2001 Nitrogen Dioxide Summary

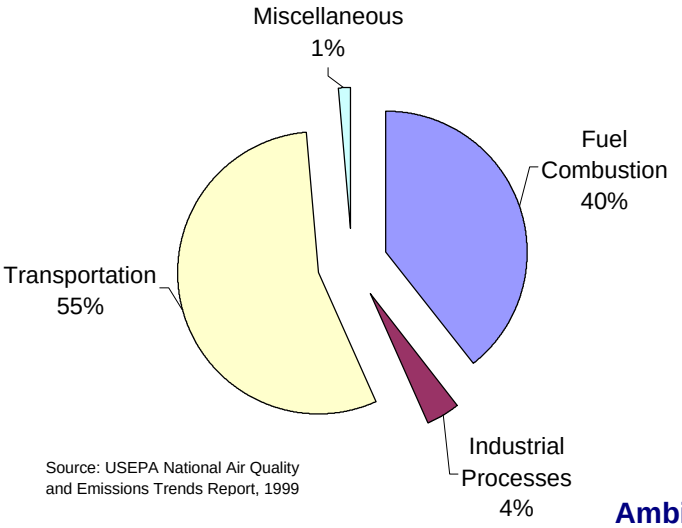
New Jersey Department of Environmental Protection

Nature and Sources

Nitrogen Dioxide (NO2) is a highly reactive gas that is formed in the air through the oxidation of nitric oxide (NO). Nitrogen Oxides (NOx), a term that encompasses NO, NO2, and other oxides of nitrogen, help to form ozone, particulate matter, haze, and acid rain. Although most NOx is emitted as NO, it is readily converted to NO2 in the atmosphere. The major sources of NOx emissions are high-temperature combustion processes, such as those occurring in cars and power plants. In the home, gas stoves and heaters produce substantial amounts of nitrogen dioxide. A pie chart summarizing the major sources of NOx is shown below.

Figure 1

NO2 Emissions by Source Category



Source: USEPA National Air Quality and Emissions Trends Report, 1999

Health and Environmental Effects

Short-term exposures (less than 3 hours) to low levels of nitrogen dioxide may aggravate pre-existing respiratory illnesses, and can cause respiratory illnesses, particularly in children ages 5-12. Long-term exposures to NO2 may increase susceptibility to respiratory infection and may cause permanent damage to the lung.

Nitrogen Oxides contribute to a wide range of environmental problems. These include potential changes in the composition of some plants in wetland and terrestrial ecosystems, acidification of freshwater bodies, eutrophication of estuarine and coastal waters, increases in levels of toxins harmful to fish and other aquatic life, and visibility impairment.

Standards

The National primary (health based) and secondary (welfare based) standards for NO2 are the same. They are set at a calendar year average concentration of 0.053 parts per million (ppm). The New Jersey standards are the same except micrograms per cubic meter (ug/m3) are the standard units and the state standard applies to any 12-month period, not just the calendar year. The state of California has a one-hour average standard of 470 ug/m3 that New Jersey uses as a guideline in assessing short-term impacts from specific sources. Table 1 provides a summary of the NO2 standards.

Table 1

Ambient Air Quality Standards for Nitrogen Dioxide– 2001

Parts Per Million (ppm)

Micrograms Per Cubic Meter (ug/m^3)

Period	Type	New Jersey	National	California
12-month average	Primary	100 ug/m3 (.05 ppm)		
Annual average	Primary		.053 ppm (100 ug/m3)	
12-month average	Secondary	100 ug/m3 (.05 ppm)		
Annual average	Secondary		.053 ppm (100 ug/m3)	
1-hour average	Primary			470 ug/m3 (.25 ppm)

Monitoring Locations

The state monitored NO2 levels at 11 locations in 2001. These sites are shown in the map to the right. The Newark Lab monitoring site had to be relocated because of construction activities. It was put back in operation on August 6th of 2001. A valid 2001 annual average could not, therefore, be calculated for that site.

