

# Revitalizing Community: Decreased COVID-19 Transmission and Mortality in Northeast, New Jersey, as a Result of Improving Air Quality throughout the COVID-19 Pandemic



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## Abstract

Due to the increasing use of nonrenewable energy sources in the twenty-first century, harmful air pollutants, such as carbon monoxide (CO) and nitrogen oxides (NOx), are cause for alarm. The COVID-19 pandemic severely curtailed the operation of transportation, factories, and other emission sources relying on the combustion of fossil fuels. Preliminary studies suggest a direct relationship between air quality, COVID-19 transmission, and human mortality rate (Ali, Islam, 2020). This study examines how COVID-19 transmission and mortality compare to monthly average concentration measurements of CO and NOx in northeast New Jersey during the quarantine time period (April 2020-March 2021) and three years prior to the pandemic (beginning April 2017). The data from these stations provide opportunities for conducting statistical analyses to prove the direct relationship between air quality and COVID-19 transmission and mortality within a specified area. In addition, such data allow scientists and policy makers to reimagine and reconsider the effect air pollution has on human and ecological communities. Analysis of New Jersey Department of Environmental Protection (NJDEP) and Department of Health (NJDOH) data show a decrease in the concentrations of pollutants due to the pandemic's "lockdown" period, which corresponded to a lower transmission and mortality rate, shown by NJDOH data of COVID-19 cases. Statistically supported data exhibit a direct relationship between air quality and transmission and mortality rates within COVID-19 patients. This study provides valuable information to local and regional communities, industries, and government officials throughout New Jersey regarding the environmental benefits gained through the COVID-19 pandemic and how air quality can affect outcomes of other various respiratory illnesses.

