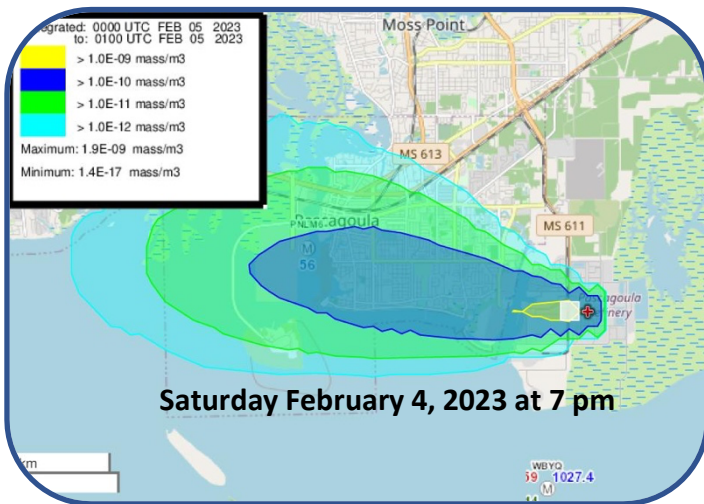


Transport of Pollution affecting the Cherokee Subdivision

While pinpointing specific sources of polluted plumes generally requires a full suite of atmospheric measurements, data on industry emissions, and the use of “dispersion” models such as EPA’s AERMOD, more readily available meteorology tools can estimate where pollution will likely travel, based on regional winds and conditions. Model results can then be compared with community observations from human senses (odor logs, visual evidence, health effects), pollution monitors (Purple Air for particles), and backyard weather stations.

Following are some examples relating a hypothetical pollution release from an arbitrary location in the Bayou Casotte Industrial Complex demonstrating plume transport and strength.



Odor complaints began Saturday midday

“Smell of cat spray urine

To sulfuric acid smell

Back to cat spray urine”

Visual observation of yellow plume at Chevron.

Technical description: National Ocean and Atmospheric Administration (NOAA) HYSPLIT Air Mass Dispersion model using HRRR 3 km resolution meteorology. Generic plume released from a central location at Chevron from 20 meters above the surface. Plot shows the average of the 1st hour of transport and dispersion. While the plot does not give specific pollutants or amounts, each colored contour closer to the source represented 10 times the concentration.

What do we know?

The winds are coming from the East. A plume from Chevron would travel over the Cherokee neighborhood and become weaker as it travels west toward the Pascagoula River.

What is our hypothesis?

There were elevated levels of ammonia and sulfuric acid cause by a polluted plume coming from the direction of the Bayou Casotte Industrial Complex (likely Chevron given the visible yellow plume)

What do we NOT know?

We cannot definitively pinpoint the source, the specific emissions, or chemical reactions within the plume. We also do not know how local "micrometeorology" from buildings, forests and the ocean might affect the dilution of pollutants near the surface with air above.

What community questions can this regional NOAA model answer?

What evidence might require running EPA’s more localized AERMOD model?

Is the data EPA plans to collect sufficient to run AERMOD?

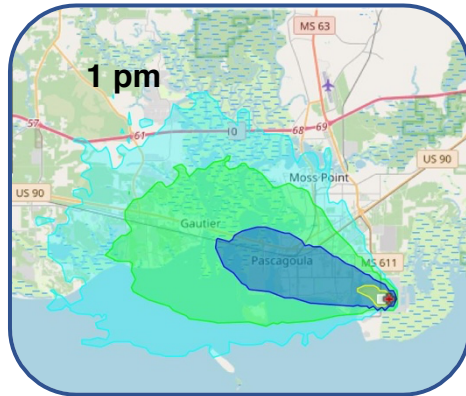
This document was prepared by community scientists Dr. Katharine Duderstadt and Caroline Frischmon through the American Geophysical Union's Thriving Earth Exchange program, in partnership with Cherokee Concerned Citizens.

