University of Kentucky
College of Public Health
Epidemiology & Environmental Health

DATE

NAME
123 No Street
East Palestine, Ohio 44413

RE: Urine test results

Dear NAME,

Thank you for your participation in the University of Kentucky East Palestine Health Tracking Study. You participated in the Biological Pilot Study at the First United Presbyterian Church on 7/17/2023.

Your urine sample was analyzed by Wayne State University's CLEAR Laboratory for markers, known as metabolites, which form when chemicals break down in the body. We measured metabolites of several chemicals related to the train derailment and burn including vinyl chloride, acrolein, and acrylates. Analysis methods did not exist for acrylate metabolites so the laboratory developed them for this study.

This letter provides your urine metabolite levels, a comparison to others in the study, and levels found in a national study. The national study was conducted in 2015-2016 by the Centers for Disease Control and Prevention (CDC). The CDC study included over 1,000 non-smokers and can be considered typical for the US population. Since the acrylate data were not available in the CDC study, we invited 13 Marietta, Ohio residents to join the study so we could have another group for comparison.

A brief summary of what we found:

- 19 non-smoking East Palestine residents who lived about one mile or less of the derailment site participated in the study.
- All urine metabolite levels found in the study participants were within the range of levels found in the CDC national comparison study.
- All urine metabolite levels found in the study participants were similar to those found in the 13 non-smoking residents of Marietta, Ohio.
- Of note:
    - One participant had a measurable level of the vinyl chloride metabolite. This metabolite is also formed from exposure to acrylonitrile or ethylene oxide. In the national comparison study by the CDC, 40% of the participants had a measurable level of this metabolite.
    - One participant had a measurable level of the butyl acrylate metabolite. The CDC did not measure this metabolite in their study. In our Marietta residents, no one had a detectable level of this metabolite.

We would be glad to answer any questions you have. If you are interested in discussing your results further, please contact me by phone 859-562-2119 or by email Erin.Haynes@uky.edu. We truly value and appreciate your participation and hope to work with you again!

Sincerely,

Erin N. Haynes, DrPH, MS
Professor, Department of Epidemiology and Environmental Health

Your Urine Test Results

Vinyl Chloride

Hydroxyethylmercapturate (HEMA) is a urine metabolite of vinyl chloride. HEMA is also a metabolite of acrylonitrile and ethylene oxide.

HEMA was detected in your sample, but at a level too low to be accurately measured.

In the national comparison study by the CDC, 40% of the participants had a measurable level of this metabolite. In the East Palestine study, one participant had a measurable level of this metabolite, and the level was **within the range** found in the CDC study.

Acrolein

3 -hydroxypropylmercapturate (3-HPMA) and N-acetyl-S-[2-carboxyethyl]-l-cysteine (CEMA) are urine metabolites of acrolein.

Your 3-HPMA level was 30 ng/mL. The range of levels found in the CDC comparison study was Not Detected – 3,510 ng/mL. Your level is within this range. There are no known health effects associated with your level.

Your CEMA level was 75 ng/mL. The range of levels found in the CDC comparison study was Not Detected – 2,610 ng/mL. Your level is within this range. There are no known health effects associated with your level.

In the national comparison study by the CDC, over 90% of participants had detectable levels of these metabolites. In the East Palestine study, 100% of participants had measurable levels of both these metabolites, and all levels were **within the range** found in the CDC study.

Butyl Acrylate

Butyl acrylate mercapturic acid (BuAMA) is a urine metabolite of butyl acrylate.

BuAMA was not detected in your sample.

There are no national comparison values for this metabolite; however, in our small Marietta group, no one had a measurable level of this metabolite in their urine. In the East Palestine study, one participant had a measurable level of this metabolite.

Benzene, Toluene, Ethylbenzene, Xylene (BTEX)

Benzene, toluene, ethylbenzene, xylene are a group of common hazardous volatile organic compounds (VOCs) commonly referred to as BTEX.

Benzene

Phenylmercapturic acid (PMA) is a urine metabolite of benzene.

PMA was not detected in your sample.

In the national comparison study by the CDC, 45% of the participants had a measurable level of this metabolite. In the East Palestine study, one participant had a measurable level of PMA, and the level was **within the range** found in the CDC study.

Toluene

S-Benzyl mercapturic acid (BMA) is a urine metabolite of toluene.

Your BMA level was 2 ng/mL. The range of levels found in the CDC comparison study was Not Detected – 1,330 ng/mL. Your level is within this range. There are no known health effects associated with your level.

In the national comparison study by the CDC, over 99% of participants had a measurable level of this metabolite. In the East Palestine study, only 74% of participants had a measurable level, and all levels were **within the range** found in the CDC study.