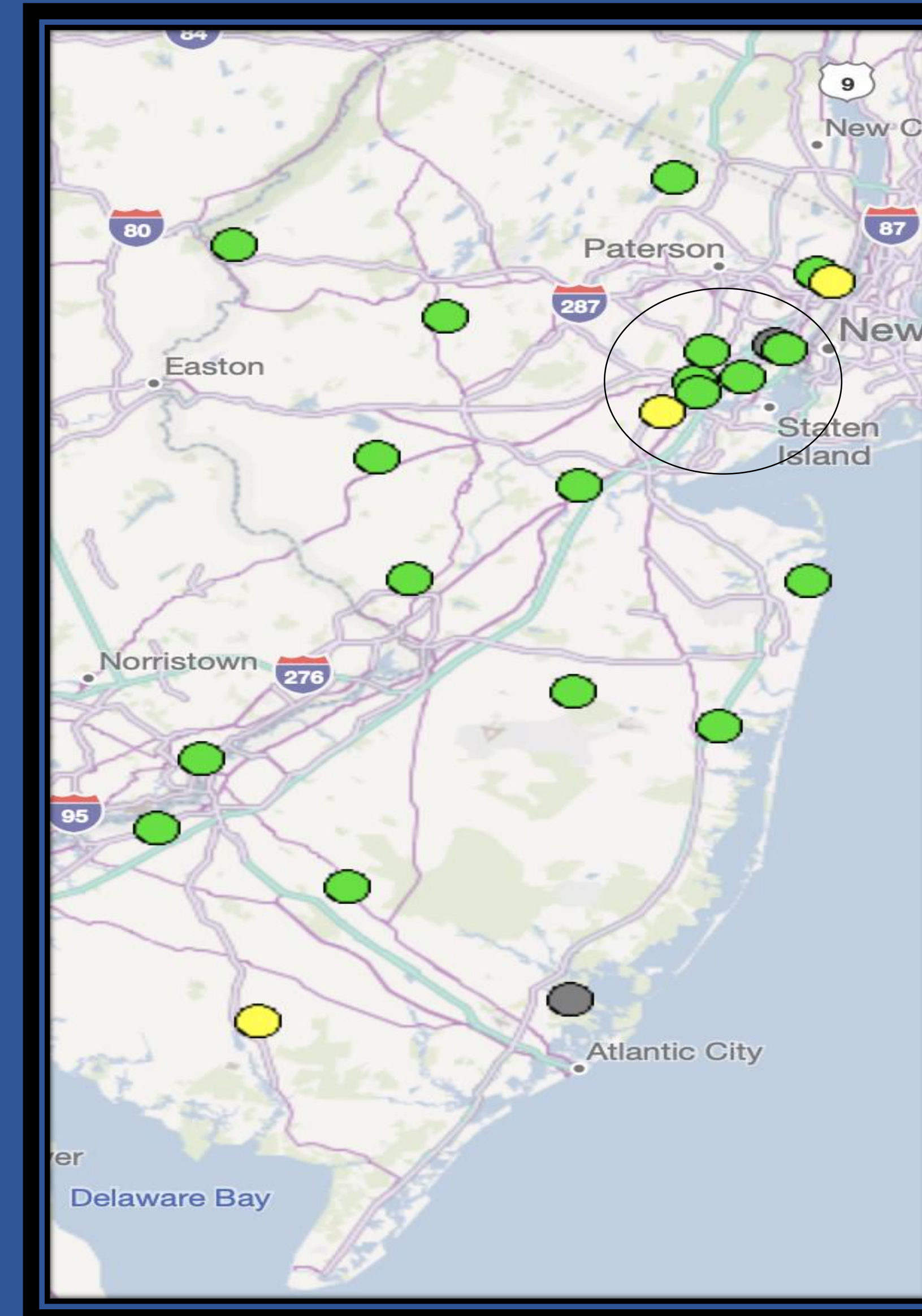
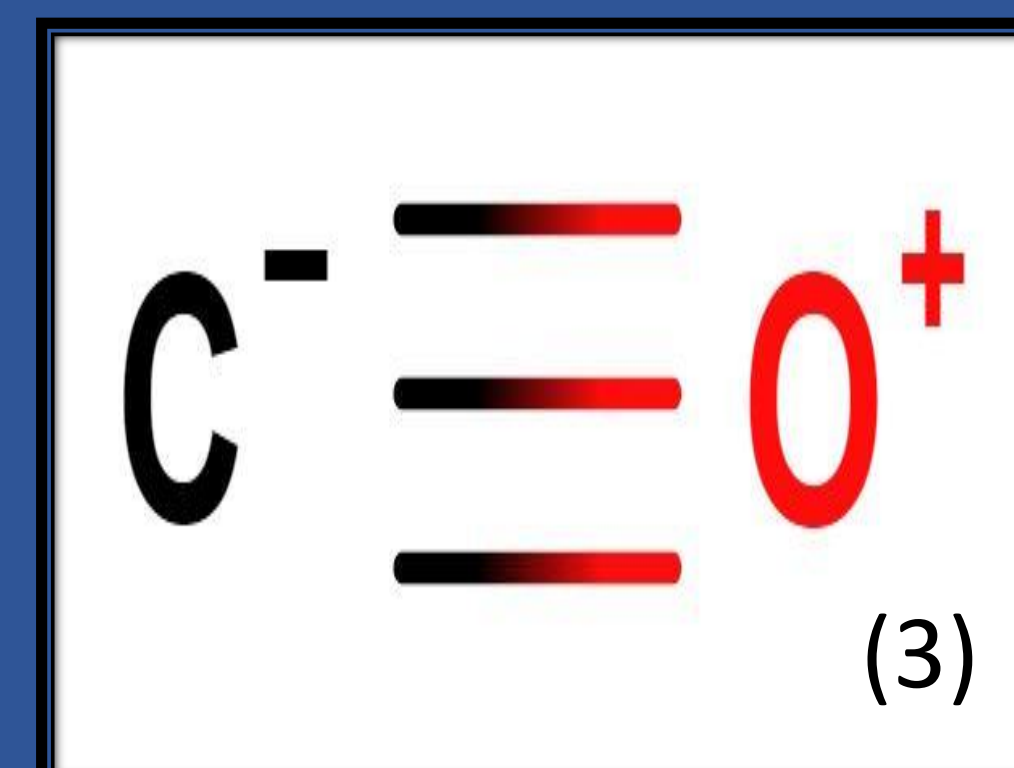
