Countywide Recycling & Disposal Facility
Community Ambient Air Monitoring
4th Quarter Report - 2010
December 23, 2010

To Fulfill the Requirements Set Forth in Order #7 of the Ohio EPA Director's Findings and Orders Dated September 30, 2009

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Countywide Recycling & Disposal Facility (Countywide, CRDF)
Community Ambient Air Monitoring
4th Quarter Report - 2010
December 23, 2010
Monitoring Events #168 through #170

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Countywide Recycling & Disposal Facility
Community Ambient Air Monitoring
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Monitoring Events #168 through #170

1.0 INTRODUCTION

1.1 Current Activities

As described in Section 1.2 below, beginning on Monday May 21, 2007, Lawhon & Associates, Inc., (L&A) has conducted ambient air sampling on behalf of the Counthywide Recycling & Disposal Facility (Countywide) as mandated by Order 5.A. of the Ohio EPA Director's Final Findings and Orders (DFFOs) dated March 28, 2007. This program has been amended per Order 7 of DFFOs (dated September 30, 2009) and by a letter from Chris Korleski, Director, Ohio EPA to Michael Darnell, Division Manager, Countywide (dated January 6, 2010). The following amendments were implemented, effective January 2010:

1. The sampling schedule was changed from one (1) event every six (6) days to one (1) event every month ;
2. The sampling and analysis for Hydrogen Fluoride and Hydrogen Chloride was eliminated; and
3. The reporting requirement was changed from Monthly to Quarterly.

This report is the fourth quarterly report to be developed for the project, (4th Quarter Report – 2010) and summarizes the results from the following Community Monitoring Events:

- **Event #168: Monday, October 4 to Tuesday October 5, 2010**
- **Event #169: Wednesday, November 3 to Thursday, November 4, 2010**
- **Event #170: Tuesday, December 7 to Wednesday, December 8, 2010**

No modifications have been made to the sampling system during the time period reflected in this Quarterly report.

1.2 Sampling Locations

L&A conducted sampling at four community locations as noted on the following map:

A. Bolivar School (S)
B. Campground (G)
C. Wetlands (W)
D. Cell Tower (C)

Unless otherwise indicated, L&A deployed the samplers at each of the locations and set the sampler controllers to begin collecting samples at 3:00 PM on the date of deployment. Samples were collected for 24 consecutive hours with the controller stopping sample collection at 3:00 PM the following day. On a rotating basis, L&A collected an additional sample from one of the locations (co-located) and submitted that sample for analysis.

Aerial photo of Countywide w/monitoring locations

1.3 Background

As specified by the Ohio EPA in Bryan Zima's March 28, 2007, letter to Jason Perdion of Baker & Hostetler, air samples were collected and analyzed for the following groups of compounds:

- Volatile Organic Compounds (VOCs): EPA Method TO-15, modified
- Sulfur Compounds: EPA Method TO-15 modified
- Aldehydes and Ketones: EPA Method TO-11A

VOCs were analyzed by TestAmerica Inc., 5815 Middlebrook Pike, Knoxville, TN 37921. Analyses for aldehydes (EPA Method TO-11A) and hydrogen fluoride/ hydrogen chloride (NIOSH Method 7903) were performed by TestAmerica Inc. Phoenix, 4625 E. Cotton Center Blvd, Suite 189, Phoenix, AZ 85040.

1.4 Benchmark Concentrations for Comparison

In order to identify ambient air conditions that may be of concern, results from the community monitoring sample analyses are compared to three different conservative, risk-based concentrations for compounds in air in non-occupational settings. The most conservative (lowest) comparison is the May 2010 USEPA Regional Screening Level (RSL), which replaced the formerly-used Region 9 Preliminary Remedial Goals (PRGs) used in previous reports. Secondly, when available, we have compared the results to the Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels (MRLs). Thirdly, we added a comparison of the results to the recently-developed (September 2009) USEPA Individual Sample Screening Levels (ISLs) developed in conjunction with 2009 School Air Toxics Monitoring Initiative. To support the School Air Toxics program, the USEPA published ISLs for both Hazardous Air Pollutants (HAPs) and non-HAP compounds in air. The differences between these screening levels are briefly discussed below.

Many of the compounds that are detected in these monitoring events are commonly found at low levels in ambient air. For some compounds such as benzene, the mathematically-derived RSL (0.31 ug/m^3) is lower than the laboratory reporting limit (0.64 ug/m^3) and lower than the average background concentration of 1.96 ug/m^3 in ambient air in Ohio (Ohio EPA, *Portsmouth Ohio Air Quality Study 2003*). Consequently, finding certain compounds in ambient air at levels above RSLs is not uncommon and may simply reflect fluctuations in background sources.

The community monitoring is conducted to support an evaluation of the potential for the Countywide Landfill to be a source of unacceptable levels of airborne constituents. However, the detection of low levels of constituents in ambient air does not necessarily indicate that these constituents have the landfill as their source.

USEPA Regional Screening Levels (RSLs): In December 2009, USEPA toxicologists and risk assessors published a list of Regional Screening Levels (RSLs) that harmonized the risk-based media concentrations across all of the USEPA Regions. These RSLs replace the individual USEPA Region PRGs, including those previously published by USEPA Region 9 and used as benchmarks in previous Countywide reporting. The latest generic screening levels published in May 2010 by the USEPA were used for comparison in this report. For the compounds of interest in the community monitoring, there are only slight differences between the RSLs and the Region 9 PRGs previously used for comparison. From this point forward, analytical results will be compared to the compound-specific RSL for residential air. The compound-specific USEPA RSL is the concentration of a compound in the ambient air that is estimated to be without significant risk to a person who would breathe exactly that level of compound continuously over a lifetime of exposure. RSLs are derived using conservative mathematical formulas and ***DO NOT*** represent the level of a compound in the air (or other environmental media) where health effects are likely to occur. RSLs are generally accepted as extremely conservative ***screening*** values such that even over a lifetime of exposure, if the concentration of a compound in the air is less than the corresponding RSL for residential

air, most public health officials and regulators are confident that there is no risk to human health. On the other hand, an analytical result that exceeds the corresponding RSL ***DOES NOT*** mean that there is an unacceptable risk to public health.