Ethylbenzene and Styrene

Phenyl glyoxylic acid (PGA) is a urine metabolite of both ethyl benzene and styrene.

The PGA level in your urine was 50 ng/mL. The range of levels found in the CDC comparison study was Not Detected - 2,400 ng/mL. Your level is within this range. There are no known health effects associated with your level.

In the national comparison study by the CDC, 99% of the participants had a measurable level of this metabolite. In the East Palestine study, all participants detectable levels of PGA, and all levels were **within the range** found in the CDC study.

Xylene

Methyl hippuric acid (MHA) is a urine metabolite of xylene.

Your MHA level was 30 ng/mL. The range of levels found in the CDC comparison study was Not Detected – 16,130 ng/mL. Your level is within this range. There are no known health effects associated with your level.

In the national comparison study by the CDC, nearly 100% of participants had a measurable level of this metabolite. In the East Palestine study, all participants had measurable levels of this metabolite, and all levels were **within the range** found in the CDC study.

Other chemicals

Your urine sample was also analyzed for four additional chemicals: Trichloroethylene (DCVMA), perchloroethylene (TCVMA), 2-ethylhexyl acrylate (2-EHAMA), and ethyl acrylate (EthAMA).

None of these four chemicals were detected in your sample.
In the national comparison study by the CDC, three of these metabolites were not tested and for the one metabolite tested, no participants had a measurable level.
No East Palestine participant had metabolites detected for these four chemicals.

Your urinary metabolite level for each chemical, the range of all participants in the East Palestine pilot study, and the CDC comparison study are provided on the following page.

Your Urine Metabolite Levels

Your urine sample was analyzed by Wayne State University's CLEAR Laboratory. This laboratory is a research lab and, while the results are trustworthy, it is not CLIA certified. This means that the results are not intended to be used as the sole source for the diagnosis or treatment of a disease.

Below is a table that contains each metabolite analyzed in your urine sample. Metabolites were measured in nanograms per milliliter (ng/mL). A nanogram is one-billionth of a gram, and a gram is about 1/30 of an ounce. A milliliter is one-thousandth of a liter, and a liter is a little bigger than a quart. The range is the lowest and highest values found among participants.

Although there are no government standards for safe levels of these urine metabolites, these ranges let you know where your level is in comparison with others in the US and your community.

Chemical	Metabolite	Your Level (ng/mL)	East Palestine Study Range (ng/mL)	CDC Study Range (ng/mL)
Vinyl chloride, ethyl oxide, and acrylonitrile	2-hydroxyethylmercapturate (HEMA)	<LOQ	Not Detected – 5	Not Detected – 12.8
Acrolein	3-hydroxypropylmercapturate (3-HPMA)	30	9 – 167	Not Detected – 3,510
	N-acetyl-S-[2-carboxyethyl]-l-cysteine (CEMA)	75	10 - 205	Not Detected – 2,610
Butyl acrylate	Butyl Acrylate Mercapturic Acid (BuAMA)	Not Detected	Not Detected - 11	Not Available Not detected in Marietta
Benzene	Phenylmercapturic Acid (PMA)	Not Detected	Not Detected – 8	Not Detected – 17.1
Toluene	S-Benzyl mercapturic Acid (BMA)	2	Not Detected – 8	Not Detected – 1,330
Ethylbenzene and Styrene	Phenyl glyoxylic Acid (PGA)	50	<LOQ – 136	Not Detected – 2,400
Xylene	Methyl hippuric Acid (MHA)	30	3 - 132	Not Detected – 16,130
2-ethylhexyl acrylate	2-ethylhexyl acrylate mercapturic acid (2-EHAMA)	Not Detected	Not Detected	Not Available Not detected in Marietta
Ethyl acrylate	Ethyl acrylate mercapturic acid (EthAMA)	Not Detected	Not Detected	Not Available Not detected in Marietta
Trichloroethylene	N-acetyl-S-(dichlorovinyl)-L-cysteine (DCVMA)	Not Detected	Not Detected	Not Available Not detected in Marietta
Perchloroethylene	N-acetyl-S-(trichlorovinyl)-L-cysteine (TCVMA)	Not Detected	Not Detected	Not Detected Not detected in Marietta

Not Detected: The laboratory instrument did not detect the chemical. **Not Available:** This chemical was not analyzed in the CDC study. **<LOQ:** The laboratory instrument was able to detect the chemical, but the level was too low to accurately measure.

To learn more about specific VOCs, you can visit the ATSDR website at https://www.atsdr.cdc.gov/toxprofiledocs/index.html. Once at the website, scroll down and click on the chemical of interest, such as benzene. On the next page, select the link for ToxFAQs in the middle of the page. Some of the tested chemicals, such as butyl acrylate and 2-ethylhexyl acrylate, are not common and therefore not found on the ATSDR website.