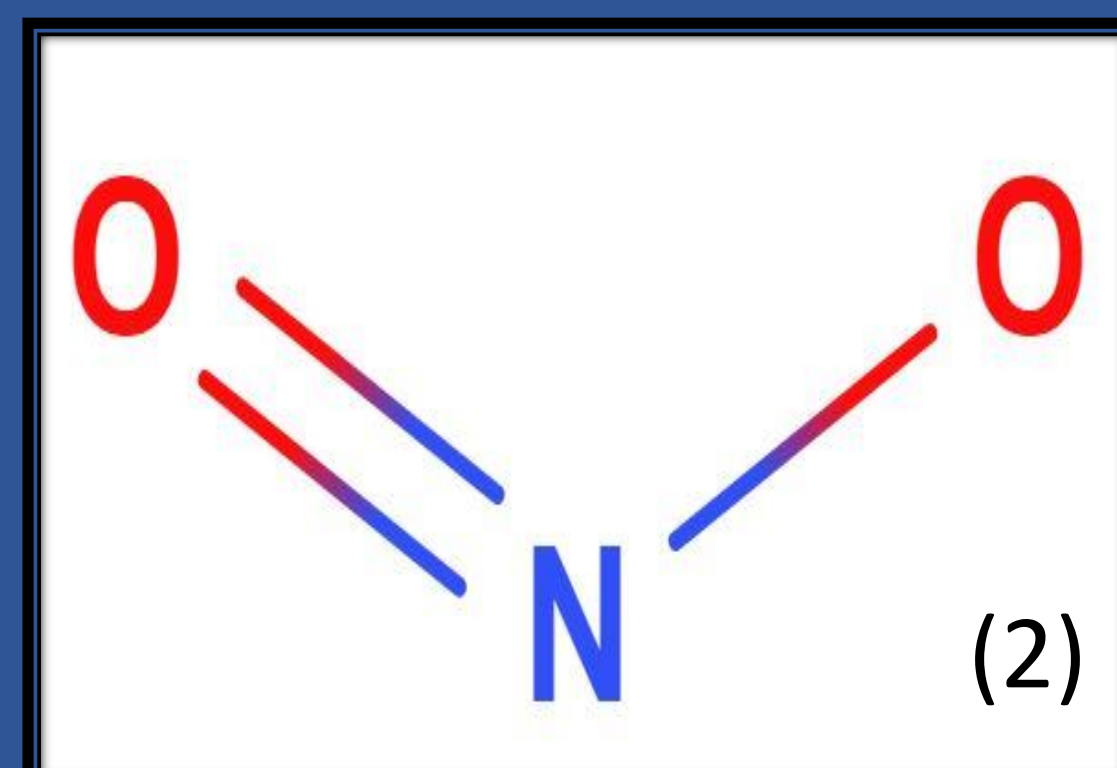
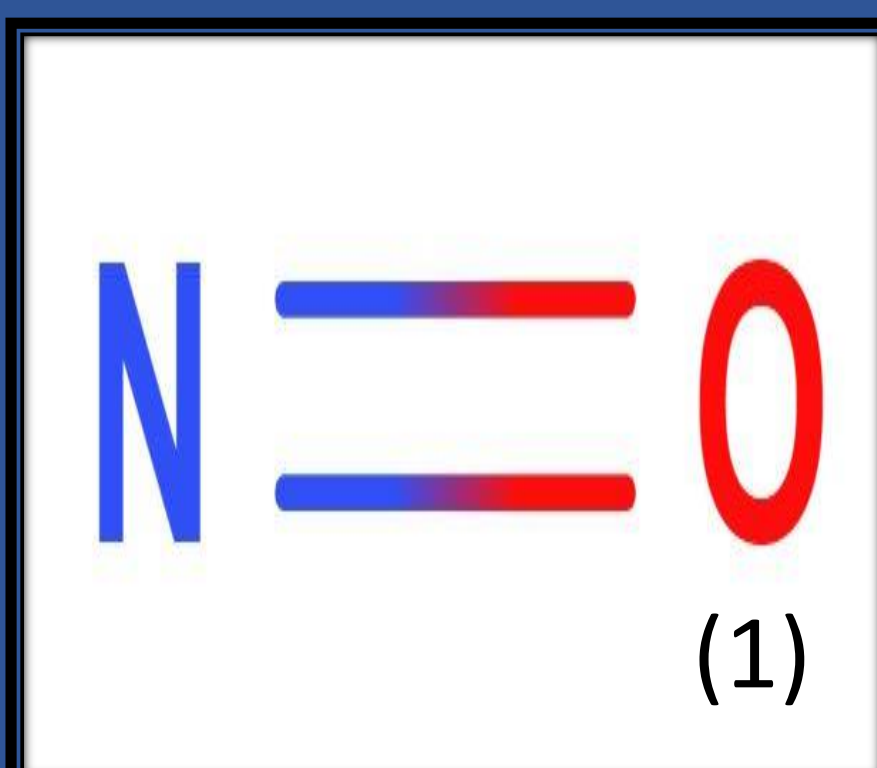