ATSDR MRLs: Analytical results are also compared to the ATSDR Acute and Chronic Minimal Risk Levels (MRLs), where available. An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be ***without*** appreciable risk of adverse health effects over a specified duration of exposure. Acute MRLs are considered protective for short-term exposures (up to 14 consecutive days of exposure at the specified level). Chronic MRLs are considered to be protective for long-term exposures (greater than one year).

USEPA Air Toxics Screening Levels: In 2009, in conjunction with the School Air Toxics Monitoring Initiative, USEPA developed Individual Sample Screening Levels (ISLs) which are used to evaluate concentrations measured in ambient air in the vicinity of schools. The ISLs were derived from several sources, including (in order of preference): ATSDR Acute MRLs, ATSDR Intermediate or Chronic MRLs, IRIS Chronic Reference Concentrations (RfCs), and USEPA Office of Air Quality Planning and Standards (OAQPS) Inhalation Unit Risk Factors (IURs). The individual sample screening levels represent short-term (or intermediate-term) duration inhalation exposure estimates that are unlikely to be associated with appreciable risk of adverse health effects for continuously exposed populations (including sensitive groups [e.g., students]). Although the duration of exposure considered to be "short-term" is not expressly described, the use of Acute MRLs in the development of these screening levels suggests that a 14-day exposure duration is appropriate for acute exposure benchmarks. (*Schools Air Toxics Monitoring Activity, Uses of Health Effects Information in Evaluating Sample Results 9/10/09;*
(http://www.epa.gov/schoolair/pdfs/UsesofHealthEffectsInfoinEvalSampleResults.pdf)

None of the aforementioned screening levels (RSLs, MRLs, ISLs) represent levels of exposure which have been documented to cause actual health effects.

1.5 Report Organization

For this report, most of the compounds that were either not detected or detected at levels below RSLs, MRLs, or Individual Screening Levels (ISLs) will not be discussed unless those particular results help to explain other findings.

Ambient environmental/climate conditions are discussed in Section 2.0. Results of the monitoring are discussed in Section 3.0. Section 4.0 includes a summary of results and a comparison of compounds analyzed during community monitoring to the EPA ISLs. Analytical results from the laboratory are provided in the Appendices.

2.0 AMBIENT CONDITIONS

The descriptions of ambient conditions are taken from the Akron-Canton Regional Airport (KCAK). The wind direction information was analyzed using wind rose plots for the sample period. These wind rose plots are compared to the location of the individual sampler relative to Countywide landfill to determine whether the sample location was nominally upwind, crosswind, or downwind of the Site. Wind rose plots illustrating the ambient conditions for the three sampling events of this quarter are included on the following pages. Based on ambient conditions L&A designated the prevailing wind direction for each monitoring station relative to the landfill as:

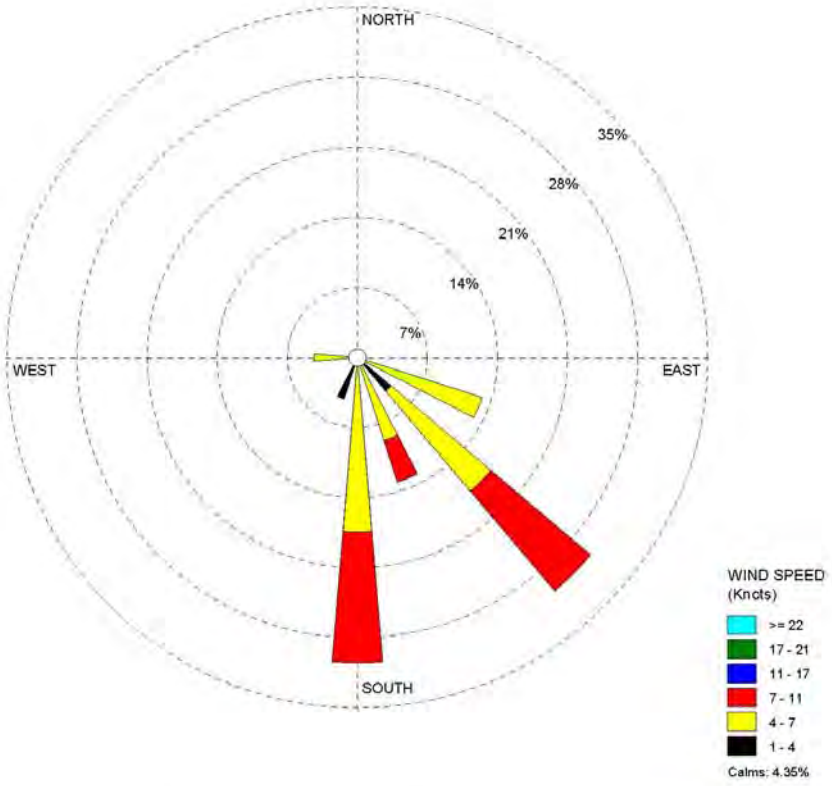
C: Crosswind
D: Downwind
U: Upwind
V: Variable

In Tables 1 through 6 and the TO-15 table (Appendix D), wind direction is indicated for the first and second days of the regularly scheduled monitoring event separated by a right slash ("/").

