

Review of MDEQ community monitoring in Pascagoula

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In partnership with Cherokee Concerned Citizens

through the American Geophysical Union (AGU) Thriving Earth Exchange

Incident Overview

The Cherokee subdivision and surrounding neighborhood experienced an air pollution episode with a visual plume, strong odors, and health effects from February 4-8, 2023. During this episode, multiple residents complained of sinus irritation, vomiting, skin reactions, numbness, and itchy/red eyes, with symptoms especially acute among children. Residents reported ammonia and sulfur odors beginning midday on February 4th, observing an unusual yellow plume in the direction of the Bayou Casotte Industrial Park in the early evening. The odors diminished on February 5th but returned around noon on February 6th, becoming increasingly strong into the evening. Odors persisted and were reported up to a few miles west (Ocean Springs) on February 7th. Odor levels varied on February 8th, becoming extremely strong around 5 pm and then weakening as rain began around 8:00 pm. Meteorological data from local weather stations show odors were consistent with winds from the east and dissipated after a cold front passed through the region on Wednesday night.

In response to community complaints, MDEQ arrived on February 8th, 2023 to conduct air monitoring outside the homes of each of those that reported odors or symptoms. They used handheld real-time air monitoring devices to quantify ammonia (NH₃), benzene, ethylbenzene, hydrogen sulfide (H₂S), hexane, nitrogen dioxide (NO₂), sulfur dioxide (SO₂), toluene, VOCs, and xylenes. According to their preliminary results, all measurements were below the detection limits of the devices for all pollutants. **However, this does not necessarily imply the air was clean.** Instead, it may indicate that more sensitive devices are needed to properly document the complaints filed by the community. Measurements also need to coincide with the time the community is experiencing odors and when meteorological conditions are conducive to detecting pollutants, taking into account winds and precipitation.

Monitoring device limitations

The main instruments used in this monitoring were the Honeywell MultiRAE and the Dräger X-PID 8500. Ammonia was measured using Gastec color-changing tubes.

The MultiRAE and the Dräger X-PID 8500 are both intended for industrial applications, such as detecting hazardous leaks directly at a production plant.¹ Since the pollutant concentrations

¹Honeywell lists the applications of the MultiRAE as “industrial hygiene, personal protection, and leak detection in industries such as aviation, chemical, environmental, oil and gas, pharmaceutical, and shipping/marine; HazMat response, and clandestine drug labs” ([Honeywell MultiRAE data sheet](#)). Dräger states that the Dräger X-PID 8500 “brings these technologies directly to the hazardous area of any production site ([Dräger X-PID 8500 data sheet](#))”.

measured at hazardous facilities are usually much greater than those in residential areas, the detection limits for many of the measured pollutants are much higher than they should be for community air monitoring.

Below are some examples of how the instruments were not sufficient for community air monitoring:

- Ethylbenzene, xylenes, and hydrogen sulfide levels in Pascagoula could have each been over 1000x higher than average for the U.S.², and they still would have been undetectable by the instruments used in this monitoring (1 ppm = 1000 ppb).
- Benzene levels in Pascagoula could have been over 85x higher than the average outdoor level of benzene in the U.S.², and the air toxin still would have been undetectable in this monitoring.

Comparison to air quality health-based guidance levels

Comparing the detection limits to federal air quality health-based guidance levels further demonstrates that the monitoring devices are intended for industrial settings and are not sufficient for outdoor, ambient air monitoring in residential areas.

Air quality standards for pollutant concentrations in occupational or industrial settings are set by the Occupational Safety and Health Administration (OSHA). They are typically much higher than health-based values for outdoor ambient air in part because workplace exposure is only for 8 hours per day, rather than 24/7. Additionally, those more vulnerable to air pollution exposure, such as children and the elderly, are not included in workplace standards.

Vulnerable populations and 24/7 exposure are considered for outdoor health-based guidance values and standards set by the CDC and the EPA. These values are more appropriate to use in the context of outdoor community air monitoring in Pascagoula. In the following table, we compare the instrument detection limits to health-based guidance levels, called the minimum risk levels (MRL), set by the CDC Agency for Toxic Substances and Disease Registry (ATSDR) for outdoor, ambient air quality. We compare nitrogen dioxide (NO₂) to the EPA National Ambient Air Quality Standards (NAAQS), as no MRL exists for this pollutant. The NO₂ NAAQS is set for 1-hour average exposure, while the MRLs are set for 1-14 days of exposure.

If the instrument detection limit is above the health-based value or standard, we are not able to determine whether the air can be considered healthy for all populations.

² Reported by the [CDC Agency for Toxic Substances and Disease Registry \(ATSDR\) ToxGuides](#)

Pollutant	Detection limit of instruments (ppm)	Standard or health guidance level (ppm)	Reference	Is the detection limit low enough to measure values at or above the health guidance level?
Ammonia (NH ₃)	0.2	1.7	ATSDR MRL	Yes
Benzene	0.05	0.009	ATSDR MRL	No
Ethylbenzene	3	5	ATSDR MRL	Yes
Hydrogen sulfide (H ₂ S)	1	0.07	ATSDR MRL	No
Hexane	1	0.6	ATSDR MRL ³	No
Nitrogen dioxide (NO ₂)	0.1	0.1	NAAQS	DL = NAAQS
Sulfur dioxide (SO ₂)	0.1	0.01	ATSDR MRL	No
Toluene	1	2	ATSDR MRL	Yes
VOCs	0.1	N/A	N/A	N/A
Xylenes	3	2	ATSDR MRL	No

Alternative monitoring devices

The list below suggests alternative air quality monitors to use in response to community complaints. These monitors have much lower detection limits that can properly address community concerns and document pollutant concentrations in outdoor, ambient air.

Suggested monitor	Pollutant(s) measured	Detection limit (ppm)
Aeroqual Series 500 Monitor with sensor heads for environmental (ENV) applications	NO ₂ , SO ₂ , VOCs, H ₂ S, NH ₃	NO ₂ : 0.005; SO ₂ : 0.04; VOCs: 0.01; H ₂ S: 0.04; NH ₃ : 0.2
Chromatotec microBTEX Portable VOC Analyzer	Benzene, toluene, xylenes, ethylbenzene	Benzene: ~0.001; toluene: ~0.001; xylenes: ~0.004; ethylbenzene: ~0.002

³ The ATSDR standard for hexane is only available for chronic exposure (1 year or more). All other ATSDR standards shown here are for acute exposure (between 1-14 days).