Figure 4: NJDEP Air Monitoring Stations throughout New Jersey  
Source: NJDEP DoAQ

Year	Number of Air Exceedance Days
2017	19
2018	22
2019	14
2020	6

Table 1: Number of Air Exceedance Days per Calendar Year  
Source: NJDEP DoAQ

Figures 1, 2, 3:  
Molecules studied.  
(1) Nitrogen Monoxide,  
(2) Nitrogen Dioxide,  
(3) Carbon Monoxide  
Source: molview.org



## Data Analysis

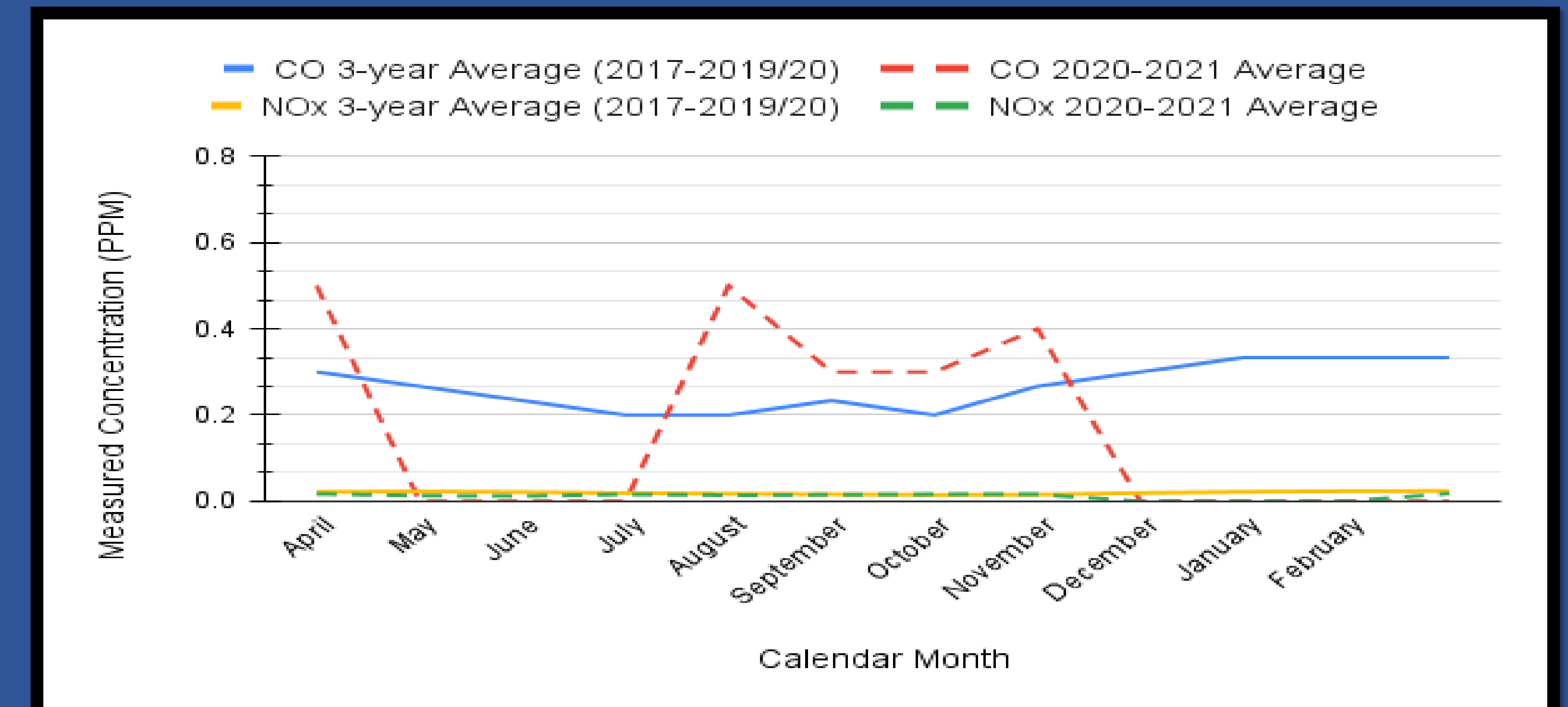


Figure 5: Graph representing concentration measurements of carbon monoxide (CO) and nitrogen oxides (NOx) at the Jersey City NJDEP station over a three-year average prior to the COVID-19 pandemic compared to the monthly average during the COVID-19 pandemic period  
Source: NJDEP DoAQ