NO2 Levels in 2001

None of the monitoring sites recorded exceedances of the primary or secondary NO2 standards during 2001. The maximum annual average concentration recorded was 0.040 ppm at Exit 13 of the New Jersey Turnpike in Elizabeth. While national health and welfare standards have not been established for Nitric Oxide (NO), it is considered to be an important pollutant that contributes to the formation of ozone, fine particles and acid rain. The maximum annual average concentration of NO recorded in 2001 was 0.051 ppm, also at the Exit 13 site.

Figure 2

2001 Oxides of Nitrogen Monitoring Network

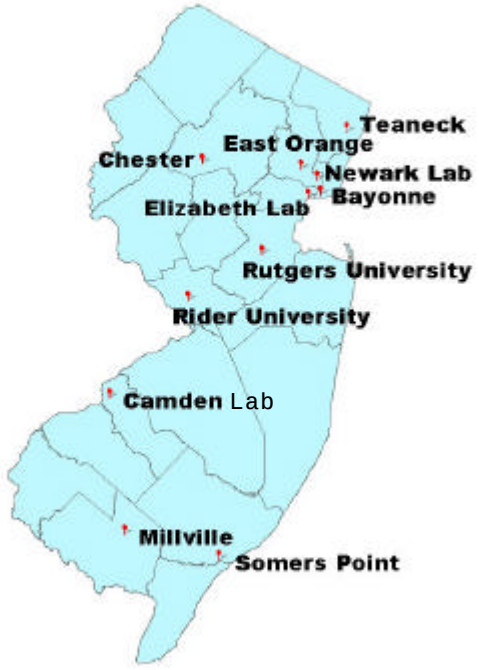


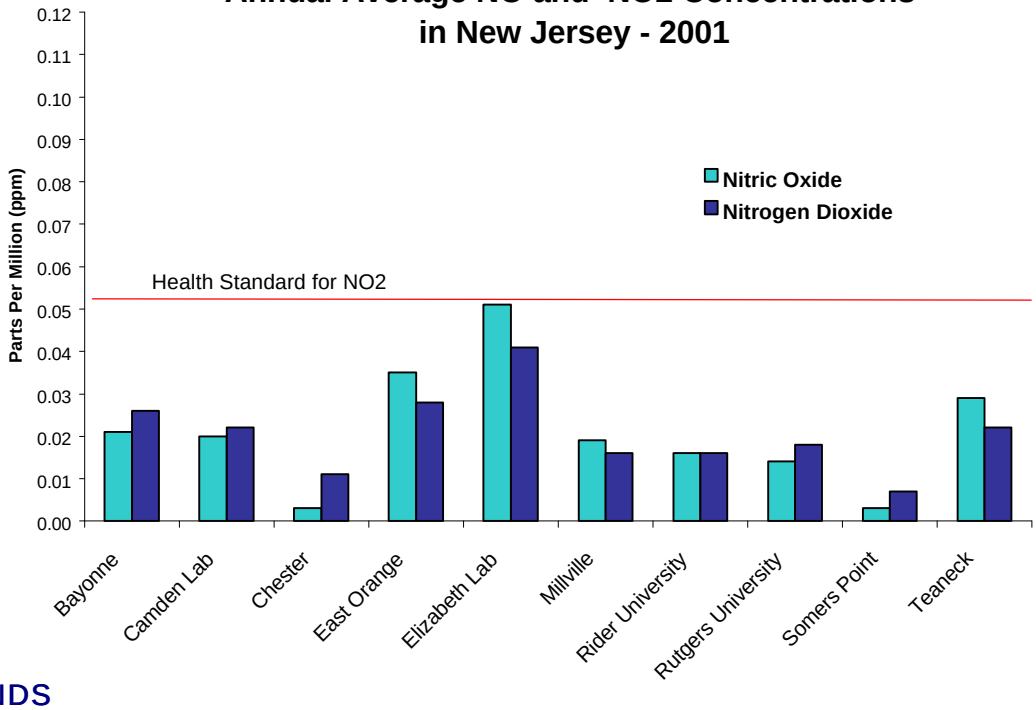
Table 2
Nitrogen Dioxide & Nitric Oxide Data – 2001

