in May 2024; the overall 3-year trend is down since this well was first sampled. MW-K1 is located approximately 250 ft downgradient of where the treated discharge from UD-3 is released onto the ground surface. The 3-year downward trend of PFAS, to this recent non-detection, may be an indication that the prior potentially impacted groundwater is being flushed of PFAS.

II. STATISTICAL ANALYSES OF EXCEEDANCES OF GROUNDWATER STANDARDS

Statistical Analyses

In accordance with the approved Water Quality Monitoring Program, statistical analyses are conducted on groundwater quality data for a running 5-year look-back period, and only on groundwater parameters for which more than half of the selected-period's data points exceeds a Primary Groundwater Enforcement Standard (GES). In May 2024 statistical analyses and visual estimations of trends are conducted over the 5-year period from May 2019 through May 2024. For a summary of statistical exceedances of GESs in the May 2024 sampling round, see Appendix 1, pages 12-13, and individual well data on pages 35-94 and pages 98-114.

Statistical analyses using EasyFit of 95% confidence intervals were calculated on normalized data (when normalization was possible). In instances where the raw data are not normal, three transformations were conducted (natural log, square root, and exponential). If the transformed data also are not normal, the statistical analyses are conducted on whichever data form is closest to normality, as indicated by the sum of the absolute values of skewness and kurtosis being closest to zero.

Statistical Exceedances of GESs are Seen at the Following Locations:

Upgradient or cross-gradient of lined and unlined landfills (4 of the 17 wells): Total and dissolved arsenic and/or total and dissolved manganese levels statistically exceed GESs in four (4) of these seventeen (17) wells in May 2024: BRW-3D, BRW-5S, E-3 and G-9D.

Between lined and unlined landfill (1 well): Total and dissolved arsenic and total and dissolved manganese levels statistically exceed GESs in this one well in May 2024: F1. Benzene levels statistically exceed the GES in this one well in May 2024: F1.

Downgradient of Unlined Areas A & B (8 of the 9 wells): Total and dissolved arsenic, and/or total and dissolved manganese, and/or total and dissolved nickel levels statistically exceed GESs in eight (8) of these nine (9) wells in May 2024: 412R, A1, B1, BRW-1, D1R, D2, P2R-R and P8. Acetone, benzene, and 2-butanone levels statistically exceed GESs in one (1) of these wells in May 2024: D2. The sum of the five VT-regulated PFAS statistically exceeds the GES in one well: P2R-R.

Downgradient of lined landfills, and not impacted by Unlined Areas A & B (5 of the 11 wells): Total and dissolved arsenic and/or total and dissolved manganese levels statistically exceed GESs in five (5) of these eleven (11) wells in May 2024: 103, 703, E2,P6 and K1.

Preliminary Analysis of Cause and Significance of GES Exceedances

The metals with statistical GES exceedances are common naturally-occurring compounds in Vermont groundwater. However, the standards exceedances are generally greater in magnitude in the down-gradient wells, reflecting impacts from the unlined landfill and/or impacts from changes in the redox regime as groundwater travels the long distances beneath the lined phases.

The VOCs and/or PFAS with statistical GES exceedances between landfills and downgradient of Unlined Areas A & B are likely the result of migration of leachate from the Unlined landfill Areas A & B.

III. SURFACE WATER, INCLUDING UNDERDRAIN OUTLETS

There are twelve (12) surface water sampling stations on streams, ditches, and rivers at and near the NEWSVT facility. Note that the upstream/downstream/side-gradient characteristics stated below are based on surface water flow directions, not groundwater flow directions, and that the discharges from the underdrain systems are listed in this section because they are regulated by VTDEC as surface water: See location map, summary tables and individual laboratory reports in the Appendices. For a summary of recent trends, see Appendix 1, page 5. These current trends were visually estimated in comparison to the previous sampling event. For a table showing exceedances of surface water quality standards in the May 2024 sampling round, see Appendix 1, page 10.

Surface water quality results are compared to the Vermont Water Quality Standards (VWQS); effective 11/15/22, Appendix C, for Protection of Human Health (Consumption of Organisms only), and Protection of Aquatic Biota, Average Acceptable Concentration (AAC) Chronic Criteria. If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is used or calculated using formulas provided in Appendix D and E of the VWQS. Dissolved concentrations of select metals (cadmium, chromium, copper, lead, nickel, and zinc) are estimated using laboratory-reported total metals concentrations and conversion factors provided in Appendix D of the VWQS. Both total and dissolved concentrations are now included in the data tables. Select metals are non-detected; their detection limits are higher than their water quality standards, so the actual concentrations of these metals cannot be compared to standards.

A. UPSTREAM OR SIDE-GRADIENT SURFACE WATER LOCATIONS

There are three (3) upstream or side-gradient surface water sampling points at NEWSVT: SW-1 Black River Upstream, SW-3 Landfill Brook East, and SW-9 Southwest Stream #1; all three (3) locations were sampled in May 2024.

Trends in Upstream or Side-Gradient Surface Water Quality Results, May 2024: Trends in the May 2024 surface water quality results were evaluated as explained above, and are summarized below:

Inorganic compounds, which include Metals and Indicator Parameters, showed *downward trends* in SW-1, SW-3 and SW-9.

VOCs were non-detected in all sampled upstream surface or side-gradient surface water locations.

SVOCs were non-detected in all sampled upstream or side-gradient surface water locations.

PFAS analysis is not required from any upstream or side-gradient surface water location.

Summaries of Upstream or Side-Gradient Surface WQ Results, from individual locations:

SW-1 Black River Upstream: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- All metals and indicator parameters are within historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 1999.
- SVOCs remain non-detected since analysis began in October 2004. SW-1 was re-sampled on 7/22/2024 as part of a targeted re-sampling effort, due to an anomalous SVOC detection in the downstream Black River station, SW-2. SVOC results in SW-1 from both sampling events in May 2024and July 2024, remain non-detected.
- PFAS analysis is not required.

SW-3 Landfill Brook East: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS as is generally typical:
  - Arsenic, Total [2.7 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range.
- All other metals, inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 2000, with the exception of two low-level detections in May 2011 [Acetone and 2-Butanone; they have no VWQS], and May 2017 [Acetone and 2-Butanone; they have no VWQS and have not been detected since].
- SVOCs remain non-detected since analysis began in May 2005.
- PFAS analysis is not required.

SW-9 Southwest Stream #1: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- All metals, inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- Sodium declined to within historic range, after being detected at its highest concentration last round.
- VOCs remain non-detected since analysis began in May 2016.
- SVOCs remain non-detected since analysis began in April 2019, with the exception of one low-level detection in May 2022 [Bis(2-ethyl-hexyl)phthalate; above the VWQS and not detected since].
- PFAS analysis is not required.

B. DOWNSTREAM SURFACE WATER LOCATIONS

There are nine (9) downstream surface water sampling points at NEWSVT: SW-2 Black River Downstream, SW-4 North Landfill Stream, SW-5 St. Onge Ditch, SW-6 Landfill Brook East, SW-7A Western Stream, SW-8 Wetland Below UD-1, 2, SW-10 Southwest Stream #2, SW-11 Southwest Stream #3 and SW-12 Southwest Stream #4; all nine (9) locations were sampled in May 2024;

Trends in Downstream Surface Water Quality Results, May 2024: Trends in the May 2024 surface water quality results were evaluated as explained above, and are summarized below:

Inorganic compounds, which include Metals and Indicator Parameters, showed *downward trends* in SW-2, SW-4, SW-6, SW-8, SW-11, and SW-12; *upward trends* in SW-10; and *mixed trends* in SW-5 and SW-7A.

VOCs were non-detected in all sampled downstream surface water locations.

SVOCs showed *upward trends* in SW-4 and SW-12; all other downstream surface water locations were non-detected.

PFAS analysis is required only at SW-8 (letter from K. Kathan, dated 4/16/2020), during the semi-annual sampling events in May and October. In May 2024, PFAS showed an *upward trend* in SW-8.

Summaries of Downstream Surface WQ Results, from individual locations:

SW-2 Black River Downstream: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- All metals, inorganic compounds and indicator parameters are within their historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 1999.
- SVOCs had been non-detected since analysis began in May 2005, with the exception of one low-level detection in October 2004 (see below). However, during sampling in May 2024, one SVOC was detected: Bis(2-ethyl-hexyl)phthalate [23.3 ug/L] [VWQS = 0.37 ug/L], which was verified by the laboratory as correct. This compound has only been detected during one (1) previous sampling event: that was in October 2004, which was the only prior SVOC detection since analysis began in October 2004. This compound is an extremely common flexible plasticizer, which may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months.
  Due to this anomalous detection, WHEM collected a sample on 7/22/2024, which was non-detected for all SVOC compounds. Therefore, this SVOC detection in May 2024 appears to be anomalous. SVOC results will be closely reviewed during the next semi-annual sampling event in October 2024. The area where SW-2 is collected is close to Airport Road and the bridge over the Black River. It is in an area often used for fishing , and where miscellaneous trash is often observed and collected by NEWSVT personnel. This situation may have contributed to this anomalous SVOC detection this round.
- PFAS analysis is not required.

SW-4 North Landfill Stream: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- All metals, inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 1999.
- One (1) SVOC was detected for the first time since analysis began in October 2004, and exceeded its VWQS; it has been verified by the laboratory as correct:
  - Bis(2-ethyl-hexyl)phthalate [5.4 ug/L] [VWQS = 0.37 ug/L]. This is an extremely common flexible plasticizer, which during sampling may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months. This SVOC detection in May 2024 appears to be anomalous and will be closely reviewed during the next semi-annual sampling event in October 2024.
- All other SVOCs remain non-detected since analysis began in October 2004.
- PFAS analysis is not required.

SW-5 St. Onge Ditch: In general, inorganic compounds, which include metals and indicator parameters, were mixed in May 2024 compared to the previous round. Notable:

- All metals, inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in October 2004.
- SVOCs remain non-detected since analysis began in October 2004, with the exception of one low-level detection in May 2018 [Ideno(1,2,3-cd)Pyrene; above the VWQS and not detected since], and one detection in October 2022 [Bis(2-ethyl-hexyl)phthalate; above the VWQS and not detected since].
- PFAS analysis is not required.

