



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
ENFORCEMENT AND  
COMPLIANCE ASSURANCE

July 2, 2008

**MEMORANDUM**

SUBJECT: Results of UV DOAS Monitoring Campaign  
Countywide Recycling and Disposal Facility  
East Sparta, Stark County, Ohio

FROM: Cary Secret /s/  
Office of Civil Enforcement  
Air Enforcement Division

TO: Management

**Background**

Under an Administrative Order on Consent with the United States, Republic Services of Ohio II, LLC, owner and operator of Countywide Recycling and Disposal ("Countywide"), is required to conduct ambient air monitoring of selected volatile organic compounds as part of a removal action to correct sub-surface heating at its facility in East Sparta, Ohio (See, Administrative Settlement Agreement and Order on Consent for Removal Action, Docket No. V-W-08-C-897, April 11, 2008). Section VIII of the order, Work to be Performed, contains the following statement regarding the monitoring objectives:

*e. Development of an Air Monitoring and Sampling Plan for selected volatile organic compounds (VOCs) that will expand air monitoring and sampling efforts in order to yield data which can be used to assess potential exposures in the community and demonstrate the effectiveness of implemented control technologies. A record of sample locations and results must be maintained and submitted to the Ohio EPA and U.S. EPA;*

Therefore, Countywide is required to develop an air monitoring and sampling plan for the purpose of community exposure assessment and overall monitoring of landfill operations.

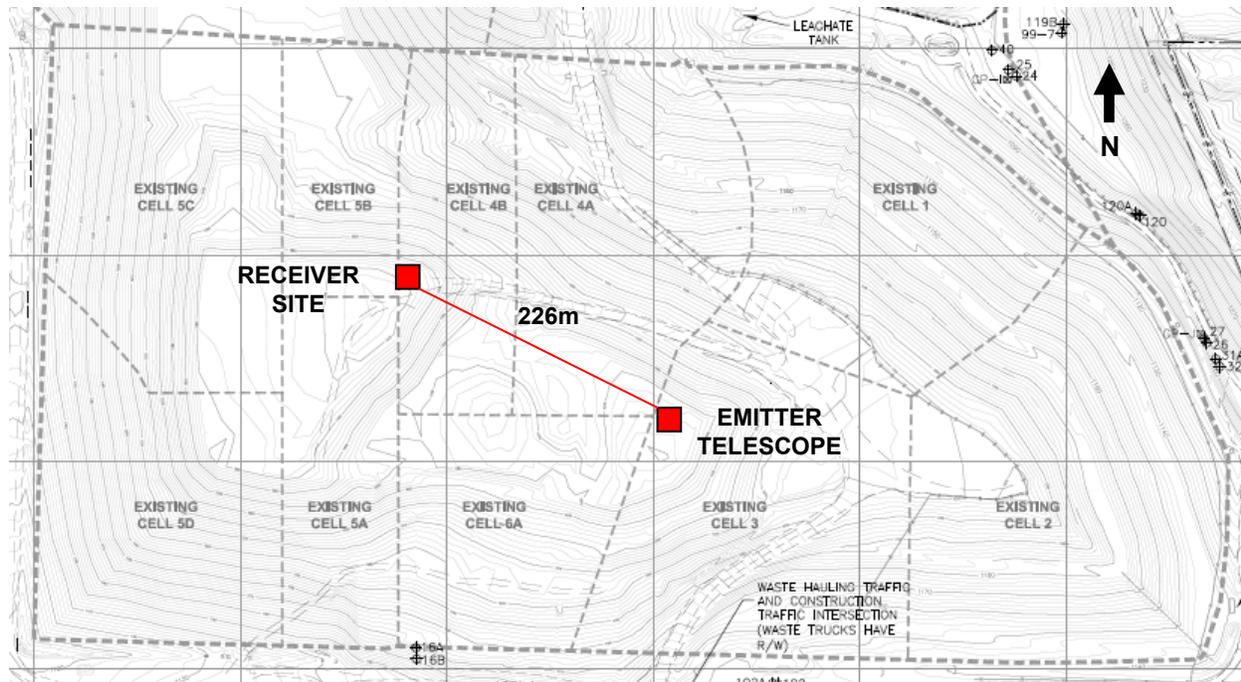
On May 22, 2008, Countywide submitted an ambient monitoring plan under the consent order entitled "Work Plan to Perform Ambient Air Monitoring for Countywide Recycling & Disposal Facility." The Work Plan identified benzene as a primary compound of public health concern in the landfill gas (max = 301.54 ppmV, Page 15).