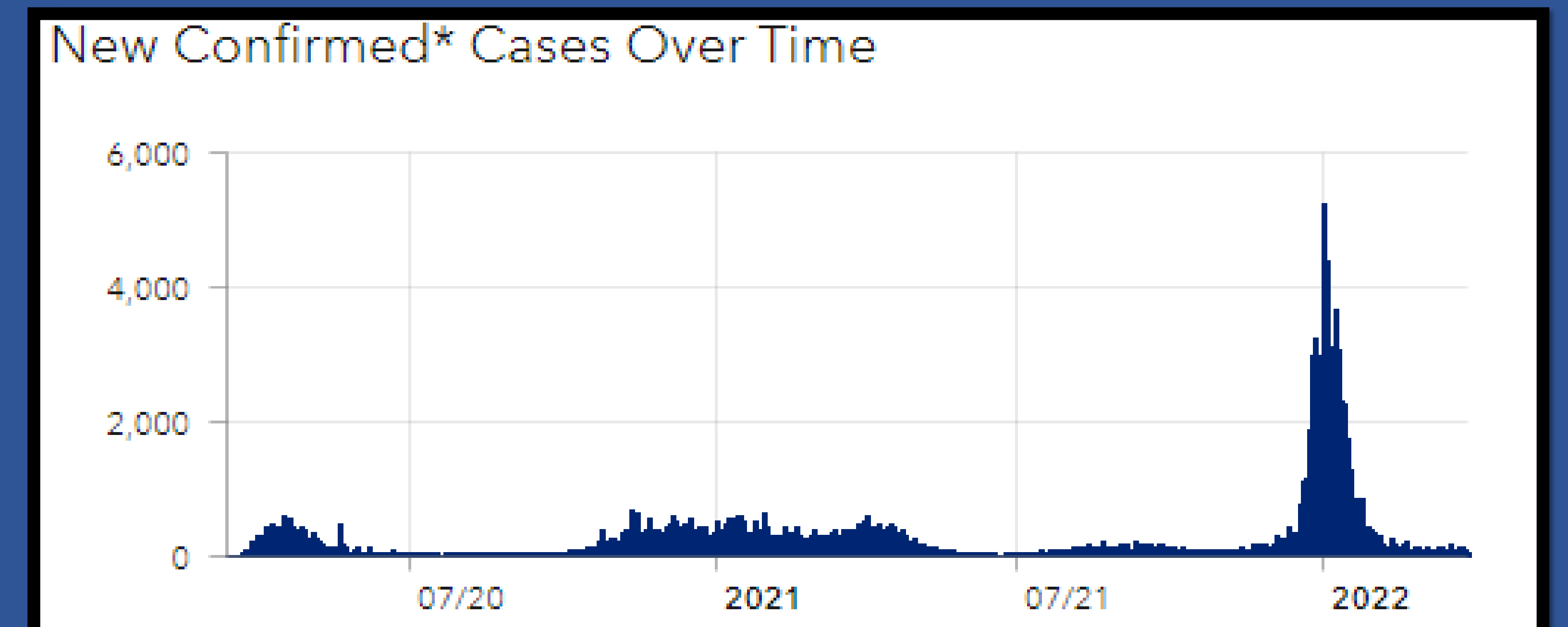


Figure 6: Graph representing new confirmed COVID-19 cases over time during the COVID-19 pandemic period. This graph is focused strictly on Essex and Bergen County, New Jersey  
Source: New Jersey Department of Health

## Major Findings & Conclusions

- Air quality greatly improved in northeast NJ during the quarantine time period (beginning March 2020)
- CO and NOx concentrations decreased at various air monitoring stations in northeast New Jersey during lockdown time period
- **Low concentrations of air pollutants has led to not only increased environmental benefits, but also decreased COVID-19 transmission and mortality**