WIND ROSE PLOT

Countywide Community Ambient Air Monitoring - Event #168
3:00 pm Monday October 4 to 3:00 pm Tuesday October 5, 2010

DISPLAY
Wind Speed
Flow Vector (blowing to)



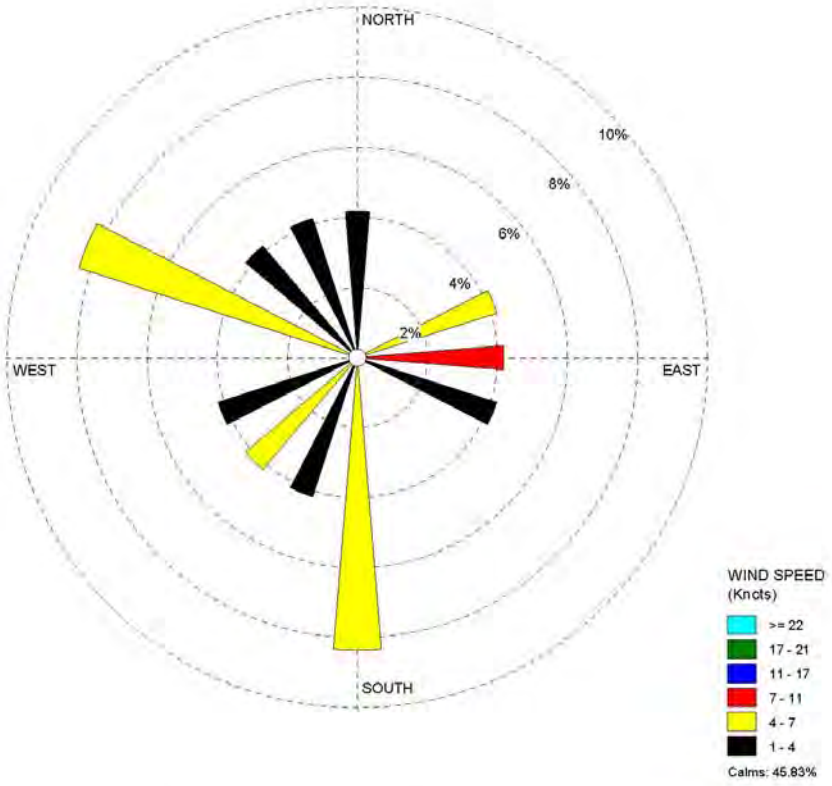
COMMENTS		COMPANY NAME	
October 4, 2010 Temp (F): Avg 50.8 Min 48.0 Max 53.1 Relative Humidity: 78% Dew Point (F): 44.2 Precipitation: Trace October 5, 2010 Temp (F): Avg 46.8 Min 45.0 Max 51.1 Relative Humidity: 89% Dew Point (F): 43.5 Precipitation: 0.1 inch		**Lawhon and Associates**	
		MODELER **C LaLonde**	
	CALM WINDS **4.35%**		
	AVG. WIND SPEED **5.98 Knots**	DATE **10/6/2010**	PROJECT NO. **07-0082**

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT

Countywide Community Ambient Air Monitoring - Event #169
3:00 pm Wednesday November 3 to 3:00 pm Thursday November 4, 2010

DISPLAY
Wind Speed
Flow Vector (blowing to)



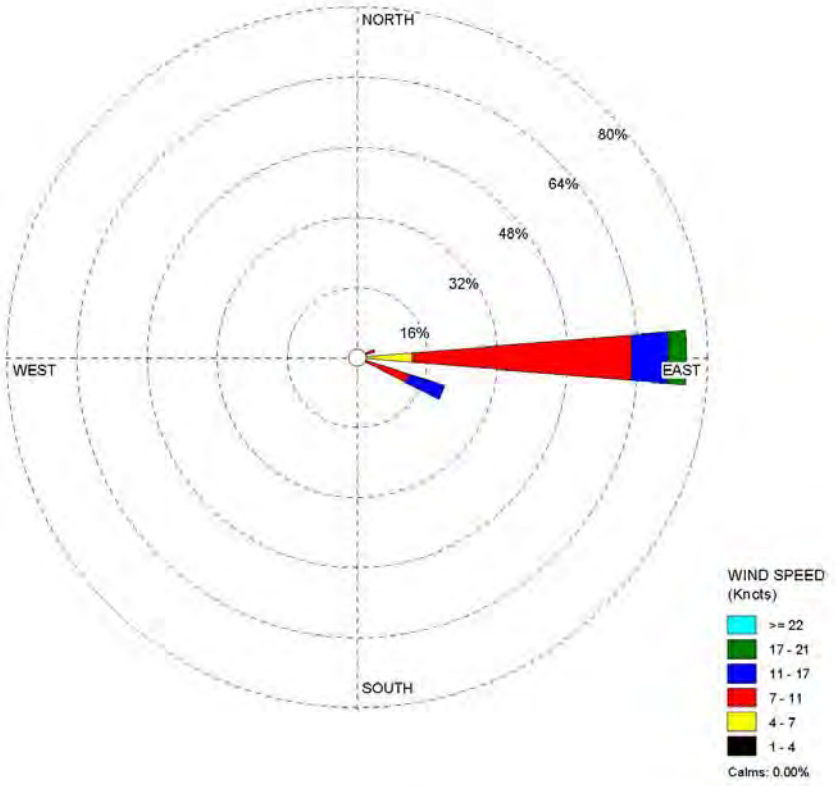
COMMENTS		COMPANY NAME	
November 3, 2010 Temp (F): Avg 48.5 Min 43.0 Max 54.0 Relative Humidity: 48% Dew Point (F): 28.5 Precipitation: Trace November 4, 2010 Temp (F): Avg 42.8 Min 39.9 Max 48.0 Relative Humidity: 75% Dew Point (F): 35.1 Precipitation: None		**Lawhon and Associates**	
		MODELER **C LaLonde**	
	CALM WINDS **45.83%**		
	AVG. WIND SPEED **2.66 Knots**	DATE **12/14/2010**	PROJECT NO. **07-0082**

WRPLOT View - Lakes Environmental Software

WIND ROSE PLOT

Countywide Community Ambient Air Monitoring - Event #170
3:00 pm Tuesday December 7 to 3:00 pm Wednesday December 8, 2010

DISPLAY
Wind Speed
Flow Vector (blowing to)



COMMENTS		COMPANY NAME	
December 7, 2010 Temp (F): Avg 20.9 Min 19.9 Max 21.9 Relative Humidity:69% Dew Point (F): 12.3 Precipitation: Snow December 8, 2010 Temp (F): Avg 20.2 Min 17.1 Max 24.1 Relative Humidity: 75% Dew Point (F): 13.32 Precipitation: Snow		**Lawhon and Associates**	
		MODELER **C LaLonde**	
	CALM WINDS **0.00%**		
	AVG. WIND SPEED **10.38 Knots**	DATE **12/14/2010**	PROJECT NO. **07-0082**

WRPLOT View - Lakes Environmental Software

3.0 ANALYTICAL RESULTS

The laboratory analyzed the air samples for an extensive number of compounds in accordance with the approved work plan. Only those results that exceed RSLs will be discussed in the body of this report. Although other compounds may have been detected in a sample, if they were quantified at concentrations below the respective RSL, they are not considered to pose a significant risk and thus were not discussed further in this report. Analytical results from the laboratory are provided in the Appendices.