To determine whether benzene is emitted from the landfill at concentrations of concern for public health, the Air Enforcement Division (AED) conducted near-source ambient benzene measurements on June 10, 11, and 12, 2008 using an ultraviolet differential optical absorption spectrometer (UV DOAS) manufactured by Opsis Ab. In addition, on-site wind direction and wind speed data was recorded at an elevation of 10 m above the landfill surface using a Climatronics Tacmet II ultrasonic anemometer which was co-located with the UV DOAS monitoring path. In addition to benzene, the UV DOAS was calibrated to measure the ambient concentrations of toluene and p-xylene for informational purposes (note: p-xylene was not detected). Gas and wind data was monitored continuously and was recorded as 5-minute averages.

The UV DOAS receiver telescope, anemometer, and analyzer were located next to an inactive flare at the highest point of Cell 4B; the emitter telescope was located 226 m to the east-southeast at the highest point of Cell 3. The optical path was approximately 2 m to 5 m above the surface of Cells 3, 4A, and 4B (see Figure 1). The UV DOAS receiver site was located at the following coordinates:

N 40°, 43', 12.0"                      17 UTM 466636E, 4507506N  
W 81°, 23', 42.2"                      Elevation: 1,270 feet

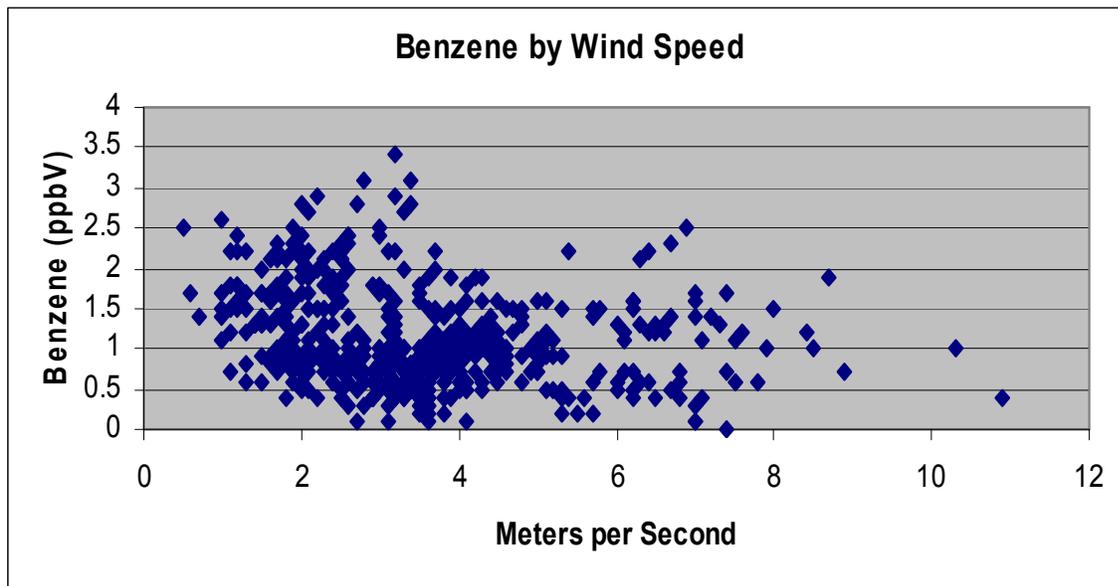
Figure 1. UV DOAS Monitor Site Configuration



