

Air Samples Taken Around Landfill

Conversions b/t ppbv and ug/m3 were done using [Eurofins unit conversion calculator for air toxics](#)

- December 28, 2020 samples
 - Analyzed by: Commonwealth of Virginia, Division of Consolidated Laboratory Services
 - Time of day sampled: 8:52 p.m.
 - **Sampling method: Canister, 1-2 minutes in duration each**
 - Location 1: Near 2125 Shakesvill Road/near Highlands Juvenile Detention Center
 - **Benzene: 44.80 ppbv / 143.12 ug/m3**
 - **Toluene: 3.36 ppbv / 12.66 ug/m3**
 - **Ethylbenzene: 3.39 ppbv / 14.72 ug/m3**
 - **o-Xylene: 0.84 ppbv / 3.65 ug/m3**
 - **m,p-Xylenes: 2.38 ppbv / 10.33 ug/m3**
 - Location 2: Shakesville Tabernacle Missionary Baptist Church Parking Lot on Shakesville Road
 - **Benzene: 0.58 ppbv / 1.85 ug/m3**
 - **Toluene: 0.77 ppbv / 2.9 ug/m3**
 - **Ethylbenzene: 0.10 ppbv / 0.4341922 ug/m3**
 - **o-Xylene: 0.16 ppbv / 0.694773 ug/m3**
 - **m,p-Xylenes: 0.32 ppbv / 1.39 ug/m3**
 - Location 3: Booher Road and Willow Oak Court Intersection
 - **Benzene: 21.76 ppbv / 69.52 ug/m3**
 - **Toluene: 3.33 ppbv / 12.55 ug/m3**
 - **Ethylbenzene: 2.06 ppbv / 8.94 ug/m3**
 - **o-Xylene: 0.63 ppbv / 2.74 ug/m3**
 - **m,p-Xylenes: 1.78 ppbv / 7.73 ug/m3**
- January 10, 2021 samples
 - Analyzed by: Pace Analytical.
 - Time of day sampled: 8:58 p.m. for Shakesville Road location, 9:15 p.m. for Maryland Ave/Poplar St location
 - Sampling method: Canister, 1-2 minute grab sample
 - Location 1 - Shakesville Road (can't find exact location)
 - **Benzene: 2.35 ppbv / 7.51 ug/m3**
 - **Toluene: 1.39 ppbv / 5.24 ug/m3**
 - **Ethylbenzene: 0.405 ppbv / 1.76 ug/m3**
 - **o-Xylene: 0.426 ppbv / 1.85 ug/m3**
 - **m,p-Xylenes: 1.17 ppbv / 5.07 ug/m3**
 - Location 2 - Maryland Ave/Poplar St

- **Benzene: 7.29 ppbv** / 23.3 ug/m3
 - **Toluene: 1.65 ppbv** / 6.22 ug/m3
 - **Ethylbenzene: 0.742 ppbv** / 3.23 ug/m3
 - **o-Xylene: 0.366 ppbv** / 1.59 ug/m3
 - **m,p-Xylenes: 1.01 ppbv** / 4.38 ug/m3
- March 20, 2021 samples
 - Analyzed by: Pace Analytical
 - Time of day sampled: Check with landfill
 - Location: Perimeter of landfill- exact location unclear
 - Method: Canister sample taken over 24 hours
 - Benzene: **2.9 ppbv** / 9.26 ug/m3
 - Toluene: **0.39 ppbv** / 1.47 ug/m3
 - *Note: estimated concentration above the adjusted method detection limit and below the adjusted reporting limit*
 - Ethylbenzene: **0.229 ppbv** / 0.993 ug/m3
 - o-Xylene: **0.093 ppbv** / 0.405 ug/m3
 - *Note: estimated concentration above the adjusted method detection limit and below the adjusted reporting limit*
 - m,p-Xylenes: **0.2325 ppbv** / 1.01 ug/m3
 - *Note: estimated concentration above the adjusted method detection limit and below the adjusted reporting limit*
- April 1, 2021 samples
 - Analyzed by: Commonwealth of Virginia Division of Consolidated Laboratory Services
 - Method: 1-2 minute canister samples
 - Location 1: Owens field - 36.5959 lat. -82.1461 long
 - Time of day sampled: 6:31 p.m.
 - **Benzene: 0.40 ppbv**
 - **Toluene: 0.30 ppbv**
 - **Ethylbenzene: <1.25 ppbv**
 - **o-Xylene: 0.10 ppbv**
 - **m,p-Xylenes: 0.20 ppbv**
 - Location 2: Shakesville Tabernacle Church S198 - 36.6055 lat. -82.1431 long
 - Time of day sampled: 5:59 p.m.
 - **Benzene: 0.10 ppbv**
 - *PARAMETER QUALIFIER: Value between SQL and MDL; A result reported below the reporting level should be considered an estimated value.*
 - **Toluene: 0.10 ppbv**
 - *PARAMETER QUALIFIER: Value between SQL and MDL; A result reported below the reporting level should be considered an estimated value.*
 - **Ethylbenzene: <1.25 ppbv**