3.1 Volatile Organic Compounds

Compounds detected above their respective RSLs by Method TO-15 modified (TO-15m) are summarized in Tables 1 through 3. TO-15m analyzes air samples that are collected in a SUMMA® canister over a 24-hour period. All of the TO-15m analyses presented in this monthly report were performed by TestAmerica Inc., Knoxville, TN. Laboratory data reports are provided in the Appendices. The QA/QC packages from Test America are not included in the Appendices because of their large size but can be made available upon request.

As in past events, the only VOCs that are routinely detected above their respective RSLs, are benzene and carbon tetrachloride. The concentrations of these two persistently present VOCs (benzene and carbon tetrachloride) did not exceed their respective Acute/Chronic MRLs or the HAP ISLs in any sample covered by this report. Additionally, the concentrations of the compounds do not indicate any pattern associated with their locations relative to the landfill and thus do not appear to have the landfill as their source. The VOC results are presented in Tables 1 through 3.

Table 1: VOCs Detected Above Screening Levels
Event #168: Monday, October 4 to Tuesday October 5, 2010[1,2]

Compound	Acute MRL	Chronic MRL	RSL	HAP ISL	School Co-located		Cell Tower	Camp ground	Wetland
			Prevailing wind direction		C/C		D/C	U/U	C/D
Benzene	29	10	**0.31**	30	0.28J	0.26J	0.27J	0.28J	0.27J
Carbon tetrachloride	188	188	**0.41**	200	**0.66J[3,4]**	**0.64J**	**0.66J**	**0.58J**	**0.75J**

1. All units are in (ug/m^3)
2. Laboratory Analytical Results are in Appendix A
3. Bold indicates result exceeded RSL
4. J = Laboratory Data Qualifier: Estimated concentration below laboratory reporting limit

Table 2: VOCs Detected Above Screening Levels
Event #169 Wednesday, November 3 to Thursday, November 4, 2010[1,2]

Compound	Acute MRL	Chronic MRL	RSL	HAP ISL	School	Cell Tower	Campground Co-Located		Wetland
			Prevailing wind direction		D/D	D/D	U/D		C/C
Benzene	29	10	**0.31**	30	**1.4[3]**	**0.92**	**1.1**	**0.99**	**1.0**
Carbon tetrachloride	188	188	**0.41**	200	**0.54J[4]**	**0.53J**	**0.53J**	**0.56J**	**0.53J**

1. All units are in (ug/m^3)
2. Laboratory Analytical Results are in Appendix B
3. Bold indicates result exceeded RSL
4. J = Laboratory Data Qualifier: Estimated concentration below laboratory reporting limit

Table 3: VOCs Detected Above Screening Levels
Event #170: Tuesday, December 7 to Wednesday, December 8, 2010[1,2]

Compound	Acute MRL	Chronic MRL	RSL	HAP ISL	School	Cell Tower	Camp-ground	Wetland Co-located	
				Prevailing wind direction	U/U	U/U	C/C	D/D	
Benzene	29	10	**0.31**	30	**0.65[3]**	**0.64**	**0.74**	**0.96**	**0.66**
Carbon tetrachloride	188	188	**0.41**	200	**0.55J[4]**	0.37J	**0.74J**	**0.55J**	**0.49J**
Tetrachloroethene	1,400	280	**0.41**	1,400	ND[5]	ND	ND	**1.60**	ND
Trichloroethene	10,000	546	**1.20**	10,000	ND	ND	ND	**24**	ND
1,4-Dichlorobenzene	12,020	60	**0.22**	10,000	ND	ND	ND	**8.9**	ND
1,2-Dichloroethane	NA[6]	2,400	**0.094**	NA	ND	ND	ND	**0.38J**	ND

1. All units are in (ug/m^3)
2. Laboratory Analytical Results are in Appendix C
3. Bold indicates result exceeded RSL
4. J = Laboratory Data Qualifier: Estimated concentration below laboratory reporting limit
5. ND indicates compound not detected
6. NA – Not Available

3.2 Sulfur Compounds

Carbon disulfide was the only sulfur compound detected during the three (3) sampling events reviewed in this report. When detected, the concentrations of carbon disulfide were extremely low and well below the respective RSL. All detections are included on the TO-15m Summary Table.

3.3 Aldehydes and Ketones

In order to obtain a continuous 24 hours of data, three separate gel collection tubes had ambient air drawn through them sequentially for 8-hours each. Consequently, there are three separate sample results for each location for each monitoring event. These three sample results are combined to calculate a 24-hour average concentration. Analyses for aldehydes and ketones by method TO-11a were conducted by TestAmerica Inc., Phoenix Arizona.

Although Method TO-11a analyzes for a number of carbonyl compounds, formaldehyde and acetaldehyde are the constituents most frequently detected and are the aldehyde compounds of greatest potential concern from a public health standpoint. In addition to formaldehyde and acetaldehyde, several other carbonyl compounds were occasionally detected in the samples summarized in this report. The results for these compounds are included on the laboratory reporting sheets found in the Appendices. Only results for formaldehyde and acetaldehyde are summarized in Tables 4 through 6, below.