SW-6 Landfill Brook East: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS, as sporadically occurs:
  - Arsenic, Total 1.6 mg/L; VWQS = 1.0 ug/L]. The May 2024 concentration is within the historic range.
- All other metals, inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- Hardness and Sodium declined to within their historic ranges, after being detected at their highest concentrations last round.
- VOCs remain non-detected since analysis began in May 2005.
- SVOCs remain non-detected since analysis began in May 2005.
- PFAS analysis is not required.

SW-7A Western Stream: In general, inorganic compounds, which include metals and indicator parameters, were mixed in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS, as is typical:
  - Arsenic, Total [5.6 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range.
- All other metals, inorganic compounds and indicator parameters are within their historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 2016.
- SVOCs remain non-detected since analysis began in May 2019.
- PFAS analysis is not required.

SW-8 Wetland Below UD-1,2: In general, inorganic compounds, which include metals and indicator parameters, trended down and PFAS trended up in May 2024 compared to the previous round. Notable:

- All metals and indicator parameters are within their historic ranges, with no VWQS exceedances.
- Two inorganic compounds were detected at their highest concentrations to date:
  - Chloride [52 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
  - Sodium [38 mg/L]; it is routinely detected and has no VWQS.
- All other inorganic compounds are within their historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in October 2004.
- SVOCs remain non-detected since analysis began in October 2004.
- PFAS: There are no Vermont standards for PFAS in surface water. The sum of the five Vermont-regulated-in-groundwater PFAS [181 ng/L] trended up in May 2024 to its highest concentration since analysis began in November 2019. It is possible this elevated concentration is due to the recent earthwork nearby to the south, for the expansion of the west detention pond and the area surrounding it since the previous sampling round. PFAS results in the next semi-annual sampling event in October 2024 will be closely reviewed now that the earthwork has been finalized.

SW-10 Southwest Stream #2: WHEM personnel noted the sample location of SW-10, and surrounding area, had accumulated fine gray silty sediment since the previous sampling event in October 2023. Therefore, the sampling location was moved approximately 5 ft west of its original location. The presence of this sediment is likely due to heavy rainfalls mobilizing the material over the previous six (6) months. Laboratory results do not indicate any adverse impacts due to the presence of the material.

In general, inorganic compounds, which include metals and indicator parameters trended up in May 2024, compared to the previous round. Notable:

- All metals and indicator parameters are within historic ranges, with no VWQS exceedances.
- One inorganic compound was tied at its highest concentration to date:
  - Chloride [13 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS.
- All other inorganic compounds are within their historic ranges, with no VWQS exceedances.
- Total Arsenic and Total Manganese declined to within historic ranges, after being detected at their highest concentrations to date last round.
- VOCs remain non-detected since analysis began in April 2019.
- SVOCs remain non-detected since analysis began in April 2019.
- PFAS analysis is not required.

SW-11 Southwest Stream #3: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS, as is typical:
  - Arsenic, Total [2.6 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range.
- All other metals, inorganic compounds and indicator parameters are within their historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 2016.
- SVOCs remain non-detected since analysis began in April 2019.
- PFAS analysis is not required.

SW-12 Southwest Stream #4: In general, inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS, as is typical:
  - Arsenic, Total [8.2 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range.
- All other metals, inorganic compounds and indicator parameters are within their historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 2016.
- One (1) SVOC was detected for the first time since analysis began in April 2019 and exceeded its VWQS:
  - Bis(2-ethyl-hexyl)phthalate [5.8 ug/L] [VWQS = 0.37 ug/L]. This is an extremely common flexible plasticizer, which during sampling may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months. This SVOC detection in May 2024 appears to be anomalous and will be closely reviewed during the next semi-annual sampling event in October 2024.
- All other SVOCs remain non-detected since analysis began in April 2019.
- PFAS analysis is not required.

C. UNDERDRAINS

Each of the lined landfill phases (Phases 1, 2, 3, 4 and 6) has an independent underdrain system of perforated pipes bedded in high-permeability drainage sand and stone located either in trenches or a continuous blanket beneath or within the engineered soil drainage system: Underdrain Outlet Phase I [UD-1], Underdrain Outlet Phase 2 [UD-2], Underdrain Outlet Phase 3 [UD-3], Underdrain Outlet Phase 4 [UD-4] and Underdrain Outlet Phase 6 [UD-6]. The purpose of the underdrain systems is to isolate the lined landfills from groundwater, and to discharge the intercepted groundwater by gravity flow at separate locations on the lower slopes around the margins of the landfill. See the paragraph

below for details about the current status of each of these underdrain outlets. The Solid Waste Program has determined that the discharges from the underdrains are regulated as surface water. See location map, summary tables and individual laboratory reports in the Appendices. For a summary of recent trends, see Appendix 1, page 5. These current trends were visually estimated in comparison to the previous sampling event. For a table showing exceedances of surface water quality standards in the underdrain discharges in the May 2024 sampling round, see Appendix 1, page 11.

The underdrain pipes are periodically flushed with high-pressure water. NEWSVT personnel reported the underdrain pipes were last flushed during the week of August 1, 2023.

Status of UD-1 and UD-2: Beginning on August 20, 2019, the discharges from UD-1 and UD-2 are no longer released to the slope below Phase 2. These discharges have been contained and are managed as leachate by being pumped to the leachate holding tank (refer to *comment letter from SWP; Kasey Kathan, dated 8/19/2019 regarding WHEM's May 2019 Water Quality Report* for details). The flow rates from UD-1 and UD-2 cannot be measured beginning October 2019 because those flows now discharge into their own very deep manholes, in which it is not possible to measure their discharge rates safely or accurately. From these two manholes, the flows are pumped into the leachate collection system. Using a peristaltic pump or disposable hand bailer, individual samples are collected of the liquids in the manholes for UD-1 and UD-2.

Status of UD-3: On February 28, 2023, a solid waste permit amendment was granted for the PFAS treatment and disposal of the discharge from UD-3. This PFAS treatment system was installed and became operational in September 2023. The UD-3 discharge is diverted through carbon treatment vessels prior to being released to the ground surface. Monthly samples are collected throughout the treatment train to monitor the treatment efficacy, and to provide indications of when to change the carbon treatment vessels or treatment trains. The semi-annual water quality samples are collected from the untreated UD-3 water at the inlet to the treatment system. The flow rates from UD-3 are accurately measured directly at the discharge of the treatment system using an empty calibrated container and stopwatch.

Status of UD-4: The discharge from UD-4 is currently released to the ground surface at the outlet of the underdrain pipe. The flow rates from UD-4 are accurately measured directly at the discharge point using an empty calibrated container and stopwatch.

Status of UD-6: The discharge pipe for Underdrain 6 was primarily installed in the late fall of 2020, although the outlet of the pipe was not ready for sampling until early fall 2021. Sampling and measurements of flow rates from UD-6 began with the October 2021 compliance sampling round, which was prior to solid waste disposal into Phase VI. In mid-fall 2021, the final liner installation and the sand cover layer was completed, and solid waste placement in Phase VI Cell 1 commenced in late fall 2021. The flow rates from UD-6 are accurately measured directly at the discharge of the treatment system using an empty calibrated container and stopwatch.

Underdrain water quality results are compared to the Vermont Water Quality Standards (VWQS); effective 11/15/22, Appendix C, for Protection of Human Health (Consumption of Organisms only), and Protection of Aquatic Biota, Average Acceptable Concentration (AAC) Chronic Criteria. If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is used or calculated using formulas provided in Appendix D and E of the VWQS. Dissolved concentrations of select metals (cadmium, chromium, copper, lead, nickel, and zinc) are estimated using laboratory-reported total metals concentrations and conversion factors provided in Appendix D of the VWQS. Both total and dissolved concentrations are now included in the data tables. Some of the metals are

reported as non-detected; however, their detection limits are higher than their water quality standards, so the actual concentrations of these metals cannot be compared to standards. PFAS has no VWQS.

Trends in Underdrain Water Quality Results, May 2024: Trends in the May 2024 underdrain water quality results were evaluated as explained above, and are summarized below:

Inorganic compounds, which include Metals and Indicator Parameters, showed *downward trends* in UD-1, and *upward trends* in UD-2, UD-3, UD-4 and UD-6.

VOCs were non-detected in all underdrain locations.

SVOCs were non-detected in all underdrain locations.

PFAS has been analyzed since July 2019 in UD-1 and UD-2; since September 2019 in UD-3 and UD-4; and since October 2021 in UD-6. There is no VWQS for PFAS. May 2024 trends in the combined concentrations of the Vermont-regulated-in-groundwater PFAS were *downward* in UD-1 and *upward* in UD-2 and UD-3 (prior to treatment), and stable/non-detected in UD-4 and UD-6 [stable because continuing to be non-detected].

Underdrain Flow Rates: Flow rates from UD-1 and UD-2 cannot be measured. In May 2024, flow rates increased in UD-4 (1,325 gpd) and decreased in UD-6 (6,624 gpd) compared to the previous round in October 2023. Flow rate measurement collection was inadvertently omitted in May 2024 from UD-3. However, a subsequent flow rate was measured at UD-3 on 6/10/2024 at 7,416 gpd, which is an increase compared to the previous round in October 2023.

Summaries of Underdrain WQ Results, from individual locations:

Underdrain Outlet Phase I (UD-1): This discharge is currently diverted into the leachate collection system. In general, PFAS and inorganic compounds, which include metals and indicator parameters, trended down in May 2024 compared to the previous round. Notable:

- Two metals exceeded their VWQS, as is generally typical:
  - Arsenic, Total [7.6 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range;
  - Iron, Total [2.50 mg/L; VWQS = 1.0 mg/L]. The May 2024 concentration is within the historic range.
- All other metals, inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- Sodium declined to within historic range, after being detected at its highest concentration last round.
- VOCs remain non-detected since October 2010. Prior to this, various low-level VOC detections were reported since analysis began in October 1997; all were below VWQSs.
- SVOCs remain non-detected since analysis began in in October 2004, with the exception of one low-level detection last round in October 2023 [Dimethyl phthalate; far below the VWQS].
- PFAS: There are no Vermont standards for PFAS in surface water. The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS [161 ng/L] trended downward. The overall 5-year trend is up.