## Data Summary

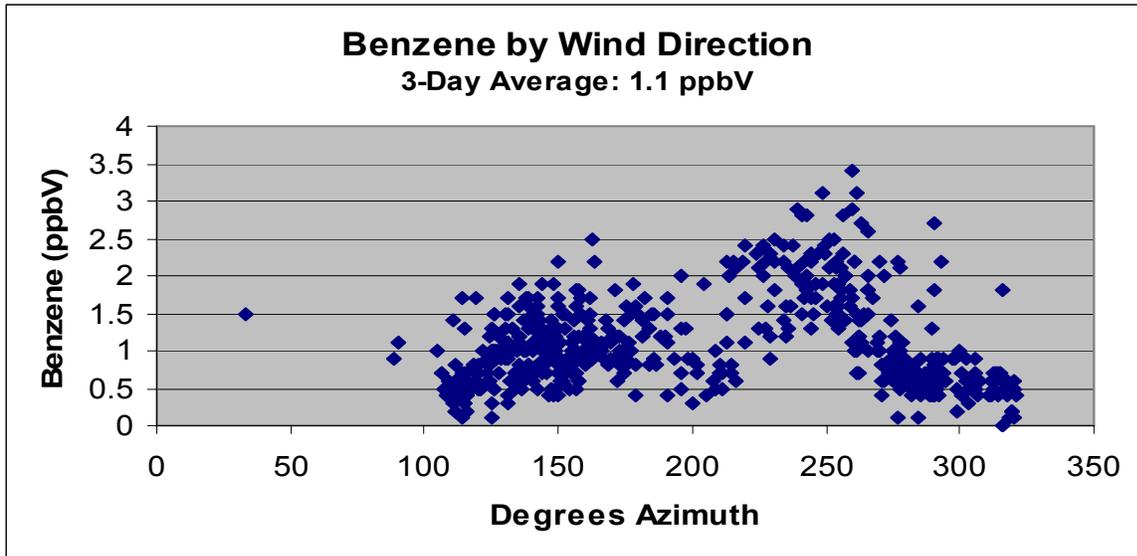
The UV DOAS optical path was placed above the landfill cells to measure ambient benzene concentrations during calm winds, when ambient dilution is minimal, and to identify other sources by correlating the concentration of benzene in the air with the direction of the wind. During the 3-day monitoring period, there were periods of sufficiently calm winds to allow benzene concentrations to become concentrated above the surface. At no time did the path-average concentration exceed 3.4 ppbV (See Chart 1).