- **o-Xylene: <1.25 ppbv**
 - **m,p-Xylenes: <1.25 ppbv**
- Location 3: Stowers property - 36.6026 lat. -82.1535 long.
 - Time of day sampled: 7:08 p.m.
 - **Benzene: 0.60 ppbv**
 - **Toluene: <1.25 ppbv**
 - **Ethylbenzene: <1.25 ppbv**
 - **o-Xylene: <1.25 ppbv**
 - **m,p-Xylenes: <1.25 ppbv**

*testing has some qualifiers that I don't understand

Air sample analysis by Wilma Subra - Dec. and Jan. samples

- Analysis of Dec. 2020 and Jan. 2021 air samples in/around area of Bristol landfill, done March 31 by Wilma Subra
- I've rearranged/reformatted the below info but it was all compiled and written by Subra

Background on Subra

- [MacArthur Fellows profile](#)
- Chemical & Engineering News: "[Wilma Subra: An unstoppable pioneer in environmental chemistry and community advocacy](#)"

Details about samples

Ambient Air Samples were collected at:

- Shakesville Road on January 10, 2021
- Maryland Avenue/Poplar St. on January 10, 2021

The air samples were analyzed for TO-15 Volatile Organic Compounds by Pace Analytical.

Ambient Air Samples were collected at:

- Shakesville Tabernacle Missionary Baptist Church, Parking Lot on December 28, 2020
- Near 2125 Shakesville Road and Near Highlands Juvenile Detention Center on December 28, 2020
- Intersection of Booker Rd. and Willow Oak Court on December 28, 2020

The air samples were analyzed for TO-15 Volatile Organic Compounds by Commonwealth of Virginia, Division of Consolidated Laboratory Services.

Conclusion: Cumulative Health and Exposure Impacts

A total of 25 Volatile Organic Compounds were detected in the ambient air at five sampled locations in association with the Bristol Landfill. The individuals in the area of the landfill are being exposed to 25 individual volatile organic compounds and constantly being exposed to Benzene, Ethylbenzene, Toluene, o-Xylene and 1,2,4-Trimethylbenzene. The cumulative

impacts of exposure and health impacts associated with up to 25 volatile organic compounds and a host of other chemicals that were not tested for, that were potentially present in the ambient air community members are breathing, have the potential to result in extensive cumulative acute health impacts and long term cumulative health impacts due to chronic exposure.

Top findings

Based on the Volatile Organic Compounds detected in the air at two locations tested by Pace Analytical and three locations tested by Commonwealth of Virginia, Division of Consolidated Laboratory Services, the following were documented:

Benzene

Benzene, a known human cancer causing agent, was detected at all five sampling locations and in the highest concentration of any volatile compound at four* of the five sampling locations.