Underdrain Outlet Phase 2 (UD-2): This discharge is currently diverted into the leachate collection system. In general, inorganic compounds, which include metals and indicator parameters, trended up in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS, as is typical:
  - Arsenic, Total [10.0 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range.
- All other metals, inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since October 2018. Prior to this, various low-level VOC detections were reported since analysis began in October 1997; all were below VWQSs.
- SVOCs remain non-detected since analysis began in October 2004, with the exception of one low-level detection in October 2016 [Pyrene; far below the VWQS and not detected since], and one low-level detection in May 2023 [Di-n-butylphthalate; below the VWQS and not detected since].
- PFAS: There are no Vermont standards for PFAS in surface water. The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS [66 ng/L] trended upward. The overall 5-year trend is down.

Underdrain Outlet Phase 3 (UD-3): This discharge is currently treated for PFAS, so the discharge to the ground surface is non-detected. In the untreated UD-3 discharge, inorganic compounds, which include metals and indicator parameters, in general trended up in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS, as is typical:
  - Arsenic, Total [3.9 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range.
- Two inorganic compounds were detected at their highest concentrations to date:
  - Chloride [38 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
  - Sodium [18 mg/L]; it is routinely detected and has no VWQS.
- All other metals, other inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in May 1999, with the exception of two low-level detections in May 2008 [Acetone and 2-Butanone; they have no VWQS and have not been detected since].
- SVOCs remain non-detected since analysis began in October 2004.
- PFAS: There are no Vermont standards for PFAS in surface water. The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS [183 ng/L] trended upward to its highest concentration. The overall 5-year trend is up. PFAS is currently being treated, so the discharge to the ground surface is non-detected.
- The temperature in UD-3 was measured at 22.3 deg. C during sampling. The previously-rising temperatures pattern in UD-3 appear to have stabilized beginning in May 2018 at approximately 22 deg. C. and has been generally slowly declining since May 2019. This pattern of recent stabilizing or slow declines in temperature was also seen in the primary leachate of Phase III, from highs of approximately 28 deg. C. in May 2016 down to recent temperatures of 20 – 21 deg. C. during the previous round in October 2023. However, this May 2024 sampling round indicated an apparent increase in all temperatures (see graph on page 359 of Appendix 1).
- Flow rate measurement collection was inadvertently omitted in May 2024 from UD-3. However, a subsequent flow rate was measured at UD-3 on 6/10/2024 at 7,416 gpd, which is an increase compared to the previous round in October 2023.

Underdrain Outlet Phase 4 (UD-4): In general, inorganic compounds, which include metals and indicator parameters, trended up in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS, as is typical:
  - Arsenic, Total [3.9 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the historic range.
- Two inorganic compounds were detected at their highest concentrations to date:
  - Chloride [39 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
  - Sodium [12 mg/L]; it is routinely detected and has no VWQS.
- All other metals, other inorganic compounds and indicator parameters are within historic ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in October 2006, with the exception of two low-level detections in May 2011 [Acetone and 2-Butanone; they have no VWQS] and June 2011 [Acetone and 2-Butanone; they have no VWQS and have not been detected since].
- SVOCs remain non-detected since analysis began in October 2006.
- PFAS: There are no Vermont standards for PFAS in surface water. The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS remained non-detected as has occurred since sampling began in September 2019. The overall 5-year trend is stable [non-detected].
- The temperature in UD-4 was measured at 13.8 deg. C during sampling. The overall pattern of UD-4 temperatures appears to be declining since its high in May 2019 (23.2 deg. C). The overall pattern of UD-4 temperature fluctuations had roughly paralleled the fluctuations of temperatures of the Phase IV leachates to the recent temperatures of 23 – 27 deg. C. during the previous round in October 2023. However, this May 2024 sampling round indicated an apparent increase in Phase IV Cell 2 leachate (see graph on page 360 of Appendix 1).
- The flow rate from UD-4 was measured at 1,325 gpd and is continuing the significant and steady decline since May 2020. This may reflect the impacts of water table capture and lowering by the adjacent underdrain beneath Phase VI.

Underdrain Outlet Phase 6 (UD-6): In general, inorganic compounds, which include metals and indicator parameters, trended up in May 2024 compared to the previous round. Notable:

- One metal exceeded its VWQS:
  - Arsenic, Total [3.9 ug/L; VWQS = 1.5 ug/L]. The May 2024 concentration is within the 2-year range.
- Two inorganic compounds were detected at their highest concentrations in the 2-year range:
  - Chloride [21 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
  - Hardness [321 mg/L]; it is routinely detected and has no VWQS.
- All other metals, other inorganic compounds and indicator parameters are within the 2-year ranges, with no VWQS exceedances.
- VOCs remain non-detected since analysis began in October 2021.
- SVOCs remain non-detected since analysis began in October 2021. However, during sampling in May 2024, one SVOC was detected: Bis(2-ethyl-hexyl)phthalate [32.0 ug/L] [VWQS = 0.37 ug/L], which was verified by the laboratory as correct. This compound is an extremely common flexible plasticizer, which may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months.

  Due to this anomalous detection, WHEM collected a sample on 7/22/2024, which was non-detected for all SVOC compounds. Therefore, this SVOC detection in May 2024 appears to be anomalous. SVOC results will be closely reviewed during the next semi-annual sampling event in October 2024.

- PFAS: There are no Vermont standards for PFAS in surface water. The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS remained non-detected as has occurred since sampling began in October 2021, with the exception of May 2022.
- The flow rate from UD-6 decreased substantially to 6,624 gallons per day (gpd) in May 2024, compared to 32,918 gpd in October 2023. This is a marked decrease, and we would expect that the UD-6 flow rate will continue to decline over time.

IV. DRINKING WATER

There are no drinking water sources within 1,000 feet of the limits of solid waste at NEWSVT, and no drinking water sources are included in the Water Quality Monitoring Program or Solid Waste Management Facility Certification requirements. Three wells in the NEWSVT water quality monitoring program serve as non-potable water supplies for uses other than for drinking water, in buildings at the NEWSVT site, as follows: DW-36516 (St. Onge House & Barn, 2005 well) serves the vacant former St. Onge residence and barn; to our knowledge, it is not used as a drinking water source in either building. The two other wells (DW-21 Office, and DW-30616 Maintenance) are not used as potable water sources; bottled water is provided in each building. Water quality results for these wells have been incorporated into the groundwater section of this report, above.

V. LEACHATE

At NEWSVT, there are a total of nine (9) leachate sampling locations; eight (8) individual cells and the combined leachate AST: Lined Phase I, Phase II, Phase II Cell 1, Phase III Cell 2, Phase IV Cell 1, Phase IV Cell 2, Phase IV Cells 3&4, Phase VI Cell 1, and the combined AST. Leachate from Unlined Areas A & B is not collected, so it cannot be sampled.

Between the previous semi-annual sampling event in October 2023 and this current May 2024 sampling event, solid waste was being placed exclusively in Phase VI Cell 1. Leachate from all lined areas was being actively managed. All 9 (nine) primary leachate sampling locations were successfully sampled in May 2024; no samples were required from the secondary leak-detection systems.

Leachate from individual landfill cells: Each of the eight leachate pumping systems in the lined landfill cells has a separate pump station that allows the collection of discrete samples from both the primary and secondary leachate collection systems in each cell. For routine leachate sampling, samples are collected from the primary leachate collection systems in each lined cell, generally by turning on the leachate pump.

Possible sampling of secondary leak detection system liquid: If any of the secondary leachate leak-detection systems have accumulation rates which have recently exceeded twenty (20) gallons per acre per day, a grab sample from that cell's secondary detection system would also be collected. NEWSVT personnel will notify WHEM if and when secondary leachate sample collection is necessary. For the May 2024 sampling round, NEWSVT personnel notified WHEM that no sampling of any secondary leak-detection liquids was required.

Combined Leachate from the AST's: One AST (AST #1), has been in use since 2006 to store a combination from all phases and cells of the site, consisting of the following liquids: primary leachate, small amounts of secondary detection-system liquid, and small amounts of liquids from Underdrain 1 and Underdrain 2. As part of the of the Phase VI expansion, a second AST (AST #2) was installed in 2021 adjacent to AST #1. The use of this second AST commenced in September 2023. Recently prior to the May 2024 sampling event, AST #2 had been primarily used to store treated leachate from the leachate treatment system when it was active. Pumping systems in AST #1 and AST #2 send their

contents to piping in the nearby leachate load-out building, where tanker trucks are filled for transport to off-site disposal. Leachate samples for compliance monitoring are collected from this piping in the building. A digital screen in the building indicates which AST is sending liquid. For the May 2024 leachate sampling event, samples were collected from AST #1 containing untreated leachate, and will be during future sampling events.

Laboratory Analyses, and Comparisons of Results to Standards: The leachate samples are analyzed for total metals and other inorganics, volatile organics (by EPA Method 8260C), semi-volatile organics (by EPA 8270C), and the AST leachate is analyzed for PFAS [by modified Method 537]. See the leachate quality summary tables in Appendix 1, and individual laboratory reports in Appendix 2. For a summary of recent leachate trends, see the table on page 6 of Appendix 1. These May 2024 trends were visually estimated in comparison to the previous sampling event.

- Comparison to Vermont Toxicity Characteristics: Leachate quality is compared to the *Vermont Hazardous Waste Management Regulations*, Toxicity Characteristic (TC); Chapter 2, Table 1: Maximum Concentration of Contaminants for the Characteristic of Toxicity (February 1, 2022). The lab results for the May 2024 leachate samples indicate that NEWSVT leachate is not characterized as toxic, because none of the parameters analyzed exceed the Vermont TC concentrations.

- Comparison to Guidelines for Accepting Landfill Leachate at Permitted Wastewater Treatment Facilities [WWTFs]: Concentrations of PFOA and PFOS in the AST leachate are compared to the VTDEC *Guideline Levels for Accepting Landfill Leachate at Permitted WWTFs* [Memo: P. Laflamme & C. Schwer, 7/06/2017]. The May 2024 concentrations of PFOA and PFOS are far below the concentrations for which there are restrictions regarding where landfill leachate may be disposed, as has been the case since leachate sampling for PFAS began in January 2018.