Parts Per Million (ppm)

Monitoring Site	Nitrogen Dioxide 1-Hour Average (ppm)		Nitrogen Dioxide 12-Month Average (ppm)		Nitric Oxides Annual Average (ppm)
	Maximum	2nd Highest	Maximum	Calendar year	
Bayonne	.097	.089	.027	.026	.021
Camden Lab	.071	.071	.022	.022	.020
Chester	.059	.059	.011	.011	.003
East Orange	.090	.090	.029	.028	.035
Elizabeth Lab	.142	.141	.041	.040	.051
Millville	.070	.067	.017	.016	.019
Newark Lab[a]	.103	.100	--	--	--
Rider University	.069	.067	.017	.016	.016
Rutgers University	.087	.084	.019	.018	.014
Somers Point	.057	.056	.008	.007	.003
Teaneck	.110	.110	.023	.022	.029

[a] Data not available prior to August 6th

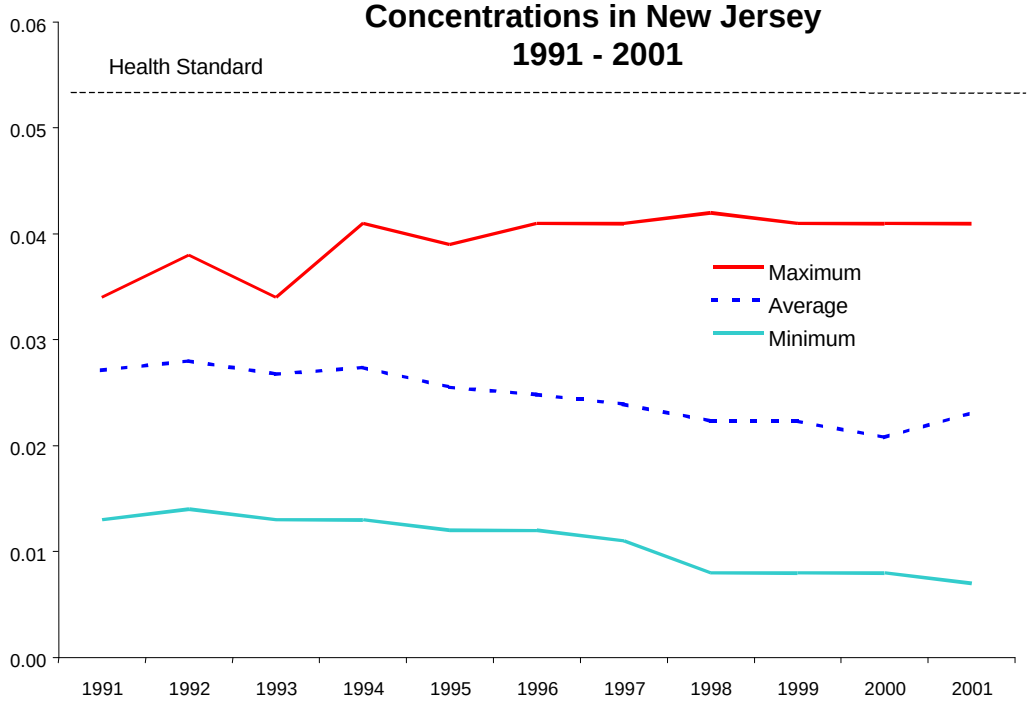
Figure 3
Annual Average NO and NO2 Concentrations in New Jersey - 2001



TRENDS

NO2 concentrations have not posed a significant direct health problem in New Jersey. A graph of NO2 levels showing the highest, lowest and average annual mean concentrations recorded from 1991 to 2001 is provided below. There is still a great deal of interest in oxides of nitrogen because of their role in the formation of other pollutants – most notably ozone and fine particles. Both these pollutants are of concern over much of the northeastern United States and efforts to reduce levels of ozone and fine particles are likely to require reductions in NO emissions.

Figure 4
Annual Average Nitrogen Dioxide Concentrations in New Jersey 1991 - 2001



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