- Near 2125 Shakesville Road/near Highlands Juvenile Detention Center – 44.8 ppbv*
- Maryland Ave./Poplar St. – 23.3 ug/m3*
- Intersection of Booker Rd. and Willow Oak Court – 21.76 ppbv*
- Shakersville Road – 7.51 ug/m3*
- Shakersville Tabernacle Missionary Baptist Church Parking Lot – 0.58 ug/m3

Louisiana Ambient Air Standard for Benzene

Louisiana has Ambient Air Standards for Benzene – 12.5 ug/m3/3.76 ppbv. Three of the five Benzene Ambient Air Concentrations in the area of the landfill exceeded the Louisiana Ambient Air Standard for Benzene.

- Near 2125 Shakesville Road/near Highlands Juvenile Detention Center – 12 times the Louisiana Ambient Air Standard for Benzene.
- Maryland Ave./Poplar St. – 1.9 times the Louisiana Ambient Air Standard for Benzene.
- Intersection of Booker Rd. and Willow Oak Court – 5.8 times the Louisiana Ambient Air Standard for Benzene.

In association with Benzene, the ambient air samples contained concentrations of Toluene, Ethylbenzene, o-Xylene and m,p-Xylene.

Toluene

Toluene was detected at all five ambient air monitoring locations ranging from 0.77 ppbv to 6.22 ug/m3.

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.77 ppbv
- Intersection of Booker Road and Willow Oak Court – 3.33 ppbv
- Near 2125 Shakesville Road and Near Highlands Juvenile Detention Center – 3.36 ppbv
- Shakesville Road – 5.24 ug/m3
- Maryland Avenue/Poplar St. – 6.22 ug/m3

The Shakesville Tabernacle Baptist Church Parking Lot sampling location had the highest concentration of Toluene of any Volatile Organic Compound detected at this sampling location during the sampling events (0.77 ppbv).

Shakesville Road (5.24 ug/m³) and the Intersection of Booker Road and Willow Oak Court (3.33 ppbv) had the second highest Toluene concentrations of any Volatile Organic Compound detected at these two locations..

Ethylbenzene

Ethylbenzene was detected at all five monitoring locations ranging from 0.10 ppbv to 3.39 ppbv.

- Shakesville Tabernacle Missionary Baptist Church – 0.10 ppbv.
- Shakesville Road – 1.76 ug/m³
- Intersection of Booker Road and Willow Oak Court – 1.78 ppbv
- Maryland Avenue/Poplar St. - 3.23 ug/m³
- Near 2125 Shakesville Road and Near Highlands Juvenile Detention Center – 3.39 ppbv

o-Xylene

o-Xylene was detected at all five monitoring locations and ranged from 0.16 ppbv to 1.85 ug/m³.

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.16 ppbv
- Intersection of Booker Road and Willow Oak Court – 0.63 ppbv
- Near 2125 Shakesville Road and Near Highlands Juvenile Detention Center – 0.84 ppbv
- Maryland Avenue/Poplar St. – 1.59 ug/m³
- Shakesville Road – 1.85 ug/m³

m,p-Xylene

m,p-Xylene was detected at four of the five monitoring locations and ranged from 0.32 ppbv to 5.07 ug/m³.

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.32 ppbv
- Near 2125 Shakesville Road and near Highlands Juvenile Detention Center – 2.38 ppbv
- Maryland Avenue/Poplar St. – 4.38 ug/m³
- Shakesville Road – 5.07 ppbv

Health impacts of top findings

Benzene

Acute Health Impacts

- Irritates the skin, eyes nose, throat
- Causes coughing, wheezing, headaches, dizziness, lightheadedness, nausea, vomiting

Chronic Health Impacts

- A Carcinogen in humans, causes leukemia
- Limited evidence it is a teratogen in animals, should be treated as a possible teratogen in humans.