Table 4: Aldehydes Detected Above Screening Levels
Event #168: Monday, October 4 to Tuesday October 5, 2010[1,2]

Aldehyde	HAP ISL	Acute MRL[3]	Chr. MRL[3]	RSL	School			Cell Tower			Campground			Wetland		
	Prevailing wind direction				C/C			D/C			U/U			C/D		
					1	2	3	1	2	3	1	2	3	1	2	3
Acetaldehyde	**90**	NA[4]	NA	1.1	**1.7*[5,6]**	**1.7***	**1.7***	**2.2***	**2.6***	**2.2***	**2.0***	**2.6***	**2.8***	**2.9***	**1.7***	**2.8***
Formaldehyde	**50**	**50**	**10**	0.19	**3.4***	**3.0***	**2.9***	**4.2***	**3.5***	**2.9***	**5.7**	**4.4***	**3.7***	**6.4**	**3.5***	**3.9***

1. All units are in (ug/m^3)
2. Laboratory Analytical Results are in Appendix A
3. ATSDR Minimal Risk Levels (MRL) (ATSDR Toxicological Profile for Formaldehyde, July 1999) - Acute MRL 0.04 ppm = 50 ug/m^3; Chronic MRL 0.008 ppm=10 ug/m^3
4. NA= Not available
5. Bold indicates concentration exceeded RSL
6. *Indicates possible break-through from front to back of sorbent tube.

Table 5: Aldehydes Detected Above Screening Levels
Event #169 Wednesday, November 3 to Thursday, November 4, 2010[1,2]

Aldehyde	HAP ISL	Acute MRL[3]	Chr. MRL[3]	RSL	School			Cell Tower			Campground			Wetland		
Prevailing wind direction					D/D			D/D			U/D			C/C		
					1	2	3	1	2	3	1	2	3	1	2	3
Acetaldehyde	**90**	NA[4]	NA	1.1	**4.3*[5,6]**	**4.2***	**3.4***	**3.5***	**3.8***	**3.6***	**3.3***	**4.0***	**5.3***	**5.1***	**3.5***	**4.0***
Formaldehyde	**50**	**50**	**10**	0.19	**6.1**	**4.0***	**3.9***	**4.9**	**4.1***	**3.9***	**7.0**	**5.1***	**4.2***	**7.6**	**3.9***	**4.4***

1. All units are in (ug/m^3)
2. Laboratory Analytical Results are in Appendix B.
3. ATSDR Minimal Risk Levels (MRL) (ATSDR Toxicological Profile for Formaldehyde, July 1999) - Acute MRL 0.04 ppm = 50 ug/m^3; Chronic MRL 0.008 ppm=10 ug/m^3
4. NA= Not available
5. Bold indicates concentration exceeded RSL
6. *Indicates possible break-through from front to back of sorbent tube.

Table 6: Aldehydes Detected Above Screening Levels
Event #170: Tuesday, December 7 to Wednesday, December 8, 2010[1,2]

Aldehyde	HAP ISL	Acute MRL[3]	Chr. MRL[3]	RSL	School			Cell Tower			Campground			Wetland		
Prevailing wind direction					U/U			U/U			C/C			D/D		
					1	2	3	1	2	3	1	2	3	1	2	3
Acetaldehyde	**90**	NA[4]	NA	1.1	**1.5*[5,6]**	**1.0***	**1.1***	**1.9***	**1.7***	**2.0***	**1.6***	**2.6***	**2.4***	**2.9***	**2.0***	**3.0***
Formaldehyde	**50**	**50**	**10**	0.19	**1.0***	**0.8**	**0.6***	**1.3***	**1.5***	**1.5***	**1.6***	**2.5***	**1.9***	**2.6***	**2.7***	**2.1***

1. All units are in (ug/m^3)
2. Laboratory Analytical Results are in Appendix C.
3. ATSDR Minimal Risk Levels (MRL) (ATSDR Toxicological Profile for Formaldehyde, July 1999) - Acute MRL 0.04 ppm = 50 ug/m^3; Chronic MRL 0.008 ppm=10 ug/m^3
4. NA= Not available
5. Bold indicates concentration exceeded RSL
6. *Indicates possible break-through from front to back of sorbent tube.

4.0 SUMMARY AND DISCUSSION

4.1 Volatile Organic Compounds

None of the concentrations of any of the detected VOC analytes exceeded their respective Acute/Chronic MRL or the HAP Individual Sample Screening Levels, irrespective of the potential source(s). All of the reported benzene concentrations were within the range of background levels reported in the literature and by other investigators. The concentration of benzene detected from the 15 samples collected from October 4, 2010 to December 8, 2010 ranged from 0.26 ug/m^3 to 1.4 ug/m^3 (mean 0.69 ug/m^3); ***these concentrations are below the average background concentration in ambient air in Ohio (Ohio EPA, Portsmouth Ohio Air Quality Study 2003) and comparable to values reported in recent in reports.*** There are no apparent trends over time or any apparent correlation of concentrations with the sampling site relative position to the landfill.

As mentioned in previous Monthly Reports, there are numerous local and area sources of compounds, including lawn mowing, emissions from the heavy equipment working on the nearby expansion area of the landfill, motor vehicles on nearby roads and Interstate 77, the Marathon refinery on the south side of Canton, vehicles on the landfill, and the landfill. The sources of carbon tetrachloride are not known, but the consistently low concentrations of this environmentally persistent compound across all monitoring locations (irrespective of wind direction) indicate that, like benzene, it is present in background air not related to the landfill emissions. The carbon tetrachloride results

(n=14 samples; range 0.35ug/m^3 to 0.75 ug/m^3; mean 0.58 ug/m^3) are similarly low and present in regional airshed background. ***In summary, the monitoring did not detect any incremental amounts of any VOCs that can reliably be attributed to the landfill.***

Note: The two compounds, benzene and carbon tetrachloride, that were measured at concentrations (or estimated concentrations as designated by a "J" qualifier) above their RSLs for residential air (0.31 ug/m^3 and 0.41 ug/m^3, respectively) have RSLs that are below the laboratory reporting limit (0.64 ug/m^3 and 1.3 ug/m^3, respectively) for these compounds. Consequently, any quantifiable detection of these compounds will exceed the highly conservative RSLs for residential air. Given these compounds presence in quantifiable concentrations in background air, the ATSDR MRLs and the USEPA HAP ISLs provide a more realistic basis of comparison. ***No VOC constituent from any of the 15 samples analyzed in these events exceeded (or even approached) their respective acute or chronic ATSDR MRL or their USEPA HAP ISL.***