**Chart 1**



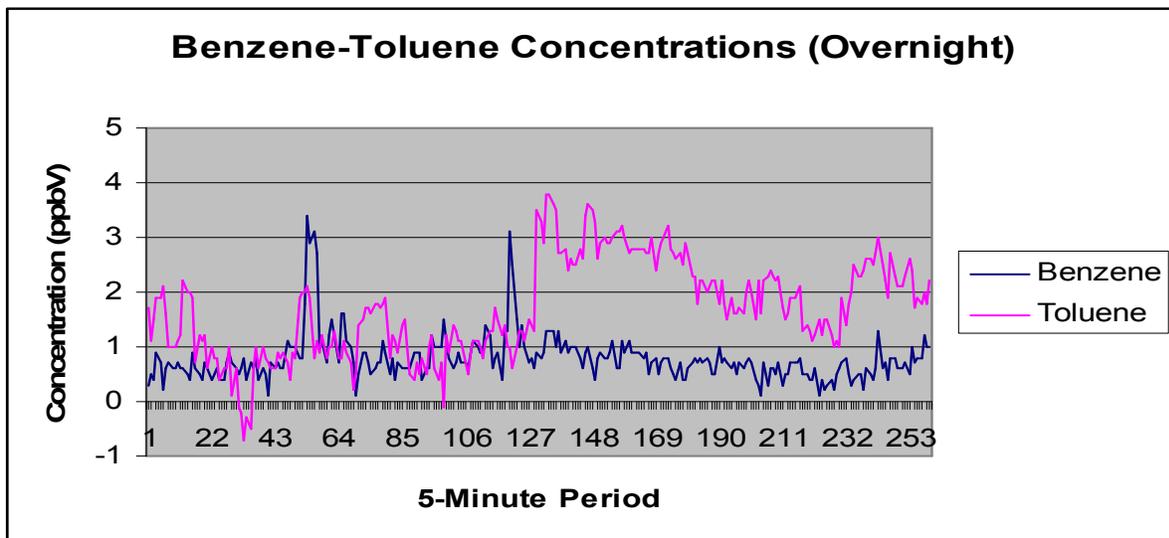
As shown in Chart 2, the peak 5-minute benzene concentration occurred when the winds were from 260 degrees, or downwind of an uncovered portion of Cell 5A (south slope) where surface cracks and 50 ppmV photo-ionization detector readings were found during a walking survey (see Figure 2). SUMMA canister samples (canisters 2066 and 3030) were collected in the emitting area (see Figure 2) by Lawhon and Associates, Countywide's environmental contractor, for analysis by method TO-15. Results were yet to be received as of the date of this report.

Chart 2



Approximately 200 heavy-duty trucks arrive and depart the landfill daily between the hours of 05:30 and 18:00. Chart 3 shows the ambient concentrations of benzene and toluene during the evening and overnight hours of 18:00 to 05:30, when truck traffic was absent. Benzene concentrations peaked at 3.4 ppbV when the path was downwind of the uncovered area of Cell 5A; toluene concentrations above 2 ppbV occurred when most of the length of the optical path was down-wind of Cells 3, 4A, and 4B.

Chart 3



## Other Observations

In addition to the south slope of Cell 5A, noted above, Paul Ruesch (EPA Region 5) and I walked the UV DOAS optical path and several other areas of the landfill using hand-held photo-ionization detectors (PIDs) to locate surfaces that emitted volatile organic compounds (VOCs). The primary objective was to locate surface cracks and other sites where VOCs generated within the landfill escaped to the atmosphere. The PID survey observations are described below by date, time, and location. Additionally, general areas where a PID response was recorded are highlighted on Figure 2.

June 11, 2008

12:31 to 12:44: Cells 3, 4A, 4B, along the UV DOAS path. PID readings in the breathing zone were associated with odorous compounds. The PID response ranged from 0 ppbV (no odor present) to 400 ppbV (odor present). The PID readings suggested that VOCs were present at concentrations higher than those of benzene, toluene, or p-xylene as measured by UV DOAS.

13:15: Opening on top of temporary leachate storage tank adjacent to Relief Well (RW-1). PID response reading of 8,188 ppbV.