Phase I Leachate, Primary: In general, metals and other inorganics trended down, and VOCs and SVOCs trended up in May 2024 compared to the previous round. Notable:

- Metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- Two VOCs were detected at their highest concentrations to date:
  - T-Butanol [14,100 ug/L]; it is routinely detected and has no TC;
  - 1,2-Dichlororethane [20.6 ug/L] [TC = 500 mg/L]; it is sporadically detected and remains far below its TC.
- One VOC was detected for the first time and is not unexpected in landfill leachate:
  - 1,2,3-Trimethylbenzene [6.6 ug/L]; it has no TC.
- All other VOCs were within historic ranges; all were below their TCs, as is typical.
- The following low-level SVOCs were detected for the first time; they have no TCs, and their presence is not unexpected in landfill leachate:
  - Benzo(a)anthracene [7.9 ug/L], Benzo(b)fluoranthene [6.5 ug/L], Benzo(g,h,i)perylene [6.9 ug/L], Chrysene [7.5 ug/L], Dibenzo(a,h)anthracene [5.8 ug/L] and Ideno(1,2,3-cd)pyrene [5.7 ug/L].
- All other SVOCs were within historic ranges; all were below their TCs, as is typical.
- PFAS analysis is not required.

Phase II Leachate, Primary: In general, metals and other inorganics trended up, and VOCs and SVOCs trended down in May 2024 compared to the previous round. Notable:

- Metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- One VOC was detected at its highest concentration to date:
  - T-Butanol [3,680 ug/L]; it is routinely detected and has no TC.

- All other VOCs were within historic ranges; all were below their TCs, as is typical.
- SVOCs were within historic ranges; all were below their TCs, as is typical.
- PFAS analysis is not required.

Phase III Cell 1 Leachate, Primary: In general, metals, other inorganics and VOCs trended down, and SVOCs were non-detected in May 2024 compared to the previous round. Notable:

- All Metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- VOCs were within historic ranges; all were below their TCs, as is typical.
- SVOCs were non-detected, as has occurred since October 2021.
- PFAS analysis is not required.

Phase III Cell 2 Leachate, Primary: In general, metals trended down, other inorganics and VOCs trended up, and SVOCs were non-detected in May 2024 compared to the previous round. Notable:

- All Metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- One VOC was detected at its highest concentration to date:
  - T-Butanol [4,260 ug/L]; it is routinely detected and has no TC.
- All other VOCs were within historic ranges; all were below their TCs, as is typical.
- SVOCs were non-detected, as has occurred since October 2021.
- PFAS analysis is not required.

Phase IV Cell 1 Leachate, Primary: In general, metals, other inorganics, VOCs and SVOCs trended down in May 2024 compared to the previous round. Notable:

- All Metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- One VOC was detected at its highest concentration to date:
  - T-Butanol [8,680 ug/L]; it is routinely detected and has no TC.
- All other VOCs were within historic ranges; all were below their TCs, as is typical.
- SVOCs were within historic ranges; all were below their TCs, as is typical.
- PFAS analysis is not required.

Phase IV Cell 2 Leachate, Primary: In general, metals, VOCs and SVOCs trended down, and other inorganics were mixed in May 2024 compared to the previous round. Notable:

- The temperature was tied at its highest value to date at 29.10 C.
- All metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- VOCs were within historic ranges; all were below their TCs, as is typical.
- SVOCs were non-detected; this has only occurred one other time, in October 2020.
- PFAS analysis is not required.

Phase IV Cells 3 & 4 Leachate, Primary: In general, metals, other inorganics, VOCs and SVOCs trended down in May 2024 compared to the previous round. Notable:

- All metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- VOCs were within historic ranges; all were below their TCs, as is typical.
- SVOCs were within historic ranges; all were below their TCs, as is typical.
- PFAS analysis is not required.

Phase VI Cell 1 Leachate, Primary: In general, metals, other inorganics and VOCs trended down and SVOCs were mixed in May 2024 compared to the previous round. Notable:

- All Metals and other inorganics were below their TCs.
- One VOC was detected for the first time and is not unexpected in landfill leachate:
  - P-Isopropyltoluene [7.5 ug/L]; it has no TC.
- All other VOCs were below their TCs.
- One SVOC was detected for the first time and is not unexpected in landfill leachate:
  - 2-Methylphenol 13.1 ug/L]; it has no TC.
- All other SVOCs were below their TCs.
- PFAS analysis is not required.

Combined Leachate Above-Ground Storage Tank [AST]: In general, metals, other inorganics, VOCs and PFAS trended up and SVOCs trended down in May 2024 compared to the previous round.

- All metals and other inorganics were within historic ranges; all were below their TCs, as is typical.
- VOCs were within historic ranges; all were below their TCs, as is typical.
- SVOCs were within historic ranges; all were below their TCs, as is typical.
- All five of the VT-regulated-in-groundwater PFAS compounds were detected in the leachate AST sample in May 2024, at a combined concentration that was within the historic range and increased compared to October 2023. There is no clear trend in these combined concentrations since sampling began in 2018. The concentrations of the two PFAS compounds in landfill leachate whose disposal options are regulated in VT [PFOA, PFOS], increased in the May 2024 leachate AST sample when compared to the previous October 2023 sample, and are well within their moderately-fluctuating historic ranges. The May 2024 concentrations of PFOA and PFOS in the AST leachate are far below the concentrations for which there are restrictions regarding where landfill leachate may be disposed (per 2017 VDEC guideline levels), as has been the case since leachate sampling for PFAS began in January 2018 as follows:

  - May 2024 PFOA: 1,510 ng/L = 1.26% of no-restrictions threshold;
  - May 2024 PFOS: 207 ng/L = 20.7% of no-restrictions threshold.

VI. QUALITY ASSURANCE/QUALITY CONTROL

Groundwater Samples, QA/QC for VOCs:
In May 2024 two QA/QC Groundwater Trip Blank samples were poured by WHEM, from de-ionized water provided by Endyne, Inc., which was stored in the same coolers as the groundwater samples. All VOC compounds were non-detected, indicating acceptable sampling and laboratory procedures for VOCs in groundwater samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, one QA/QC Equipment Blank sample was collected by WHEM to represent the equipment used for groundwater sample collection on various dates from the groundwater sampling pump used for low-flow sampling of some of the deep monitoring wells. This pump requires decontamination between each well use. To decontaminate the pump between each use, a mixture of de-ionized water mixed with Alconox is run through the pump while it is turned on, followed by a rinse with de-ionized water. At the end of sampling use, the pump is placed into a cylinder filled with laboratory provided de-ionized water, and the Equipment Blank sample is collected for VOC analysis. All VOC compounds were non-detected, indicating acceptable decontamination procedures in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, four QA/QC Duplicate Groundwater samples were collected from E1 (Dup1), D2 (Dup 2), 705 (Dup 3) and F1 (Dup 4) and were analyzed for all required parameters. The laboratory results for Dup-1, Dup-2, Dup-3 and Dup-4 were all in close relation (concentrations in each duplicate pair had less than 45% relative differences). This data indicates acceptable sampling and laboratory procedures for groundwater samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

Groundwater Samples, QAQC for PFAS:
In May 2024, two QA/QC PFAS Trip Blank samples were provided by Alpha Analytical for the coolers containing PFAS groundwater samples. All PFAS compounds were non-detected. This indicates acceptable sampling and laboratory procedures for PFAS groundwater samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, one QA/QC PFAS Equipment Blank sample was collected by WHEM to represent the equipment used for groundwater and underdrain sample collection on various dates. This equipment is comprised of new disposable tubing, or direct grab samples from the underdrain. All PFAS compounds were non-detected. This indicates acceptable sampling and laboratory procedures for PFAS groundwater samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, three QA/QC PFAS Field Blank samples were poured on-site by WHEM each day PFAS groundwater samples were collected. All PFAS compounds were non-detected. This indicates WHEM personnel, and the ambient environment were free of PFAS compounds, and also indicates acceptable sampling and laboratory procedures for PFAS groundwater samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

Surface Water Samples, QA/QC for VOCs:
In May 2024, one QA/QC Surface Water Trip Blank sample was provided by Endyne, Inc., which was stored in the same cooler as the VOC surface water samples. All VOC compounds were non-detected. This indicates acceptable sampling and laboratory procedures for VOCs in surface water samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

Surface Water Samples, QAQC for PFAS:
In May 2024, one QA/QC PFAS Trip Blank sample was provided by Alpha Analytical for the cooler containing the PFAS surface water sample. All PFAS compounds were non-detected. This indicates acceptable sampling and laboratory procedures for the PFAS surface water sample in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, one QA/QC PFAS Field Blank sample was poured on-site by WHEM the day PFAS surface water samples were collected. All PFAS compounds were non-detected. This indicates WHEM personnel, and the ambient environment were free of PFAS compounds, and also indicates acceptable sampling and laboratory procedures for PFAS surface water sample in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

Underdrain Samples, QA/QC for VOCs:
In May 2024, one QA/QC Underdrain Trip Blank sample was poured by WHEM, from de-ionized water provided by Endyne, Inc., which was stored in the same cooler as the VOC underdrain samples. All VOC compounds were non-detected. This indicates acceptable sampling and laboratory procedures

for VOCs in surface water samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

Underdrain Samples, QAQC for PFAS:
In May 2024, one QA/QC PFAS Trip Blank sample was provided by Alpha Analytical for the cooler containing PFAS underdrain samples. All PFAS compounds were non-detected. This indicates acceptable sampling and laboratory procedures for PFAS underdrain samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, one QA/QC PFAS Equipment Blank sample was collected by WHEM to represent the equipment used for underdrain and groundwater sample collection. This equipment is comprised of new disposable tubing, or direct grab samples from the underdrain. All PFAS compounds were non-detected. This indicates acceptable sampling and laboratory procedures for PFAS groundwater samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, one QA/QC PFAS Field Blank sample was poured on-site by WHEM the day PFAS underdrain samples were collected. All PFAS compounds were non-detected. This indicates WHEM personnel, and the ambient environment were free of PFAS compounds, and also indicates acceptable sampling and laboratory procedures for PFAS underdrain samples in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

Leachate Samples, QA/QC for VOCs:
In May 2024, two QA/QC Leachate Trip Blank samples were stored in the same coolers as the individual leachate cell VOC samples, and leachate AST sample. One was provided by Endyne, Inc., and one was poured by WHEM, from de-ionized water provided by Endyne, Inc. VOC compounds were non-detected. This indicates acceptable sampling and laboratory procedures for VOCs in leachate samples in the May 2024 sampling round.