Ethylbenzene

Acute Health Impacts

- Irritates skin, eyes, nose, throat
- Causes headache, dizziness, lightheadedness, loss of coordination, passing out

Chronic Health Impacts

- May be a carcinogen in humans since it has been shown to cause cancer of the kidneys, testes, lung and liver in animals
- Limited evidence it is a teratogen in animals, it should be treated as a possible teratogen in humans

- Limited evidence it may damage the developing fetus and may affect male and female fertility

Toluene

Acute Health Impacts

- Irritates skin, eyes, nose, throat
- Causes coughing, wheezing, headache, dizziness, lightheadedness, affects the nervous system causing trouble concentrating, slowed reflexes

Chronic Health Impacts

- May be a teratogen in humans since it is a teratogen in animals.
- May damage the developing fetus

Xylene

Acute Health Impacts

- Irritates skin, eyes, nose, throat
- Causes coughing, wheezing, headache, nausea, vomiting, dizziness, lightheadedness, passing out

Chronic Health Impacts

- May damage the developing fetus
- May damage the liver and kidneys

Other findings + health impacts

In addition to Benzene, Ethylbenzene, Toluene and Xylenes, 20 additional volatile organic compounds were detected in the air at some of the five sampling locations.

1,2,4-Trimethylbenzene

Samples

- Shakesville Rd. – 1.81 ug/m³
Maryland Avenue/Popular St. – 1.33 ug/m³
- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.15 ppbv
- Near 2125 Shakesville Road/Near Highland Juvenile Det. C. – 1.07ppbv
- Intersection of Booker Rd. and Willow Oak Court – 0.71 ppbv

Acute health impacts

- Irritate skin, eyes, lungs
- Cause dizziness, lightheadedness, passing out, headaches, feel nervous, tense, tired, sleepy, bronchitis, coughing, shortness of breath

Chronic health impacts

- May cause changes in the blood cells, affect the blood's clotting ability

Chloromethane

Detected

- Shakesville Rd. – 1.04 ug/m³
- Maryland Avenue/Popular St. – 2.09 ug/m³
- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.66 ppbv
- Intersection of Booker Rd. and Willow Oak Court – 0.58 ppbv

4-Ethyltoluene

- Shakesville Rd. – 1.72 ug/m³

- Maryland Avenue/Popular St. – 1.34 ug/m3
- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.05 ppbv

Dichlorofluoromethane

Detected

- Shakesville Rd. - 2.37 ug/m3
- Maryland Avenue/Popular St. – 2.33 ug/m3
- Near 2125 Shakesville Road/Near Highland Juvenile Det. C. – 0.51ppbv

Acute Health Impacts

- Irritate skin, eyes, nose, throat, lungs
- Causes coughing, wheezing, shortness of breath, headaches, dizziness, nausea, vomiting, lightheadedness, confusion, tremors

Chronic Health Impacts

- May damage the developing fetus, cause abnormal heart rhythm (arrhythmia), may damage the liver

Hexane

Detected

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.35 ppbv
- Near 2125 Shakesville Road/Near Highland Juvenile Det. C. – 0.56 ppbv
- Intersection of Booker Rd. and Willow Oak Court – 0.38 ppbv

Acute Health Impacts

- Irritate and burn skin
- Irritate nose, throat, lungs
- Cause coughing, wheezing, shortness of breath, headaches, nausea, vomiting, dizziness, lightheadedness, passing out

Chronic Health Impacts

- May damage testes, may damage nervous system causing numbness, tingling, blurred vision, pins and needles, weakness in hands and feet.

Heptane

Detected

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.17 ppbv
- Near 2125 Shakesville Road/Near Highland Juvenile Det. C. – 0.42 ppbv
- Intersection of Booker Rd. and Willow Oak Court – 0.39 ppbv

Acute Health Impacts

- Irritates eyes, nose, throat
- Cause headache, lightheadedness, dizziness, lack of coordination
- Loss of appetite and/or nausea
- May affect the nervous system

Styrene

Detected

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 1.77 ppbv
- Near 2125 Shakesville Road/Near Highland Juvenile Det. C. – 0.36 ppbv
- Intersection of Booker Rd. and Willow Oak Court – 0.77 ppbv

Acute Health Impacts

- Irritate skin, eyes, nose, throat

- Cause rash, dryness, redness and burning feeling on contact, headache, dizziness, lightheadedness, passing out.

Chronic Health Impacts

- May be a carcinogen in humans since it has been shown to cause lung cancer in animals.