February 4-9, 2023 Pollution Episode

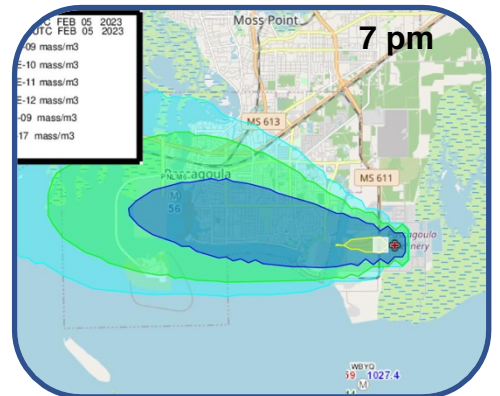
Saturday February 4th



Before odors arrived

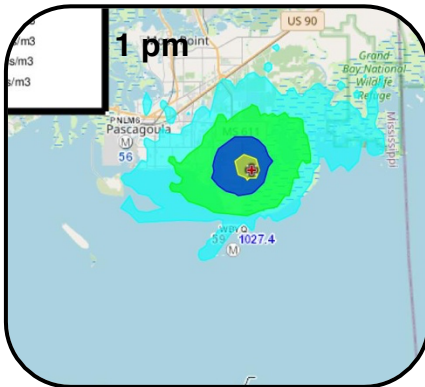
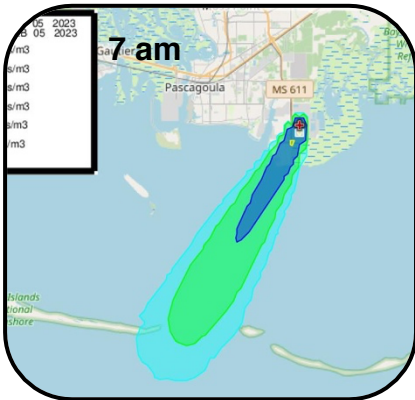


“Smell of cat spray urine
To sulfuric acid smell
Back to cat spray urine”

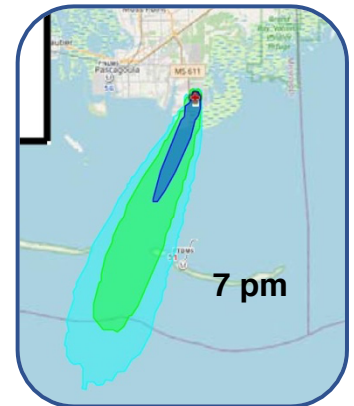


Sulfur plume seen at Chevron

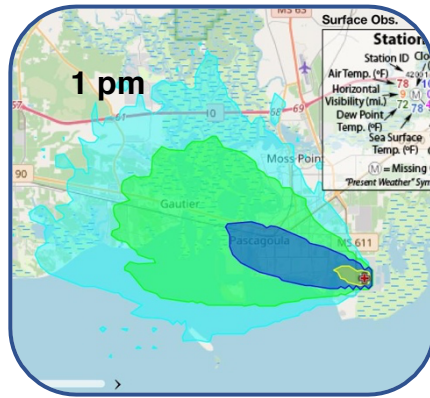
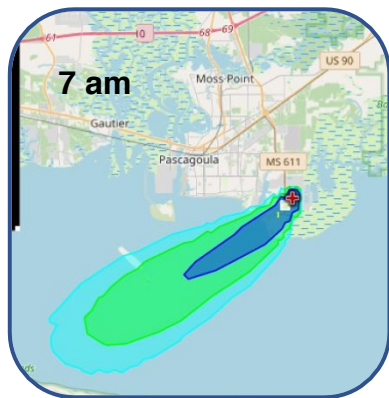
Sunday February 5th



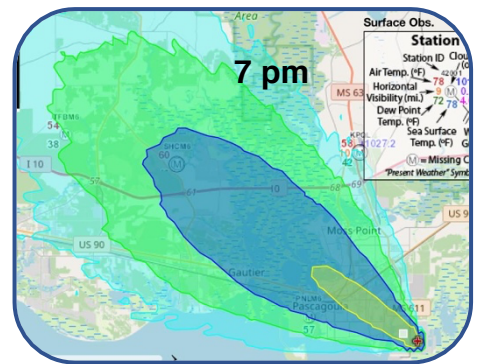
“Sunday not as strong”