Leachate AST Samples, QAQC for PFAS:
In May 2024 one QA/QC PFAS Trip Blank sample was provided by Alpha Analytical for the cooler containing PFAS leachate AST sample. All PFAS compounds were non-detected. This indicates acceptable sampling and laboratory procedures for the PFAS leachate sample in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

In May 2024, one QA/QC PFAS Field Blank sample was poured on-site by WHEM the day the PFAS leachate AST sample was collected. All PFAS compounds were non-detected. This indicates WHEM personnel, and the ambient environment were free of PFAS compounds, and also indicates acceptable sampling and laboratory procedures for PFAS leachate AST sample in the May 2024 sampling round. See the summary table in Appendix 1; laboratory results are in Appendix 2.

VII. GROUNDWATER DEPTHS, ELEVATIONS and FLOW DIRECTIONS

Groundwater depths were measured in all groundwater monitoring wells (but not the drinking water wells). Water levels averaged slightly higher in elevations (shallower depths) in May 2024 compared to the previous October 2023 sampling event. A summary table of the May 2024 groundwater elevations is included in Appendix 1, page 323. Tables and graphs of these measurements, showing all historic groundwater elevation data for each monitoring well, are included in Appendix 1, pages 324-358.

A groundwater elevation contour map, showing estimated horizontal groundwater flow directions in the surficial materials, is included in Appendix 1, page 2. This contour map is created by WHEM using water level data only from shallow surficial wells, in conjunction with surface water sampling elevations where available and appropriate. Water level data from bedrock wells and deep surficial wells are generally not used to create this map, since those data may not reflect the water table elevations at those locations. In May 2024, shallow surficial groundwater flow paths were generally the same as previous sampling events; they were generally to the west and northwest in the vicinity of lined Phases III and IV; generally to the north in the vicinity of lined Phase II; and generally to the northwest, north and northeast in the vicinity of lined Phase I and Unlined Areas A&B. The deep Phase VI underdrain [sump at elevation 767 ft.] appears to be influencing groundwater flow directions immediately to its west (down-gradient), as would be expected: groundwater in the surficial monitoring wells west of Phase VI is being drawn to the east (upgradient) by the underdrain, as indicated by the groundwater elevations west of Phase VI being 23 ft to 48 ft higher than the Phase VI Cell 1 underdrain sump.

VIII. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

General:

1. Sampling of groundwater, surface water, underdrain and leachate samples was conducted by WHEM between 5/6/2024 through 5/21/2024.
2. Sampling was done in accordance with Conditions 67, 68, 69, 70 and 71 of the *Solid Waste Management Facility Certification* (effective October 12, 2018) and amended February 13, 2023 [leachate AST PFAS pre-treatment approval] and February 28, 2023 [Underdrain Outlet Phase 3 PFAS pre-treatment approval, and addition of MW-K1 to the semi-annual water quality monitoring plan].
3. Groundwater, surface water, underdrains, and leachate samples were analyzed by Endyne, Inc., of Williston, Vermont, or their sub-contracted certified laboratories.
4. Groundwater PFAS, surface water PFAS, underdrain PFAS and leachate AST PFAS samples were analyzed by Alpha Analytical.
5. All monitoring wells were successfully sampled in May 2024 via WHEM's low-flow sampling SOP with the exception of the three non-potable water supply wells, which were grab-sampled as usual, one monitoring well with insufficient water (G-27S) and one monitoring well obstructed with tubing (G-26BR). The low-flow tubing obstructing monitoring well G-26BR will be removed and sampled as soon as possible. The results for this well will be addressed in a separate letter. As per the SOP, all monitoring wells were field-measured for depth to water; and temperature, specific conductance, DO, pH, ORP and turbidity readings were obtained until readings stabilized (or after one hour of data collection; whichever comes first), and samples were then collected.
6. Method(s) of Reporting Trends in Water Quality Data: Trends are stated for the four broad categories of indicator parameters, inorganics [including metals], VOCs, and PFAS.
7. Trends in concentrations are stated two ways:
   - In each category, the trends in concentrations are estimated by visually comparing the values for this current round of sampling to the previous round of sampling [as agreed by K. Kathan, VTDEC Solid Waste Program, 3/03/2015).
   - Five-year trends in groundwater concentrations are visually estimated from the graphs, only for parameters which exceed GESs for at least half of the latest 5-year period [per approved updated Water Quality Monitoring Program, 2/14/2019]. The 5-year period for this current report is the period from May 2019 to May 2024. Select graphs show less than 5 years of data, because that is all that is available.
8. DEC Comments on Water Quality Report Regarding Previous Sampling Round:
   The VTDEC Solid Waste Program ("SWP") issued a letter dated February 20, 2024, regarding the October 2023 Semi-Annual Water Quality Report. This letter stated the following:

- *The Solid Waste Program has reviewed the report and determined the sampling event satisfies Conditions 68-71 for the Facility's 2018 certification. There are no questions or comments at this time.*

Groundwater Summary:

1. *Up-gradient or Cross-Gradient of Lined and Unlined Landfills (17 Monitoring Wells):*

Indicator parameters showed *downward trends* in 409, 706, BRW-3S, BRW-4S, BRW-5S, E-3, G-10DR, G-11D, DW-21 Office and DW-30616 Maintenance; *upward trends* in 705, BRW-3D, G-7D, G-9D, and DW-36516 (St. Onge House and Barn (2005); and *mixed trends* in G-26D; G-26BR has not yet been sampled, as explained above. Notable:

Sodium was detected at the highest concentration in the past 5-year range in the following:

- 705: Sodium, Total [36.0 mg/L]. It is routinely detected and has no GES;

Inorganic compounds including Metals showed *downward trends* in 409, 705, 706, BRW-4S, E-3 and DW-21 Office; *upward trends* in BRW-3S, BRW-3D, BRW-5S, G-9D, G-10DR, G-11D, G-26D, DW-36516 (St. Onge House and Barn (2005) and DW-30616 Maintenance; and *mixed trends* in G-7D; G-26BR has not yet been sampled, as explained above. Notable:

Arsenic was detected at the highest concentration in the past 5-year range in the following:

- BRW-3D: Arsenic, Dissolved [32.8 ug/L] [GES – 10.0 ug/L]. It is above the GES, as is typical in the past 5-year range;
- G-9D: Arsenic, Dissolved [104.0 ug/L] [GES = 10 ug/L]. It is above the GES, as is typical in the past 5-year range.

Manganese was detected at the highest concentration in the past 5-year range in the following:

- G-11D: Manganese, Dissolved [0.200 mg/L] [GES – 0.300 mg/L]. It is below the GES, as is typical in the past 5-year range.

Iron was detected at the highest concentration in the past 5-year range in the following:

- BRW-5S: Iron, Total [19 mg/L]. It is routinely detected and has no GES;
- G-11D: Iron, Dissolved [0.170 mg/L]. It is routinely detected and has no GES.

Chloride was detected at the highest concentration in the past 5-year range in the following:

- BRW-5S: Chloride, Total [11.0 mg/L]. It is routinely detected and has no GES;
- G-11D: Chloride, Total [25 mg/L]. It is routinely detected and has no GES.

VOCs were all non-detected in up-gradient or cross gradient monitoring wells, as is generally typical.

PFAS were sampled in the following wells from this group: BRW-3S, BRW-3D, BRW-4S and BRW-5S. BRW-5S showed *upward trends*, and BRW-3S, BRW-3D and BRW-4S were non-detected for PFAS, as is generally typical. Notable:

- PFAS BRW-5S: PFAS: The sum of the five VT-regulated PFAS [4.37 ng/L] [GES = 20 ng/L] is below the GES as is typical when it is sporadically detected; it trended up in May 2024.

2. *Between Lined and Unlined Landfills (1 Well):* There is one compliance monitoring well (F1) between the lined and Unlined landfills. In general indicator parameters were mixed, and metals and VOCs trended down in May 2024 compared to the previous round. All metals, indicator parameters and VOCs were within the past 5-year ranges.

3. *Down-gradient of Unlined Areas A & B (9 Monitoring Wells):*

Indicator parameters showed *downward trends* in 412R, A1, BRW-1, BRW-2R and D2; *upward trends* in B1, P2R-R and P8; and *mixed trends* in D1R. Notable:

Sodium was detected at the highest concentration in the past 5-year range in the following:

- 412R: Sodium, Total [16.0 mg/L]. It is routinely detected and has no GES;
- B1: Sodium, Total [8.6 mg/L]. It is routinely detected and has no GES;
- D1R: Sodium, Total [14.0 mg/L]. It is routinely detected and has no GES;
- P2R-R: Sodium, Total [170 mg/L]. It is routinely detected and has no GES;
- P8: Sodium, Total [37.0 mg/L]. It is routinely detected and has no GES.

COD was detected at the highest concentration in the past 5-year range in the following:

- P8: COD [79.0 mg/L]. It is routinely detected and has no GES.

Specific Conductivity was detected at the highest concentration in the past 5-year range in the following:

- B1: Specific Conductivity [283 us/cm]. It has no GES;
- P2R-R: Specific Conductivity [1,704 us/cm]. It has no GES.

Inorganic compounds including Metals, showed *downward trends* in 412R, BRW-1 and P2R-R; *upward trends* in A1, BRW-2R, D2 and P8; and *mixed trends* in B1 and D1R. Notable:

Arsenic was detected at the highest concentration in the past 5-year range in the following:

- BRW-1: Arsenic, Dissolved [5.6 ug/L] [GES = 10 ug/L]. It is below the GES, as is typical within the past 5-year range.

Manganese was detected at the highest concentration in the past 5-year range in the following:

- A1: Manganese, Dissolved [0.740 mg/L] [GES = 0.300 mg/L]. It is above the GES, as is typical within the past 5-year range;
- P8: Manganese, Total [6.50 mg/L] [GES = 0.300 mg/L]. It is above the GES, as is typical within the past 5-year range.