During sampling event #170 on December 7/8, 2010 two co-located samples for VOC analysis were collected from the wetland. One of the samples was found to contain an unusual number of chlorinated compounds (tetrachloroethene; 1,2,4-trichlorobenzene; trichloroethene; chlorobenzene; 1,3-dichlorobenzene; 1,2,-dichlorobenzene; 1,4-dichlorobenzene; 1,2-dichloroethane; and cis-1,2-dichloroethene) that were not detected in any other sample-including the co-located sampler in the wetland. We inquired with TestAmerica regarding the history of the specific SUMMA® canister that had the numerous chlorinated compounds detected in the sample. According to the laboratory, that specific canister was cleaned in the same batch as all the other canisters that were used in the December 7/8 round of sampling. All of the sampling equipment was handled in the same manner by the Lawhon technicians. The final pressure in the SUMMA® canister containing the chlorinated compounds was elevated as compared to the other 4 SUMMA® canisters used during sampling event # 170 (-9.5 mm Hg versus -2.0, -2.0, -2.5 and 0, respectively). This finding is suggestive of a faulty regulator on the SUMMA® canister in question. Given the fact that the co-located sample did not contain the chlorinated compounds listed above, and all other analytical results were consistent with historical findings, our conclusion is that these findings are an anomaly of unknown origin and may be related to the condition of the SUMMA® canister. It should be noted that even though the concentrations of Tetrachloroethene, Trichloroethene, 1,4-Dichorobenzene and 1,2-Dichloroethane exceeded the conservative USEPA RSL, none of the concentrations of these compounds exceed the ATSDR Acute MRL or Chronic MRL nor the USEPA ISL.

4.2 Aldehydes (Carbonyl Compounds)

Formaldehyde and acetaldehyde were detected at all community sampling locations. The RSLs for formaldehyde and acetaldehyde in residential air, (0.19 ug/m^3 and 1.1 ug/$m^{3,}$ respectively) are very close to the laboratory reporting limits for these compounds. Consequently, almost any measurable level of formaldehyde and acetaldehyde will exceed the respective RSL. Therefore, when available, the ATSDR Acute/Chronic

MRLs and the USEPA HAP ISLs for formaldehyde and acetaldehyde were considered to be more appropriate benchmarks for interpreting the analytical results.

None of the twelve (12) daily formaldehyde samples exceeded the ATSDR Acute MRL (50 ug/m^3 for exposures up to 14 days), the Chronic MRL (10 ug/m^3 for long-term exposures) or the ISL (50 ug/m^3). The average concentration of formaldehyde, as sampled from October 2010 to December 2010, was 3.51 ug/m^3

No samples (n=12) had levels of acetaldehyde which exceeded or even approached the ISL of 90 ug/m^3. The average concentration of acetaldehyde, as sampled from October 2010 to December 2010, was 2.71 ug/m^3.

In addition, there are no apparent correlations between the sampling locations' orientation to the landfill, prevailing wind (e.g., upwind, downwind, or crosswind), and the concentration of either formaldehyde or acetaldehyde. This indicates that the concentrations of these compounds are derived from other common sources, such as vehicle emissions, fugitive fuel emissions, and ambient air photochemical reactions. As noted previously, the density of motor vehicle traffic, the time of day and meteorological conditions better explain any observed fluctuations in levels of aldehydes than the orientation of the sample location relative to the landfill. Thus, as with the VOCs, the monitoring program does not reliably attribute any incremental concentration of aldehydes to landfill activities.

4.3 Comparison of Airborne Concentrations in the Vicinity of CRDF to EPA-ISLs

As part of an initiative to monitor ambient air conditions near the nation's schools, the USEPA established the Schools Air Toxics Monitoring Initiative. Individual sample screening levels for HAP and non-HAP compounds in air were established using available heath effects information for the specific compounds. The individual sample screening levels represent short to intermediate inhalation exposure estimates that are unlikely to be associated with appreciable health risks for the exposed population (including sensitive subgroups).

L&A reviewed the historical data collected at the Countywide Recycling & Disposal Facility over the past year (January 5, 2010 to September 2, 2010) and compared the findings to the recently published ISLs. The results of this comparison are presented in Table 7 below. This table shows:

- ***The mean annual concentration of each analyte is well-below the respective Individual Sample Screening Level, irrespective of the potential source(s);***
- The mean concentration of these constituents is typically less than 1% of the screening ISLs, again irrespective of the source of the constituents; and
- The maximum 24-hour concentration of each constituent did not exceed any of the ISLs at any time over the past year.

Table 7: Comparison of Airborne Concentrations in the Vicinity of CRDF to ISL's[1,2,3]