Monday February 6th

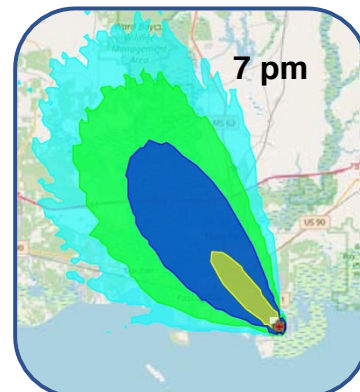
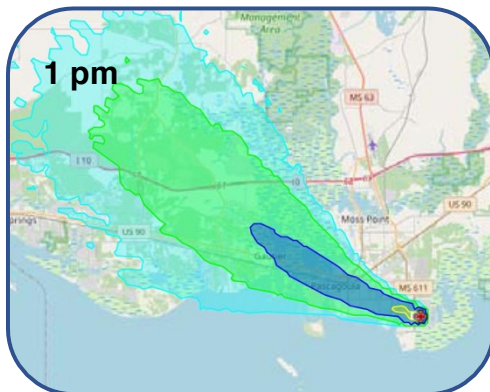
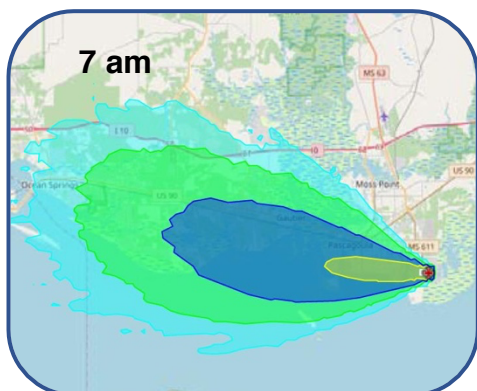


“acid smell”



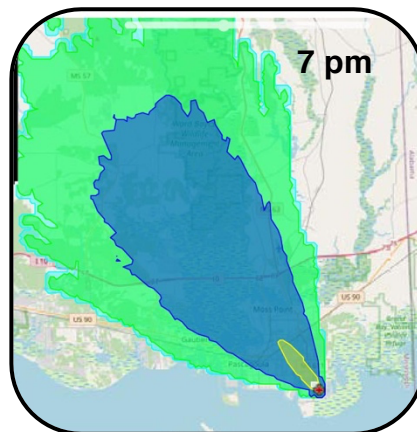
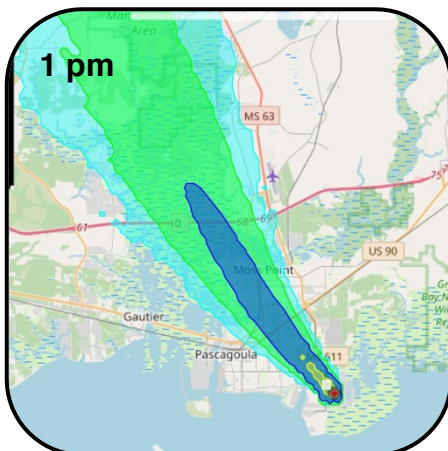
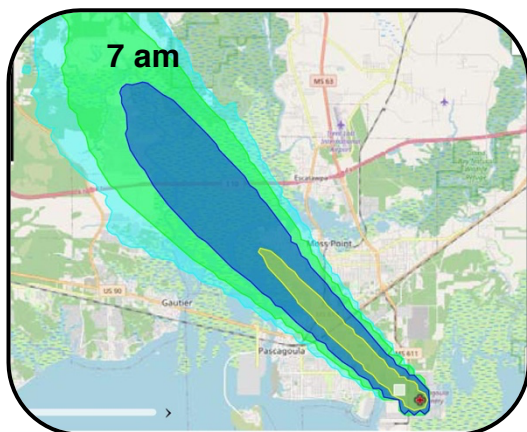
“Monday night extremely strong”

Tuesday February 7th



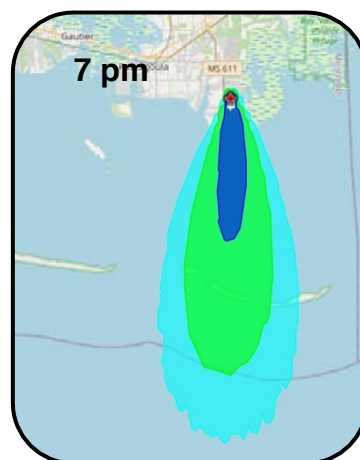
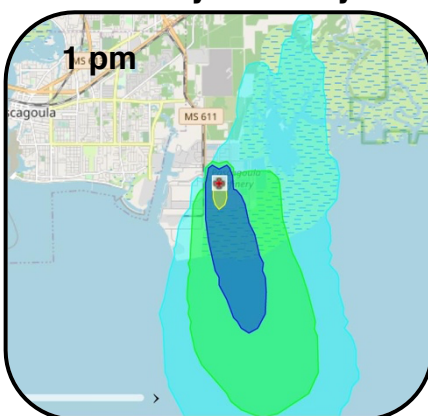
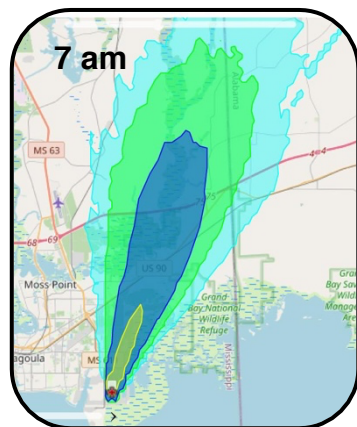
"like 1000 cats spraying. Smell was noticed a couple miles away. Even school nurse said smell went all the way to Ocean Springs."