Nickel was detected at the highest concentration in the past 5-year range in the following:

- D2: Nickel, Total [502 ug/L]; and Dissolved [544 ug/L] [GES = 100 ug/L]. It is above the GES, as is typical within the past 5-year range;

Iron was detected at the highest concentration in the past 5-year range in the following:

- 412R: Iron, Dissolved [13.0 mg/L]. It is routinely detected and has no GES;
- A1: Iron, Total [8.7 mg/L]. It is routinely detected and has no GES;
- BRW-1: Iron, Dissolved [41.0 mg/L]. It is routinely detected and has no GES;
- P8: Iron, Total [34.0 mg/L]. It is routinely detected and has no GES;

Chloride was detected at the highest concentration in the past 5-year range in the following:

- 412R: Chloride, Total [29.0 mg/L]. It is routinely detected and has no GES;

VOCs were non-detected in 412R, B1, BRW-1, BRW-2R and D1R; and *upward trends* were noted in A1, D2, P2R-R and P8. Notable:

Diethyl Ether was detected at the highest concentration in the past 5-year range in the following:

- P8: Diethyl Ether [7.7 ug/L]. It has been detected only once in the past 5-year range and has no GES.

PFAS was sampled in the following wells from this group: BRW-1, BRW-2R and P2R-R. P2R-R showed the clear presence of PFAS; this is not unexpected, given its location only about 20 ft from Unlined Area A. *An upward trend* in PFAS was noted in P2R-R. BRW-1 and BRW-2R were non-detected in May 2024, as has been the case since PFAS sampling began. Notable:

- PFAS P2R-R: The sum of the five VT-regulated PFAS [85.3 ng/L] [GES = 20 ng/L] exceeded the GES as is typical. The sum trended up to its highest concentration in the past 5-year range in May 2024 compared to October 2023.

4. *Down-gradient of lined landfills, and not impacted by Unlined Areas A & B (10 wells):*

Indicator parameters showed *downward trends* in 103, E1, G-12S, G-27D, P6 and K1; *upward trends* in E2 and G-12BR; and *mixed trends* in 703. G-27S had insufficient water to sample and since 805MR was sampled for the second time, trends cannot yet be determined. Notable:

Sodium was detected at the highest concentration in the past 5-year range in the following:

- G-12BR: Sodium, Total [3.5 mg/L]. It is routinely detected and has no GES.

Specific Conductivity was detected at the highest concentration in the past 5-year range in the following:

- 703: Specific Conductivity [399 us/cm]. It has no GES.

Inorganic compounds including Metals, showed *downward trends* in E1, G-12S, P6 and K1; *upward trends* in 103, 703, E2 and G-12BR; and *mixed trends* in G-27D. G-27S had insufficient water to sample and since 805MR was sampled for the second time, trends cannot yet be determined. Notable:

Manganese was detected at the highest concentration in the past 5-year range in the following:

- 703: Manganese, Total [4.800 mg/L] [GES = 0.300]. It is above the GES, as is typical within the past 5-year range.

Lead was detected at the highest concentration in the past 5-year range in the following:

- 703: Lead, Total [1.0 ug/L] [GES = 15 ug/L]. It is below the GES, as is typical when detected.

Iron was detected at the highest concentration in the past 5-year range in the following:

- 103: Iron, Total [1.10 mg/L]. It is routinely detected and has no GES.

Chloride was detected at the highest concentration in the past 5-year range in the following:

- 103: Chloride, Total [26.0 mg/L]. It is routinely detected and has no GES;
- E2: Chloride, Total [3.5 mg/L]. It is routinely detected and has no GES.

VOCs showed *downward trends* in 103 and all were within the past 5-year ranges . All other down-gradient monitoring wells were non-detected, as usual. G-27S had insufficient water to sample and since 805MR was sampled for the second time, trends cannot yet be determined.

PFAS was sampled in the following wells from this group: E1, E2, G-12S, P6 and K1. An *upward trend* was noted in E1 and E2 and a downward trend to non-detected was noted in K1. The sums of the five VT-regulated PFAS were non-detected G-12S P6 and K1, as is typical. MW-K1 is located approximately 250 ft downgradient of where the treated discharge from UD-3 is released onto the ground surface. The 3-year downward trend of PFAS, to this recent non-detection, may be an indication that the prior potentially impacted groundwater is being flushed of PFAS. The sums of the five VT-regulated PFAS in E1 and E2 trended up to their highest concentrations in the past 5-year ranges, but remain well below the VGES.

5. ***Preliminary Statistical Analysis of Cause and Significance:***

Upgradient or cross-gradient of lined and unlined landfills (4 of the 17 wells): Total and dissolved arsenic and/or total and dissolved manganese levels statistically exceed GESs in four (4) of these seventeen (17) wells in May 2024: BRW-3D, BRW-5S, E-3 and G-9D.

Between lined and unlined landfill (1 well): Total and dissolved arsenic and total and dissolved manganese levels statistically exceed GESs in this one well in May 2024: F1. Benzene levels statistically exceed the GES in this one well in May 2024: F1.

Downgradient of Unlined Areas A & B (8 of the 9 wells): Total and dissolved arsenic, and/or total and dissolved manganese, and/or total and dissolved nickel levels statistically exceed GESs in eight (8) of these nine (9) wells in May 2024: 412R, A1, B1, BRW-1, D1R, D2, P2R-R and P8. Acetone, benzene, and 2-butanone levels statistically exceed GESs in one (1) of these wells in May 2024: D2. The sum of the five VT-regulated PFAS statistically exceeds the GES in one well: P2R-R.

Downgradient of lined landfills, and not impacted by Unlined Areas A & B (5 of the 11 wells): Total and dissolved arsenic and/or total and dissolved manganese levels statistically exceed GESs in five (5) of these eleven (11) wells in May 2024: 103, 703, E2,P6 and K1.

- The metals with statistical GES exceedances are common naturally-occurring compounds in Vermont groundwater. However, the standards exceedances are generally greater in magnitude in the down-gradient wells, reflecting impacts from the unlined landfill and/or impacts from changes in the redox regime as groundwater travels the long distances beneath the lined phases;
- The VOCs and/or PFAS with statistical GES exceedances between landfills and downgradient of Unlined Areas A & B are likely the result of migration of leachate from the Unlined landfill Areas A & B.

6. Groundwater depths were measured in all groundwater monitoring wells (but not the drinking water wells). Water levels averaged slightly higher in elevations (shallower depths) in May 2024 compared to the previous October 2023 sampling event. In May 2024, shallow surficial groundwater flow paths were generally the same as previous sampling events; they were generally to the west and northwest in the vicinity of lined Phases III and IV; generally to the north in the vicinity of lined Phase II; and generally to the northwest, north and northeast in the vicinity of lined Phase I and Unlined Areas A&B. The deep Phase VI underdrain [sump at elevation 767 ft.] appears to be influencing groundwater flow directions immediately to its west (down-gradient), as would be expected: groundwater in the surficial monitoring wells west of Phase VI is being drawn to the

east (upgradient) by the underdrain, as indicated by the groundwater elevations west of Phase VI being 23 ft to 48 ft higher than the Phase VI Cell 1 underdrain sump.

7. No drinking water supplies are impacted by the NEWSVT facility.

Surface Water Summary:

1. There are 12 surface water sampling stations on streams, ditches and rivers at and near the NEWSVT facility; three (3) upstream or side-gradient locations: SW-1 Black River Upstream, SW-3 Landfill Brook East, and SW-9 Southwest Stream #1, and nine (9) downstream locations: SW-2 Black River Downstream, SW-4 North Landfill Stream, SW-5 St. Onge Ditch, SW-6 Landfill Brook East, SW-7A Western Stream, SW-8 Wetland Below UD-1, 2, SW-10 Southwest Stream #2, SW-11 Southwest Stream #3 and SW-12 Southwest Stream #4.
2. During the May 2024 sampling, all twelve (12) of these locations had sufficient water for sampling.
3. Surface water quality results are compared to the Vermont Water Quality Standards (VWQS); effective 11/15/22, Appendix C, for Protection of Human Health (Consumption of Organisms only), and Protection of Aquatic Biota, Average Acceptable Concentration (AAC) Chronic Criteria. If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is used or calculated using formulas provided in Appendix D and E of the VWQS. Dissolved concentrations of select metals (cadmium, chromium, copper, lead, nickel, and zinc) are estimated using laboratory-reported total metals concentrations and conversion factors provided in Appendix D of the VWQS. Both total and dissolved concentrations are now included in the data tables. Select metals are non-detected; their detection limits are higher than their water quality standards, so the actual concentrations of these metals cannot be compared to standards.
4. ***Upstream or side-gradient Surface Water locations:***
   Inorganic compounds, which include Metals and Indicator Parameters, showed *downward trends* in SW-1, SW-3 and SW-9.
   VOCs were non-detected in all sampled upstream surface or side-gradient surface water locations.
   SVOCs were non-detected in all sampled upstream or side-gradient surface water locations.
   - SW-1: SVOCs remain non-detected since analysis began in October 2004. SW-1 was re-sampled on 7/22/2024 as part of a targeted re-sampling effort, due to an anomalous SVOC detection in the downstream Black River station, SW-2. SVOC results in SW-1 from both sampling events in May 2024and July 2024, remain non-detected

   PFAS analysis is not required from any upstream or side-gradient surface water location.
5. ***Downstream Surface Water locations:***
   Inorganic compounds, which include Metals and Indicator Parameters, showed *downward trends* in SW-2, SW-4, SW-6, SW-8, SW-11, and SW-12; *upward trends* in SW-10; and *mixed trends* in SW-5 and SW-7A. Notable:
   - SW-8: Two inorganic compounds were detected at their highest concentrations to date:
     - Chloride [52 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
     - Sodium [38 mg/L]; it is routinely detected and has no VWQS.
   - SW-10: WHEM personnel noted the sample location of SW-10, and surrounding area, had accumulated fine gray silty sediment since the previous sampling event in October 2023. Therefore, the sampling location was moved approximately 5 ft west of its original location. The presence of this sediment is likely due to heavy rainfalls mobilizing the material over the previous six (6) months. Laboratory results do not indicate any adverse impacts due to the presence of the material.
   - SW-10: One inorganic compound was tied at its highest concentration to date:
     - Chloride [13 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS.