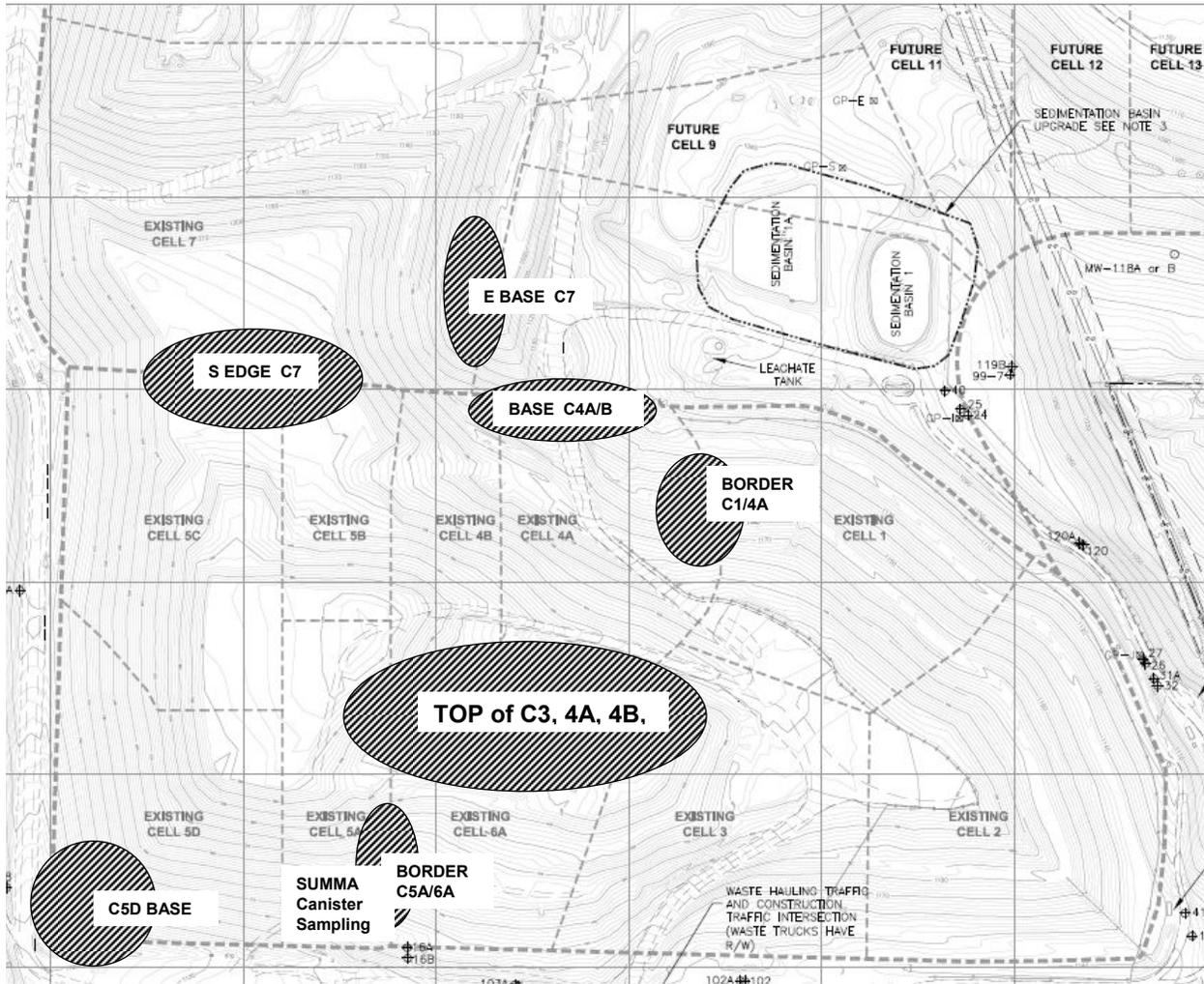
13:30: Toe of east slope of Cell 7 along storm water ditch. PID reading of 393 ppbV and odor present.

June 12, 2008

11:00 to 11:15: Active toe drain construction site at Cell 4A east of the haul road. PID reading of 0.1 - 2.2 ppmV and odor present.

11:15 – 12:30: Walking survey of Cells 1 and 2. PID reading of 5ppmV (with odor present) at an area with surface cracking and dead vegetation on the south slope at the border of Cells 1 and 4A. No other emitting locations were found on Cell 1 and Cell 2.