VOC HAP Analytes and EPA Method TO-15m Analytes	ISL[4]	Max Conc. Detected At CRDF	Mean Detected At CRDF	Mean As % of ISL	ISL Derivation
Benzene[5]	30	1.400	0.632	2.107%	Acute MRL[6]
1,3-Butadiene	20	0.440	0.440	2.200%	Acute MRL
Benzyl Chloride (2-Chlorotoluene)	140	1.050	1.050	0.750%	IUR[7]
Carbon Disulfide	7,000	11.000	0.838	0.012%	Chron. RfC[8]
Carbon Tetrachloride	200	1.100	0.594	0.297%	Inter. MRL
Chlorobenzene	10,000	6.800	0.567	0.006%	Chron. REL[9]
Chloroform	500	0.540	0.455	0.091%	Acute MRL
1,4-Dichlorobenzene	10,000	8.900	0.740	0.007%	Acute MRL
1,3-Dichloropropene[10]	40	0.910	0.910	2.275%	Inter. MRL
Ethyl Benzene	40,000	0.550	0.423	0.001%	Acute MRL
Chloroethane (Ethyl Chloride)	40,000	0.380	0.240	0.001%	Acute MRL
Ethylene Dibromide (1,2-Dibromoethane)	12	0.750	0.750	6.250%	IUR
Ethylene Dichloride (1,2-Dichloroethane)	270	2.800	0.443	0.164%	IUR
Ethylidene Dichloride (1,1-Dichloroethane)	4,400	0.405	0.402	0.009%	Chron. RfC
Hexachlorobutadiene	320	5.500	5.500	1.719%	IUR
Bromomethane (Methyl Bromide)	200	0.390	0.382	0.191%	Acute MRL
Chloromethane (Methyl chloride)	1,000	2.400	1.456	0.146%	Acute MRL
1,1,1-Trichloroethane (methyl chloroform)	10,000	0.550	0.547	0.005%	Acute MRL
Methyl Isobutyl Ketone	30,000	4.200	0.823	0.003%	Chron. RfC
Methyl Tert-Butyl Ether	7,000	1.800	1.776	0.025%	Acute MRL
Methylene Chloride (Dichloromethane)	2,000	6.500	1.382	0.069%	Acute MRL
Propylene Dichloride (1,2-dichloropropane)	200	0.460	0.460	0.230%	Acute MRL
Styrene	9,000	0.425	0.425	0.005%	Acute MRL
1,1,2,2-Tetrachloroethane	120	0.700	0.700	0.583%	IUR
Tetrachloroethene	1,400	1.600	0.717	0.051%	Acute MRL
Toluene	4,000	3.100	1.218	0.030%	Acute MRL
1,2,4-Trichlorobenzene	2,000	3.700	3.590	0.180%	Chron. RfC
1,1,2-Trichloroethane	440	0.550	0.550	0.125%	IUR
Trichloroethylene	10,000	24.000	0.947	0.009%	Acute MRL
Vinyl Chloride	1,000	0.340	0.252	0.025%	Acute MRL
Vinylidene chloride (1,1-dichloroethylene)	80	0.395	0.395	0.494%	Inter. MRL
Xylene[11]	9,000	4.100	1.106	0.012%	Acute MRL
Additional (non-HAP) Analytes					
Acetone	62,000	80.000	17.746	0.029%	Acute MRL
cis-1,2-Dichloroethene	800	1.100	0.404	0.051%	Acute MRL
trans-1,2-Dichloroethene	800	0.395	0.395	0.049%	Acute MRL
2-Butanone (MEK)	50,000	19.000	3.254	0.007%	Chron. RfC
1,3-Dichlorobenzene	10,000	3.100	0.642	0.006%	MRL 1,4-DCB
Carbonyl Compounds					
Acetaldehyde	90	6.27	2.34	2.61%	Chron. RfC
Acrolein	7	0.02	0.02	0.21%	Acute MRL
Formaldehyde	50	27.70	7.12	14.23%	Acute MRL
Propionaldehyde	80	1.82	0.71	0.88%	Chron. RfC

1. All units ug/m^3
2. Used ½ times the limit of detection for non-detected constituents
3. Concentrations from community sampling - conducted from January 5, 2010 to December 8, 2010
4. ISL – Individual Screening Level
5. Bold and Italic indicates the analyte is a Key HAP Analyte (aka "driver")
6. MRL – Minimal Risk Level – Established by ATSDR
7. IUR – Inhalation Unit Risk Factor – Established by EPA
8. RfC – Chronic Reference Concentration – Established by EPA IRIS
9. REL – Recommended Exposure Limit – Established by NIOSH
10. Includes both cis and trans-1,3-Dichloropropene
11. Includes m, p and o-Xylene

4.4 Laboratory Issues

Discrepancies in the analytical results for the two co-located TO-15 samples collected from the wetland on December 7/8 were discussed above. The potential source(s) of the anomalous results is not known. However, the results may be related to the condition of the SUMMA® canister or the regulator. Furthermore, these isolated findings do not alter the evaluation of the results nor do they alter the conclusions regarding public health.

4.5 Conclusions

No significant concentrations of any VOC, including benzene, have been reported in the months since alterations of the sampling apparatus removed all flexible tubing from the SUMMA® sampling apparatus. This is still the case for the monitoring events presented in this 4th Quarter Report - 2010.

We have also developed the following specific conclusions:

- The levels of benzene recorded at the community monitoring locations from October 4, 2010, to December 8, 2010, were very low and well within Ohio background as reported by Ohio EPA (Portsmouth Ohio Air Quality Study, 2003). Additionally, the levels are well below the respective ATSDR MRL and USEPA ISL.
- Because there are numerous local and regional sources of VOCs, it is expected that many of these compounds will continue to be detected at low levels as the community monitoring program continues.
- Concentrations of formaldehyde and acetaldehyde from October 4, 2010, to December 8, 2010, were consistent with values observed in previous months. The detected concentrations of formaldehyde and acetaldehyde appear to be at background levels and did not exceed or even approach their respective ATSDR Acute MRLs, Chronic MRLs or the USEPA ISLs.
- The average concentrations of formaldehyde and acetaldehyde recorded from all locations from May 21, 2007, through December 8, 2010, are below both the Acute and Chronic ATSDR MRL values as well as the USEPA ISLs.
- There are no trends in concentration of the detected compound with respect to whether the monitoring location was upwind or downwind of the landfill during the monitoring event. This finding indicates that the landfill is not a significant contributor to the concentrations of the constituents found in ambient air.
- This 4th Quarter Report - 2010 continues to demonstrate that the occurrence of low levels of VOCs and aldehydes in the air of the community surrounding CRDF reflects local and regional sources; and that the levels of these compounds in the ambient air do not represent either an immediate or long-term threat to public health.
- The community monitoring has not reliably identified any incremental concentration of constituents attributable to landfill operations. The found concentrations in ambient air are indicative of local and regional background conditions, irrespective of wind direction relative to the landfill.