Wednesday February 8th



"Wed at 4:00 pm couldn't smell anything. At 5:00 pm the acid smell could knock you down."

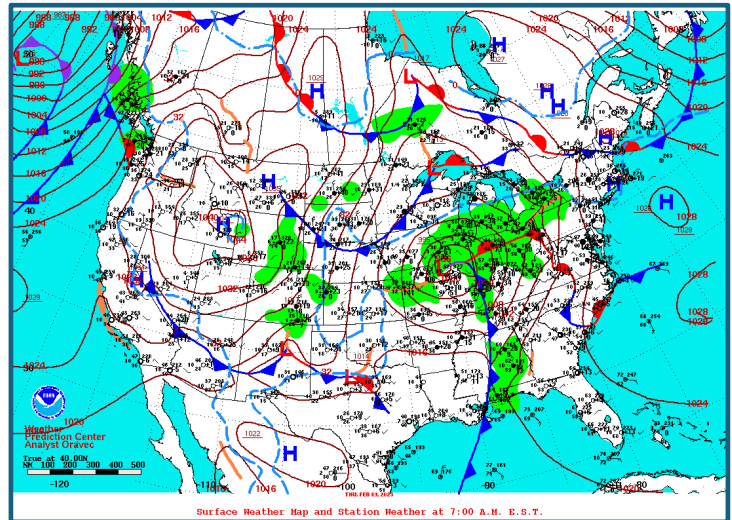
Thursday February 9th



"There was a little rain around 8 or 8:30 pm on Wednesday and then it poured overnight. Emergency Management Response Team took measurements from Wednesday night through Thursday."

The Emergency Management Response team unfortunately took measurements as a cold front with rain passed through the area. It is unlikely they would have sampled the same levels observed early in the day or throughout the week.

It is very important that in the future timely observations be made at the same time that odors are observed, winds are from the east, and the weather is dry.



Backyard weather stations can also provide valuable information on the direction that pollution is coming from (there are at least 7 personal weather stations in East Pascagoula)

*Winds were from the East (~90°) from noon on **Monday Feb 6 through Wednesday Feb 8th** (pollution traveling from the direction of the Bayou Casotte Industrial Complex*

On Thursday through Friday (Feb 9-10) winds were from the North (pollution traveling over the Gulf)

Collecting Evidence: During a pollution episode, record the date and time as well as odors, visual signs of pollution, noise, visibility, and weather. It also helps to take photos to show visibility, plumes, and debris as well as photos of smokestacks to show wind direction and how stable the atmosphere is (how much mixing and dilution with background air).

The authors gratefully acknowledge the NOAA Air Resources Laboratory (ARL) for the provision of the HYSPLIT transport and dispersion model and/or READY website (<https://www.ready.noaa.gov>) used in this document.

References:

Stein, A.F., Draxler, R.R., Rolph, G.D., Stunder, B.J.B., Cohen, M.D., and Ngan, F., (2015). NOAA's HYSPLIT atmospheric transport and dispersion modeling system, *Bull. Amer. Meteor. Soc.*, **96**, 2059-2077, <http://dx.doi.org/10.1175/BAMS-D-14-00110.1>

Rolph, G., Stein, A., and Stunder, B., (2017). Real-time Environmental Applications and Display sYstem: READY. *Environmental Modelling & Software*, **95**, 210-228, <https://doi.org/10.1016/j.envsoft.2017.06.025>

NOAA Daily Weather maps available at:
<https://www.wpc.ncep.noaa.gov/dailywxmap/>