Figure 2. General Areas of PID instrument Response - Walkover Survey  
June 11-12, 2008



### Conclusions and Recommendations

1. Benzene was not detected in Cells 3, 4A, and 4B at ambient concentrations that would likely be of concern for off-site public health protection. Benzene may be associated with emissions from the south slope of Cell 5A, which under the terms of the consent order, is to be capped with a temporary flexible membrane liner.
2. Odorous gases were present in the vicinity of Cells 3, 4A, and 4B. Odorous gases also appear to be associated with leachate. Identification of the gaseous compounds is necessary to determine whether the odorous species are toxic, and to determine whether the species can be readily measured as indicators of the success of interventions required under the consent order.
3. PID, which is a non-speciating, highly sensitive and time-resolved VOC detection method, should be considered for purposes of determining the potential for off-site

health risks and for monitoring landfill operations. Assuming adequate PID response to any compounds of concern identified in accordance with item 2, above, transportable monitoring stations consisting of a PID detector, ultrasonic anemometer, data logger, and wireless data transfer could be assembled for the purpose of detecting down-wind ambient concentrations of VOCs on a ppbV basis.

Attachment

## **Attachment - Quality Assurance**

### Quality Assurance and Control

The UV DOAS was calibrated and operated in accordance with the document entitled *Quality Assurance Project Plan for Atmospheric Monitoring, Countywide Recycling and Disposal Facility, East Sparta, Stark County, Ohio* (U.S. EPA, approved June 6, 2008). Before field deployment, the instrument was calibrated at the U.S. EPA Environmental Science Center, Ft. Meade, Maryland, at 7 span points and for zero offset using benzene, toluene, and p-xylene reference gas standards meeting a certified concentration accuracy of  $\pm 2\%$  of the stated concentration. Upon return from the field, the analyzer response to the calibration gases was checked to confirm normal operations. The measurement bias was no greater than 4% for benzene, 11% for toluene, and 14% for p-xylene.

An operational field test was conducted off site, at the Bolivar Dam, on June 9, 2008. In-field gas calibration checks were also conducted before and after the 3 days of measurement, and included analyzer operational checks of the diffraction grating accuracy and detection system integrity. The operational test and calibration checks indicated that the UV DOAS system operated normally.

Valid data was collected during 552 of the 566 five-minute data averaging periods, for an overall data capture of 98%.

### Reconciliation with Data Quality Objectives

The above-referenced quality assurance project plan indicates that in addition to benzene, formaldehyde was also to be measured by UV DOAS. Formaldehyde was not measured for the purpose of the consent order because questions about the integrity of the formaldehyde standard available to USEPA arose during the pre-deployment calibration check. Toluene and p-xylene standards were available and the compounds were added to the analyte list for informational purposes.

Invalid wind speed data was collected during 13 five-minute periods over the course of the 3-day measurement. The errant wind speed data was apparently attributable to a logger program conflict that was later resolved by adjusting the logger polling interval. All data collected during those 13 five-minute periods was removed from the data set.

Invalid gas concentration data was collected during one 5-minute period due to a truck that stopped in the optical path, blocking the light. The data was removed from the set.

At the conclusion of measurements, I found that a 2-meter section of the telescoping mast supporting the Climatronics Tacmet II weather station had come down. The Tacmet II at that time was 8 meters above the landfill surface instead of 10 meters. The area surrounding the weather monitoring site was clear of interfering obstacles. Judgmental evaluation suggests there was no significant impact on wind measurement due to the 2 meter reduction in elevation.

## Records

The following records are maintained by Cary Secrest, U.S. EPA, in Room 2119, 1200 Pennsylvania Avenue, N.W., Washington, D.C. 20004.

1. Certificates of calibration for reference gas standards, the Climatronics Tacmet II weather station, and PID response check for HNU Model P1101.
2. UV DOAS calibrations and calibration checks.
3. Countywide Landfill Field Logbook, Cary Secrest.
4. *Work Plan to Perform Ambient Air Monitoring for Countywide Recycling & Disposal Facility*. May 22, 2008.
5. *Quality Assurance Project Plan for Atmospheric Monitoring, Countywide Recycling and Disposal Facility, East Sparta, Stark County, Ohio* (U.S. EPA, approved June 6, 2008).