TO-15 Analysis by Sampling Event

Analyte					Event #168: October 4/5, 2010					Event #169: November 3/4, 2010					Event #170: December 7/8, 2010				
				Prevailing Wind	D/C	U/U	C/C		C/D	D/D	U/D		D/D	C/C	U/U	C/C	U/U	D/D	
	ISL	Acute MRL	Chronic MRL	RSL	*Cell Tower*	*Campground*	*School*		*Wetland*	*Cell Tower*	*Campground*		*School*	*Wetland*	*Cell Tower*	*Campground*	*School*	*Wetland*	
Acetone	62,000	61,762	30,881	32,000	6.7J	24	6.3J	7.4J	14	5.1J	20	5.6J	7.7J	9.9J	4.4J	--	5.8J	7.5J	4.1J
Ethylbenzene	40,000	43,419	1,303	0.97	--	--	--	0.3J	--	--	0.3J	0.55J	0.42J	0.37J	--	--	--	0.37J	--
Trichlorofluoromethane	NA	NA	NA	730	2.1	2.1	1.9	2.1	2	1.5	1.6	1.5	1.7	1.7	1.4	1.4	1.4	1.3	1.3
Heptane	NA	NA	NA	NA	--	0.38J	--	--	--	0.56J	0.73J	0.65J	0.67J	0.61J	--	--	--	0.77J	--
Hexane	NA	NA	2,115	730	0.47J	0.55J	0.36J	0.46J	0.49J	1.1J	1.3J	1.2J	1.6J	1.3J	0.33J	0.39J	0.39J	0.56J	0.39J
2,2,4-Trimethylpentane	NA	NA	NA	NA	--	--	--	--	--	0.83J	0.34J	0.31J	0.60J	0.37J	--	--	--	0.62J	--
tert-Butyl alcohol	NA	NA	NA	NA	0.14J	--	--	--	--	0.17J	0.49J	0.13J	0.26J	0.22J	0.31J	--	1.3J	0.48J	0.95J
Methylene chloride	2,000	2,084	1,042	5.2	1.3J	1.3J	0.97J	1.6J	1.4J	1.5JB	1.9B	1.4JB	2.3JB	2.0JB	0.78JB	0.76JB	0.79JB	1.6JB	0.76JB
Benzene	30	29	10	0.31	0.27J	0.28J	0.28J	0.26J	0.27J	**0.92**	**1.1**	**0.99**	**1.4**	**1.0**	**0.64**	**0.74**	**0.65**	**0.96**	**0.66**
Tetrachloroethene	1,400	1,400	280	0.41	--	--	--	--	--	**--**	**--**	**--**	**--**	**--**	--	--	--	**1.60**	--
Toluene	4,000	3,768	301	5,200	0.44J	0.71J	0.57J	0.76J	0.71J	1.8	2.4	1.9	2.8	2.6	0.36J	0.45J	0.55J	2.9	0.63J
1,2,4-trichlorobenzene	2	NA	NA	2.1	--	--	--	--	--	--	--	--	--	--	--	--	--	0.93J	--
Trichloroethene	10,000	10,000	546	1.20	--	--	--	--	--	--	--	--	--	--	--	--	--	**24**	--
1,1,2-Trichloro-1,2,2-trifluoroethane	NA	NA	NA	NA	0.49J	0.52J	0.48J	0.45J	0.45J	0.65J	0.63J	0.66J	0.64J	0.64J	0.59J	0.58J	0.54J	0.99J	0.55J
1,2,4-Trimethylbenzene	NA	NA	NA	7.3	--	--	0.60J	2.4	0.87J	0.60J	0.61J	2.3	1.6	1.2	--	--	0.52J	1.8	--
1,3,5-Trimethylbenzene	NA	NA	NA	NA	--	--	--	0.46J	--	--	--	0.69J	0.38J	--	--	--	--	0.46J	--
o-Xylene	9,000	8,687	8,687	730	--	--	--	0.61J	--	0.31J	0.38J	1.4	0.62J	0.47J	--	--	--	0.52J	--
m/p-Xylene	9,000	8,687	8,687	730	--	0.57J	0.55J	1.5	0.77J	0.85	0.97	4.1	1.5	1.3	--	--	--	1.3	--
Methyl ethyl ketone	50,000	NA	NA	5,200	--	4.2	--	--	1.8J	0.88J	6.1	0.89J	1.4J	1.8J	0.69J	--	0.82J	1.3J	0.79J
Methyl isobutyl ketone	30,000	NA	NA	3,100	--	--	--	--	--	--	0.43J	--	--	0.20J	--	--	--	0.92J	--
4-Ethyltoluene	NA	NA	NA	NA	--	--	--	0.67J	0.44J	--	0.44J	0.76J	0.59J	0.48J	--	--	--	0.41	--
Carbon disulfide	7,000	NA	934	730	--	--	--	--	--	--	--	0.20J	0.16J	--	--	--	--	--	--
Carbon tetrachloride	200	188	188	0.41	**0.66J**	**0.58J**	**0.66J**	**0.64J**	**0.75J**	**0.53J**	**0.53J**	**0.56J**	**0.54J**	**0.53J**	0.37J	**0.74J**	**0.55J**	**0.55J**	**0.49J**
Chlorobenzene	10,000	NA	NA	52	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	**--**	--	--	--	6.8	--
Chloromethane	1,000	1,033	103	94	2.0	1.6	1.2	2.4	1.2	1.5	1.5	1.5	1.5	1.3	1.6	1.4	1.5	1.5	1.2
1,2-Dichlorobenzene	NA	NA	NA	210	--	--	--	--	--	--	--	--	--	--	--	--	--	54	--
1,3-Dichlorobenzene	10,000	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	3.1	--
Cyclohexane	NA	NA	NA	6,300	--	--	--	--	--	0.24J	0.27J	0.27J	0.37J	0.33J	--	--	--	--	--
1,4- Dichlorobenzene	10,000	12,020	60	0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	**8.9**	--
Dichlorodifluoromethane	NA	NA	NA	210	3.5	3.3	3.5	3.5	3.4	3.1	3.1	3.2	3.2	3.1	2.8	2.9	2.9	2.8	2.6
1,2-Dichloroethane	NA	NA	2400	0.094	--	--	--	--	--	--	--	--	--	--	--	--	--	**0.38J**	--
cis-1,2-Dichloroethene	800	NA	NA	NA	--	--	--	--	--	--	--	--	--	--	--	--	--	1.1	--

Reference:

*Prevailing Wind Direction with respect to the landfill
U: Upwind
D: Downwind
C: Crosswind
V: Variable

NS = No Sample due to solenoid valve failure
-- = Not Detected
NA = Not Available
Bold indicates result exceeds Regional Screening Level (developed May 2010)
Shading indicates result exceeds ATSDR MRL

Laboratory Data Qualifiers:

B = Compound present in blank
J = Estimated concentration below laboratory reporting limit
D = Dilution
E = Exceeds calibration range of instrument
EST= Estimated concentration resulting in higher reporting limits.