Ethanol

- Shakesville Rd. – 4.85 ug/m³
- Maryland Avenue/Popular St. – 11.8 ug/m³

Trichlorofluoromethane

- Shakesville Rd. – 1.20 ug/m³
- Maryland Avenue/Popular St. – 1.39 ug/m³

Acute Health Impacts

- Irritate skin, eyes
- Cause lightheadedness, dizziness, irregular heartbeat

Methylene Chloride

- Maryland Avenue/Poplar St. – 0.802 ug/m³
- Intersection of Booker Rd. and Willow Oak Court – 0.27 ppbv

Acute Health Impacts

- Irritate and burn skin, eyes
- Irritate nose, throat, lungs
- Cause coughing, wheezing and shortness of breath, headache, nausea, fatigue, dizziness, lightheadedness

Chronic Health Impacts

- May be a carcinogen in humans since it has been shown to cause liver and lung cancer in animals.
- Limited evidence causes spontaneous abortions
- May damage the liver and affect the kidneys
- May affect the brain

Propylene

- Shakesville Rd. – 3.41 ug/m³
- Maryland Avenue/Popular St. – 6.92 ug/m³

Acute Health Impacts

- Cause headache, dizziness, lightheadedness, weakness, nausea, vomiting, loss of coordination, passing out

Chronic Health Impacts

- May damage liver, may affect the heart causing an irregular heart beat, may affect the nervous system

Tetrahydrofuran

- Near 2125 Shakesville Road/Near Highland Juvenile Det. C. – 0.83 ppbv
- Intersection of Booker Rd. and Willow Oak Court – 1.54 ppbv

Acute Health Impacts

- Irritate and burn skin, eyes
- Irritate nose, throat, lungs

- Cause coughing wheezing, headache, nausea, dizziness, bronchitis, shortness of breath

Chronic Health Impacts

- Causes cancer in animals. It may cause cancer of the liver, kidneys
- Limited Evidence is a teratogen in animals. Treat as a possible teratogen in humans

n-Heptane

- Maryland Avenue/Popular St. – 1.15 ug/m³

Acute Health Impacts

- Irritates eyes, nose, throat
- Cause headache, lightheadedness, dizziness, lack of coordination, loss of consciousness
- Loss of appetite , nausea

Chronic Health Impacts

- May affect nervous system

2-Propanol

- Maryland Avenue/Popular St. – 3.98 ug/m³

2,2,4-Trimethyl

- Maryland Avenue/Popular St. – 1.37 ug/m³

1,3-Butadiene

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.10 ppbv

Acute Health Impacts

- Irritate skin, eyes, nose, mouth, throat
- Cause coughing, wheezing, headaches, dizziness, lightheadedness

Chronic Health Impacts

- Probable carcinogen in humans. There is some evidence it causes lymph and blood cancer in humans.
- Has been shown to cause lymph, breast, uterine lung, heart and skin cancer in animals.

Trichloroethylene

- Shakesville Tabernacle Missionary Baptist Church Parking Lot – 0.13 ppbv

Acute Health Impacts

- Irritate and burn skin, eyes
- Cause headache, dizziness, lightheadedness, visual disturbances, nausea, vomiting, passing out

Chronic Health Impacts

- Probable Carcinogen in humans.
- Evidence it causes liver, kidney and lung cancer in animals.
- Limited evidence it is a teratogen in animals. Treat as possible teratogen in humans.
- May affect fertility and may damage the male reproductive system in animals.

4-Ethyltoluene

- Intersection of Booker Rd. and Willow Oak Court – 0.44 ppbv

Ethyl Acetate

- Intersection of Booker Rd. and Willow Oak Court – 0.17 ppbv

Acute Health Impacts

- Irritate skin, eyes, nose, throat

Chronic Health Impacts

- May decrease fertility in males.

Cyclohexane

- Intersection of Booker Rd. and Willow Oak Court – 0.21 ppbv

Acute Health Impacts

- Irritate nose, throat
- Cause coughing, wheezing, headache, dizziness, nausea, vomiting, lightheadedness, drowsiness, passing out

Chronic Health Impacts

- May damage liver and kidneys