   VOCs were non-detected in all sampled downstream surface water locations. SVOCs showed *upward trends* in SW-4 and SW-12; all other downstream surface water locations were non-detected.

SVOCs showed *upward trends* in SW-4 and SW-12; all other downstream surface water locations were non-detected. Notable:

- SW-2: SVOCs had been non-detected since analysis began in May 2005, with the exception of one low-level detection in October 2004 (see below). However, during sampling in May 2024, one SVOC was detected: Bis(2-ethyl-hexyl)phthalate [23.3 ug/L] [VWQS = 0.37 ug/L], which was verified by the laboratory as correct. This compound has only been detected during one (1) previous sampling event: that was in October 2004, which was the only prior SVOC detection since analysis began in October 2004. This compound is an extremely common flexible plasticizer, which may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months. Due to this anomalous detection, WHEM collected a sample on 7/22/2024, which was non-detected for all SVOC compounds. Therefore, this SVOC detection in May 2024 appears to be anomalous. SVOC results will be closely reviewed during the next semi-annual sampling event in October 2024. The area where SW-2 is collected is close to Airport Road and the bridge over the Black River. It is in an area often used for fishing , and where miscellaneous trash is often observed and collected by NEWSVT personnel. This situation may have contributed to this anomalous SVOC detection this round.
- SW-4: One (1) SVOC was detected for the first time since analysis began in October 2004, and exceeded its VWQS; it has been verified by the laboratory as correct:
  - Bis(2-ethyl-hexyl)phthalate [5.4 ug/L] [VWQS = 0.37 ug/L]. This is an extremely common flexible plasticizer, which during sampling may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months. This SVOC detection in May 2024 appears to be anomalous and will be closely reviewed during the next semi-annual sampling event in October 2024.
- SW-12: One (1) SVOC was detected for the first time since analysis began in April 2019 and exceeded its VWQS:
  - Bis(2-ethyl-hexyl)phthalate [5.8 ug/L] [VWQS = 0.37 ug/L]. This is an extremely common flexible plasticizer, which during sampling may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months. This SVOC detection in May 2024 appears to be anomalous and will be closely reviewed during the next semi-annual sampling event in October 2024.

PFAS analysis is required only at SW-8 (letter from K. Kathan, dated 4/16/2020), during the semi-annual sampling events in May and October. In May 2024, PFAS showed an *upward trend* in SW-8. Notable:

- SW-8 PFAS: There are no Vermont standards for PFAS in surface water. The sum of the five Vermont-regulated-in-groundwater PFAS [181 ng/L] trended up in May 2024 to its highest concentration since analysis began in November 2019. It is possible this elevated concentration is due to the recent earthwork nearby to the south, for the expansion of the west detention pond and the area surrounding it since the previous sampling round. PFAS results in the next semi-annual sampling event in October 2024 will be closely reviewed now that the earthwork has been finalized.

Underdrains Summary:

1. Each of the lined landfill phases [Phases 1, 2, 3, 4 and 6] has an independent underdrain system of perforated pipes bedded in high-permeability drainage sand and stone located either in trenches or a continuous blanket beneath or within the engineered soil drainage system: Underdrain Outlet Phase I [UD-1], Underdrain Outlet Phase 2 [UD-2], Underdrain Outlet Phase 3 [UD-3], Underdrain Outlet Phase 4 [UD-4] and Underdrain Outlet Phase 6 [UD-6].
2. Status of UD-1 and UD-2: Beginning on August 20, 2019, discharges from UD-1 and UD-2 are managed as leachate by being pumped to the leachate holding tank. Using a peristaltic pump, individual samples are collected of the liquids in the manholes for UD-1 and UD-2.

3. Status of UD-3: On February 28, 2023, a solid waste permit amendment was granted for the PFAS treatment and disposal of the treated discharge from UD-3. This PFAS treatment system was installed and became operational in September 2023. The UD-3 discharge is diverted through carbon treatment vessels prior to being released to the ground surface. Monthly samples are collected throughout the treatment train to monitor the treatment efficacy, and to provide indications of when to change the carbon treatment vessels or treatment trains. The semi-annual water quality samples are collected from the untreated UD-3 water at the inlet to the treatment system. The flow rates from UD-3 are accurately measured directly at the discharge of the treatment system using an empty calibrated container and stopwatch.
4. Status of UD-4: The discharge from UD-4 is currently released to the ground surface at the outlet of the underdrain pipe. The flow rates from UD-4 are accurately measured directly at the discharge point using an empty calibrated container and stopwatch.
5. Status of UD-6: The discharge pipe for Underdrain 6 was primarily installed in the late fall of 2020, although the outlet of the pipe was not ready for sampling until early fall 2021. Sampling and measurements of flow rates from UD-6 began with the October 2021 compliance sampling round, which was prior to solid waste disposal into Phase VI. In mid-fall 2021, the final liner installation and the sand cover layer was completed, and solid waste placement in Phase VI Cell 1 commenced in late fall 2021. The flow rates from UD-6 are accurately measured directly at the discharge of the treatment system using an empty calibrated container and stopwatch.
6. The underdrain pipes are periodically flushed with high-pressure water. NEWSVT personnel reported the underdrain pipes were last flushed during the week of August 1, 2023.
7. Underdrain water quality results are compared to the Vermont Water Quality Standards (VWQS); effective 11/15/22, Appendix C, for Protection of Human Health (Consumption of Organisms only), and Protection of Aquatic Biota, Average Acceptable Concentration (AAC) Chronic Criteria. If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is used or calculated using formulas provided in Appendix D and E of the VWQS. Dissolved concentrations of select metals (cadmium, chromium, copper, lead, nickel, and zinc) are estimated using laboratory-reported total metals concentrations and conversion factors provided in Appendix D of the VWQS. Both total and dissolved concentrations are now included in the data tables. Select metals are non-detected; their detection limits are higher than their water quality standards, so the actual concentrations of these metals cannot be compared to standards. PFAS has no VWQS.

   Inorganic compounds, which include Metals and Indicator Parameters, showed *downward trends* in UD-1, and *upward trends* in UD-2, UD-3, UD-4 and UD-6. Notable:
   - UD-3: Two inorganic compounds were detected at their highest concentrations to date in the untreated UD-3 discharge:
     - Chloride [38 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
     - Sodium [18 mg/L]; it is routinely detected and has no VWQS.
   - UD-4: Two inorganic compounds were detected at their highest concentrations to date:
     - Chloride [39 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
     - Sodium [12 mg/L]; it is routinely detected and has no VWQS.
   - UD-6: Two inorganic compounds were detected at their highest concentrations in the 2-year range:
     - Chloride [21 mg/L; VWQS = 230 mg/L]; it is routinely detected and remains far below its VWQS;
     - Hardness [321 mg/L]; it is routinely detected and has no VWQS.
   - The temperature in UD-3 was measured at 22.3 deg. C during sampling. The previously-rising temperatures pattern in UD-3 appear to have stabilized beginning in May 2018 at approximately 22 deg. C. and has been generally slowly declining since May 2019. This pattern

of recent stabilizing or slow declines in temperature was also seen in the primary leachate of Phase III, from highs of approximately 28 deg. C. in May 2016 down to recent temperatures of 20 – 21 deg. C. during the previous round in October 2023. However, this May 2024 sampling round indicated an apparent increase in all temperatures.

- The temperature in UD-4 was measured at 13.8 deg. C during sampling. The overall pattern of UD-4 temperatures appears to be declining since its high in May 2019 (23.2 deg. C). The overall pattern of UD-4 temperature fluctuations had roughly paralleled the fluctuations of temperatures of the Phase IV leachates to the recent temperatures of 23 – 27 deg. C. during the previous round in October 2023. However, this May 2024 sampling round indicated an apparent increase in Phase IV Cell 2 leachate.

VOCs were non-detected in all underdrain locations.

SVOCs were non-detected in all underdrain locations. Notable:

- UD-6: SVOCs remain non-detected since analysis began in October 2021. However, during sampling in May 2024, one SVOC was detected: Bis(2-ethyl-hexyl)phthalate [32.0 ug/L] [VWQS = 0.37 ug/L], which was verified by the laboratory as correct. This compound is an extremely common flexible plasticizer, which may have been present in the surface water from the surrounding environment due to heavy rainfalls mobilizing materials over the previous six (6) months. Due to this anomalous detection, WHEM collected a sample on 7/22/2024, which was non-detected for all SVOC compounds. Therefore, this SVOC detection in May 2024 appears to be anomalous. SVOC results will be closely reviewed during the next semi-annual sampling event in October 2024.

8. PFAS in Underdrains: PFAS has been analyzed since July 2019 in UD-1 and UD-2; since September 2019 in UD-3 and UD-4; and since October 2021 in UD-6. There is no VWQS for PFAS. May 2024 trends in the combined concentrations of the Vermont-regulated-in-groundwater PFAS were *downward* in UD-1 and *upward* in UD-2 and UD-3 (prior to treatment), and stable/non-detected in UD-4 and UD-6 [stable because continuing to be non-detected].

9. PFAS in Underdrain trends:

- UD-1: The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS [161 ng/L] trended downward. The overall 5-year trend is up. This discharge is currently diverted into the leachate collection system.
- UD-2: The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS [66 ng/L] trended upward. The overall 5-year trend is down. This discharge is currently diverted into the leachate collection system.
- UD-3: The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS [183 ng/L] trended upward to its highest concentration. The overall 5-year trend is up. PFAS is currently being treated, so the discharge to the ground surface is non-detected.
- UD-4: The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS remained non-detected as has occurred since sampling began in September 2019. The overall 5-year trend is stable [non-detected].
- UD-6: The May 2024 combined concentration of the Vermont-regulated-in-groundwater PFAS remained non-detected as has occurred since sampling began in October 2021, with the exception of May 2022.

