



COVID-19 Research: BTEX

INTRODUCTION

BTEX refers to a group of volatile organic compounds (or VOCs) made up of Benzene, Toluene, Ethylbenzene, and Xylenes. BTEX is an important class of compounds owing to the abundance of these species in the ambient atmosphere, their harmful impacts on public health, and their role in atmospheric chemistry. While BTEX compounds are constituents of a suite of Hazardous Air Pollutants (HAPs), also referred to as toxic air pollutants or air toxics, regulated by the US Environmental Protection Agency, no national ambient air quality standard exists for them and other HAPs. The primary sources of BTEX emissions are refineries, petrochemical plants, vehicle emissions, and evaporative losses from fuel storage tanks.

COVID-19: Houston Ship Channel BTEX Levels (January - April 2020)

Similar to the [observed trend](#) in NOx concentrations, BTEX concentrations in the Houston Ship Channel also show a decrease beginning in early March before the public significantly responded to COVID-19. The initial decrease in BTEX concentrations was likely due to local weather conditions (cloudy and windy) that effectively transported emissions away from their sources.

These lower concentrations occurred as emissions from transportation sources also began decreasing in the region. On March 11, 2020, the World Health Organization (WHO) declared COVID-19 to be a pandemic and evidence of local transmission of the disease caused the Houston Rodeo to be canceled. On March 17th, Harris County ordered all restaurant dining rooms and bars to close. In addition to decreasing [trends in transportation and mobility](#) resulting from the COVID-19 stay home orders, the price of West Texas Intermediate crude oil fell sharply during this time, which may have impacted refinery activity (and BTEX emissions) along the Houston Ship Channel.

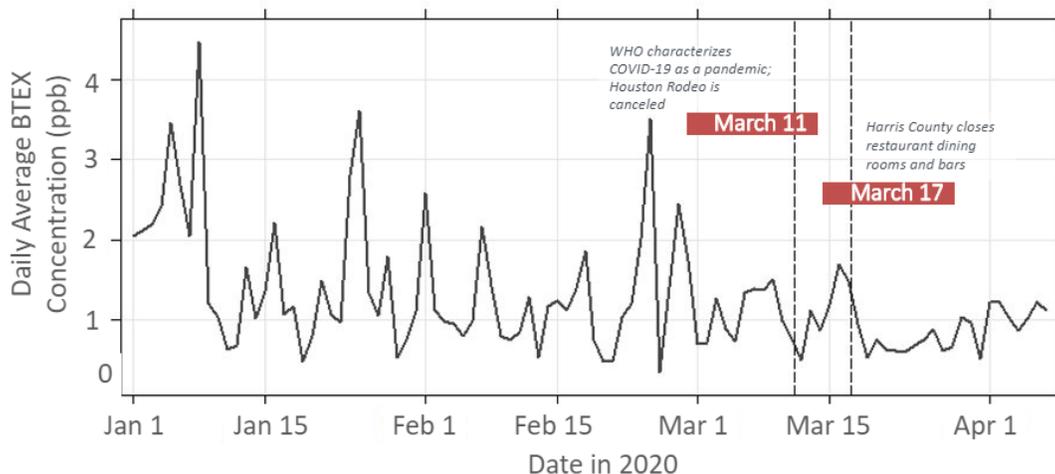


Figure 1. Average daily concentration of BTEX compounds detected in the Houston Ship Channel.

HEALTH IMPACTS OF BTEX POLLUTION

Exposure to BTEX gases can lead to headaches, eye and nose irritation, and nervous system, liver, and kidney damage. Benzene is a known carcinogen (cancer causing). Benzene has been identified as an air toxics risk driver in the [Urban Air Toxics Strategy](#) and is considered to have a significant impact on public health and the environment in urban areas.

IN-DEPTH ANALYSIS

The trend of daily averaged BTEX concentrations was similar to those at the component level (Benzene, Toluene, Ethylbenzene, and Xylenes concentrations; not shown), indicating that emission sources of all BTEX components are mostly the same across the ship channel. Like NO_x concentrations, both the magnitude and variability of average BTEX concentrations has been significantly lower since the region began responding to the COVID-19 pandemic (since March 11). The photochemical reactions of BTEX emissions can generate secondary pollutants, such as ozone and secondary aerosols via gas-to-particle conversion processes, and eventually increase the concentration of particulate matter smaller than 2.5 micrometers (PM_{2.5}).

METHODOLOGY

For the BTEX analysis, the daily average of hourly aggregated concentrations of Benzene, Toluene, Ethylbenzene, and Xylene across six stations in the Houston Ship Channel were calculated. The data were collected by TCEQ's Automated Gas Chromatographs' (AutoGCs) monitoring network.

Locations of Stations Used in Houston Ship Channel BTEX Analysis

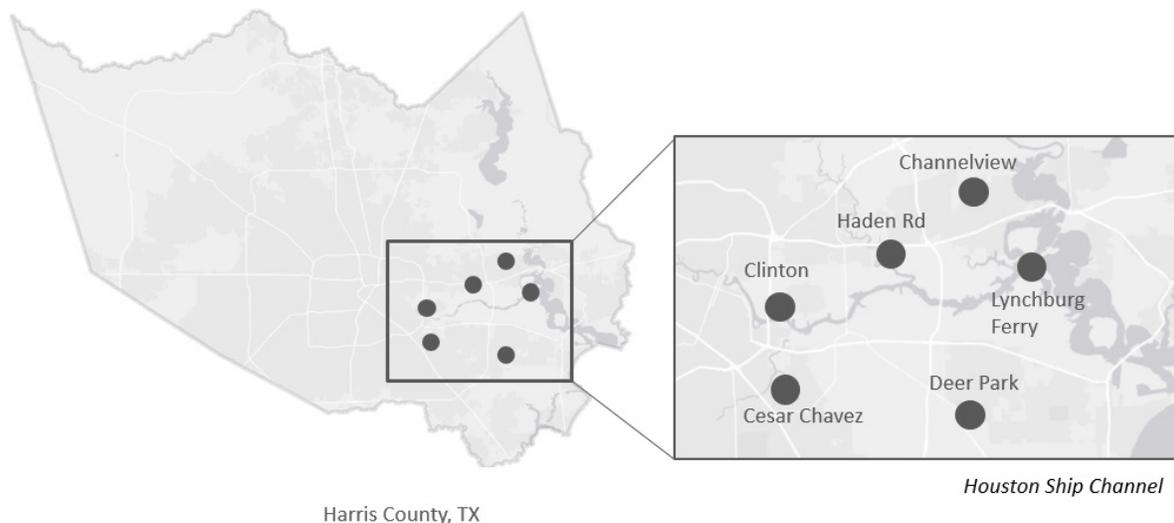


Figure 2. Map of TCEQ monitoring stations used in Houston Ship Channel BTEX analysis.

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**Learn more about HARC and review the ongoing
COVID-19 research at HARCresearch.org/work/covid19.**

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