10. Flow Rates in Underdrains:

- Flow rates from UD-1 and UD-2 cannot be measured. In May 2024, flow rates increased in UD-4 (1,325 gpd) and decreased in UD-6 (6,624 gpd) compared to the previous round in October 2023. Flow rate measurement collection was inadvertently omitted in May 2024 from UD-3. However, a subsequent flow rate was measured at UD-3 on 6/10/2024 at 7,416 gpd, which is an increase compared to the previous round in October 2023.

Leachate Summary:

1. At NEWSVT, there are a total of nine (9) leachate sampling locations; eight (8) individual cells and the combined leachate AST: Lined Phase I, Phase II, Phase II Cell 1, Phase III Cell 2, Phase IV Cell 1, Phase IV Cell 2, Phase IV Cells 3&4, Phase VI Cell 1, and the combined AST. Leachate from Unlined Areas A & B is not collected, so it cannot be sampled. This is the second sampling of Phase VI Cell 1 primary leachate.
2. Leachate from individual landfill cells: Each of the eight leachate pumping systems in the lined landfill cells has a separate pump station that allows the collection of discrete samples from both the primary and secondary leachate collection systems in each cell. For routine leachate sampling, samples are collected from the primary leachate collection systems in each lined cell, generally by turning on the leachate pump.
3. Possible sampling of secondary leak detection system liquid: If any of the secondary leachate leak-detection systems have accumulation rates which have recently exceeded twenty (20) gallons per acre per day, a grab sample from that cell's secondary detection system would also be collected. For the May 2024 sampling round, NEWSVT personnel notified WHEM that no sampling of any secondary leak-detection liquids was required.
4. Combined Leachate from the AST's: One AST (AST #1), has been in use since 2006 to store a combination from all phases and cells of the site, consisting of the following liquids: primary leachate, small amounts of secondary detection-system liquid, and small amounts of liquids from Underdrain 1 and Underdrain 2. As part of the of the Phase VI expansion, a second AST (AST #2) was installed in 2021 adjacent to AST #1. The use of this second AST commenced in September 2023. Recently prior to the May 2024 sampling event, AST #2 had been primarily used to store treated leachate from the leachate treatment system when it was active. Pumping systems in AST #1 and AST #2 send their contents to piping in the nearby leachate load-out building, where tanker trucks are filled for transport to off-site disposal. Leachate samples for compliance monitoring are collected from this piping in the building. A digital screen in the building indicates which AST is sending liquid. For the May 2024 leachate sampling event, samples were collected from AST #1 containing untreated leachate, and will be during future sampling events.
5. Laboratory Analyses: The leachate samples are analyzed for total metals and other inorganics, volatile organics (by EPA Method 8260C), semi-volatile organics (by EPA 8270C), and the AST leachate is analyzed for PFAS [by modified Method 537]. The May 2024 trends were visually estimated in comparison to the previous sampling event.
6. Comparison to Vermont Toxicity Characteristics: The laboratory results for the May 2024 leachate samples indicate that NEWSVT leachate is not characterized as toxic, because none of the parameters analyzed exceed the Vermont TC concentrations (*Vermont Hazardous Waste Management Regulations*, Toxicity Characteristic (TC); Chapter 2, Table 1: Maximum Concentration of Contaminants for the Characteristic of Toxicity (February 1, 2022).
7. Comparison to Guidelines for Accepting Landfill Leachate at Permitted Wastewater Treatment Facilities [WWTFs]: Concentrations of PFOA and PFOS in the AST leachate are compared to the VTDEC *Guideline Levels for Accepting Landfill Leachate at Permitted WWTFs* [Memo: P. Laflamme & C. Schwer, 7/06/2017]. The May 2024 concentrations of PFOA and PFOS are far below the concentrations for which there are restrictions regarding where landfill leachate may be disposed, as has been the case since leachate sampling for PFAS began in January 2018.
8. Between the previous semi-annual sampling event in October 2023 and this current May 2024 sampling event, solid waste was being placed exclusively in Phase VI Cell 1. Leachate from all lined areas was being actively managed. All 9 (nine) primary leachate sampling locations were successfully sampled in May 2024.
9. Leachate samples from the eight (8) individual phases of the landfill showed values generally within historical ranges; there were no exceedances of the VT TCs. PFAS are not analyzed in the individual phase leachates; PFAS are analyzed only in the AST contents.

Phase I Leachate, Primary: No metals or other inorganics VOCs or SVOCs exceeded their TCs, as is typical; PFAS analysis is not required. Notable:

- Two VOCs were detected at their highest concentrations to date:
  - T-Butanol [14,100 ug/L]; it is routinely detected and has no TC;
  - 1,2-Dichlororethane [20.6 ug/L] [TC = 500 mg/L]; it is sporadically detected and remains far below its TC.
- One VOC was detected for the first time and is not unexpected in landfill leachate:
  - 1,2,3-Trimethylbenzene [6.6ug/L]; it has no TC.
- The following SVOCs were detected for the first time; they have no TCs, and their presence is not unexpected in landfill leachate:
  - Benzo(a)anthracene [7.9 ug/L], Benzo(b)fluoranthene [6.5 ug/L], Benzo(g,h,i)perylene [6.9 ug/L], Chrysene [7.5 ug/L], Dibenzo(a,h)anthracene [5.8 ug/L] and Ideno(1,2,3-cd)pyrene [5.7 ug/L].

Phase II Leachate, Primary: No metals or other inorganics, VOCs or SVOCs exceeded their TCs, as is typical; PFAS analysis is not required. Notable:

- **One VOC was detected at its highest concentration to date:**
  - T-Butanol [3,680 ug/L]; it is routinely detected and has no TC.

Phase III Cell 1 Leachate, Primary: No metals or other inorganics or VOCs exceeded their TCs, as is typical, and all are within historic ranges. SVOCs were non-detected as has occurred since October 2021; PFAS analysis is not required.

Phase III Cell 2 Leachate: Primary: No metals or other inorganics or VOCs exceeded their TCs, as is typical. SVOCs were non-detected as has occurred since October 2021; PFAS analysis is not required. Notable:

- One VOC was detected at its highest concentration to date:
  - T-Butanol [4,260 ug/L]; it is routinely detected and has no TC.

Phase IV Cell 1 Leachate, Primary: No metals or other inorganics, VOCs or SVOCs exceeded their TCs, as is typical; PFAS analysis is not required. Notable:

- **One VOC was detected at its highest concentration to date:**
  - T-Butanol [8,680 ug/L]; it is routinely detected and has no TC.

Phase IV Cell 2 Leachate, Primary: No metals or other inorganics, VOC or SVOCs exceeded their TCs, as is typical; all are within historic ranges. SVOCs were non-detected; this has only occurred one other time, in October 2020. PFAS analysis is not required. Notable:

- The temperature was tied at its highest value to date at 29.10 C.

Phase IV Cell 3 & 4 Leachate, Primary: No metals or other inorganics, VOC or SVOCs exceeded their TCs, as is typical; all are within historic ranges; PFAS analysis is not required.

Phase VI Cell 1 Leachate, Primary: No metals or other inorganics, VOC or SVOCs exceeded their TCs, as is typical; all are within historic ranges. PFAS analysis is not required. Notable:

- One VOC was detected for the first time and is not unexpected in landfill leachate:
  - P-Isopropyltoluene [7.5 ug/L]; it has no TC.
- One SVOC was detected for the first time and is not unexpected in landfill leachate:
  - 2-Methylphenol [13.1 ug/L]; it has no TC.

Combined Leachate Above-Ground Storage Tank: No metals or other inorganics, VOCs or SVOCs exceeded their TCs, as is typical; all are within historic ranges. Notable:

- All five of the VT-regulated-in-groundwater PFAS compounds were detected in the leachate AST sample in May 2024, at a combined concentration that was within the historic range and increased compared to October 2023. There is no clear trend in these combined concentrations since sampling began in 2018. The concentrations of the two PFAS compounds in landfill leachate whose disposal options are regulated in VT [PFOA, PFOS], increased in the May 2024 leachate AST sample when compared to the previous October 2023 sample, and are well within their moderately-fluctuating historic ranges. The May 2024 concentrations of PFOA and PFOS in the AST leachate are far below the concentrations for which there are restrictions regarding

where landfill leachate may be disposed (per 2017 VDEC guideline levels), as has been the case since leachate sampling for PFAS began in January 2018 as follows:

- May 2024 PFOA: 1,510 ng/L = 1.26% of no-restrictions threshold;
- May 2024 PFOS: 207 ng/L = 20.7% of no-restrictions threshold.

QA/QC Samples:

1. All QA/QC groundwater VOC, surface water VOC, underdrain VOC, leachate VOC, Equipment Blank VOC, PFAS trip blank, PFAS field blank and PFAS Equipment Blank samples were non-detected. This indicates acceptable sampling, decontamination, and laboratory procedures occurred in the May 2024 sampling round.
2. The laboratory results for groundwater Dup-1, Dup-2, Dup-3 and Dup-4 were all in close relation (concentrations in each duplicate pair had less than 45% relative differences). This data indicates acceptable sampling and laboratory procedures occurred for groundwater samples in the May 2024 sampling round.

Based on this Report including the Summary and Conclusions above, WHEM makes the following Recommendations:

1. Monitoring and reporting will continue to be conducted in accordance with Conditions 67, 68, 69, 70, 71 and 83 of the issued *Solid Waste Management Facility Certification* ("Solid Waste Cert."), effective October 12, 2018 and amended February 13, 2023 [leachate AST PFAS pre-treatment approval] and February 28, 2023 [Underdrain Outlet Phase 3 PFAS pre-treatment approval, and addition of MW-K1 to the semi-annual water quality monitoring plan].
2. The next scheduled full-site water quality monitoring event will occur in October 2024.
3. G-26BR will be sampled as soon as possible and results will be submitted in a separate letter.

Sincerely,

Wendy Shellito (phone x103)
Project Scientist
wshellito@waiteenv.com

Craig Heindel, C.P.G. (phone x102)
Senior Hydrogeologist
cheindel@gmavt.net

U:\PROJECTS - WHEM\NEWSVT\SEMIANNUAL WQ REPORTS\SEMI 5-2024\NEWSV May 2024.docx or pdf

APPENDIX 1
TABLE OF CONTENTS

APPENDIX 2
TABLE OF CONTENTS

Laboratory Reports: