

Wireframe Document

US Pollution Analysis



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Last Date of Revision - 15/05/2025

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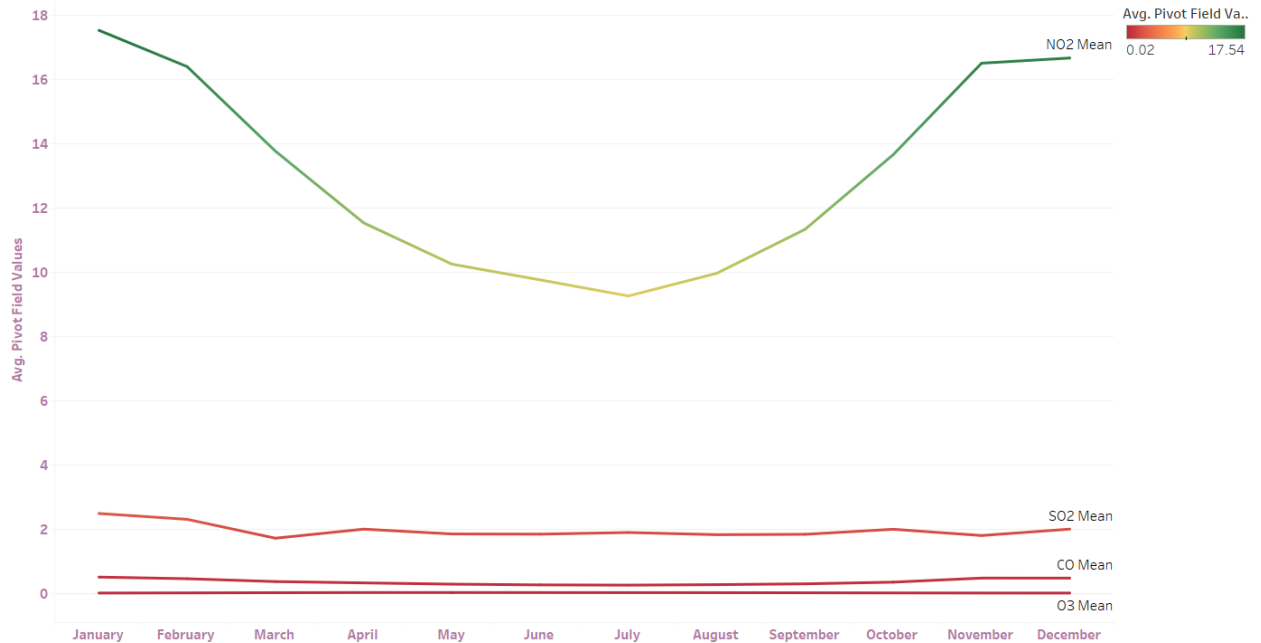
Document Control

Date	Version	Description	Author
15/05/2025	1.0	Introduction, Problem Statement	Shubham tembhurne
15/05/2025	1.1	Dataset Information, Vi Architecture Description	Shubham tembhurne
15/05/2025	1.2	Final Revision	Shubham tembhurne

We Performed Exploratory Data Analysis on Jupyter Notebook and then created a Tableau Desktop Dashboard.

1. What are the Average Pollutants by Month?

Average Pollutant Levels By Month



The trend of average of Pivot Field Values for Date Local Month. Color shows average of Pivot Field Values. The marks are labeled by Pivot Field Names.

- NO2 and CO are highest in winter months and lowest in summer
- Ozone (O3) peaks in late spring and early summer, then drops in winter
- SO2 is slightly higher in winter and early spring.

2.What is the Percentage distribution of AQI Categories?

Percentage Distribution of AQI Categories:

	NO2	O3	SO2	CO
Good	95.59	90.61	99.37	99.93
Hazardous	NaN	0.01	NaN	NaN
Moderate	4.34	7.76	0.58	0.06
Unhealthy for Sensitive Groups	0.08	1.48	0.05	0.00
Very Unhealthy	NaN	0.13	0.00	NaN

- NO2 (Nitrogen Dioxide):95.59% of readings fall in the "Good" category
Only about 4.34% reach "Moderate" levels
Very few instances (0.08%) of "Unhealthy for Sensitive Groups"
- O3 (Ozone): Most diverse distribution among all pollutants
90.61% "Good" reading
7.76% 'Moderate' Levels
1.48% "Unhealthy for sensitive Groups"
Small but notable occurrences of "Unhealthy" (0.13%) and "Very Unhealthy" conditions
- SO2 (Sulfur Dioxide): About 99.37% "Good" readings values
Very few instances (0.58%) of "Moderate" levels
Minimal occurrences of higher categories
- CO (Carbon Monoxide): Similar to SO2 with nearly equal between "Good"
No recorded instances in higher AQI categories
- This analysis suggests that while most readings fall within safe levels, Ozone (O3) shows the most concerning pattern with more frequent occurrences of unhealthy conditions compared to other pollutants

3.What are the Yearly Statistics for CO, NO2, SO2 and O3?

Yearly CO Statistics:

Date Local	CO Mean			CO AQI		
	mean	min	max	mean	min	max
2006	0.41	0.0	6.53	3.48	0.0	150.0
2007	0.37	0.0	6.50	3.00	0.0	81.0
2008	0.33	0.0	3.82	2.67	0.0	90.0
2009	0.32	0.0	4.05	2.58	0.0	81.0
2010	0.34	0.0	3.56	2.69	0.0	51.0

- Highest CO levels were recorded in 2006 (max 6.53 ppm)
- There's a general declining trend in average CO levels from 2006 to 2010
- The highest AQI value of 150 was recorded in 2006
- Recent years show lower maximum values, suggesting improved air quality.

Yearly NO2 Statistics:

Date Local	NO2 Mean			NO2 AQI		
	mean	min	max	mean	min	max
2006	14.53	0.0	70.59	26.99	0	115
2007	13.25	0.0	92.00	24.91	0	112
2008	12.25	0.0	76.45	23.50	0	110
2009	11.46	0.0	60.61	21.73	0	107
2010	11.66	0.0	56.91	22.29	0	107

- Highest NO2 levels were recorded in 2007 (max 92 ppm)
- There's a general Decrease trend in average NO2 levels from 2006 to 2010.
- The highest AQI value of 115 was recorded in 2006.
- Recent years show lower maximum values, suggesting improved air quality

Yearly SO2 Statistics:

Date Local	SO2 Mean			SO2 AQI		
	mean	min	max	mean	min	max
2006	2.60	0.00	321.62	5.00	0.0	200.0
2007	2.34	0.00	32.04	4.53	0.0	176.0
2008	1.91	0.00	31.00	3.68	0.0	125.0
2009	1.56	0.00	33.00	2.75	0.0	120.0
2010	1.18	-0.45	25.91	1.91	0.0	103.0

- Highest SO₂ levels were recorded in 2006 (max 321.62 ppm)
- There's a general decrease trend in average SO₂ levels from 2006 to 2010
- The highest AQI value of 200 was recorded in 2006
- Recent years show lower maximum values, suggesting improved air.

Yearly O₃ Statistics:

	O ₃ Mean			O ₃ AQI		
	mean	min	max	mean	min	max
Date Local						
2006	0.03	0.0	0.07	36.20	0	206
2007	0.03	0.0	0.07	36.39	0	211
2008	0.03	0.0	0.08	35.26	0	207
2009	0.03	0.0	0.07	33.02	0	206
2010	0.03	0.0	0.07	34.33	0	200

- Highest O₃ levels were recorded in 2008 (max 0.08 ppm)
- There's a general Constant trend in average O₃ levels from 2006 to 2010
- The highest AQI value of 211 was recorded in 2007
- Recent years show lower maximum values, suggesting improved air quality.

4. Which are the top 10 highest cities for CO, NO2, O3 and SO2 pollutants?

Top 10 Highest City of CO Pollutants :

City

Mexicali	11.257726
Tijuana	9.460539
Calexico	7.133277
Washington	7.076041
San Diego	5.589106
Denver	5.344913
Phoenix	5.209843
Kenner	4.944444
Burbank	4.796969
Rosarito	4.504878

Name: CO AQI, dtype: float64

- Mexicali, Tijuana, Calexico, Washington, San Diego, Denver, Phoenix, Kenner, Burbank, Rosarito are the highest CO pollutant

Top 10 Highest City of O3 Pollutants :

City

Rubidoux	53.597239
Fresno	52.027516
Fontana	50.740816
Victorville	49.132291
Norristown	47.654971
Lancaster	47.453366
Bristol	44.568507
Westport	43.505415
York	42.927570
Charlotte	42.733760

Name: O3 AQI, dtype: float64

- Rubidoux, Fresno, Victorville, Norristown, Lancaster, Bristol, Westport, York, Charlotte highest city of O3 pollutant

Top 10 Highest City of NO2 Pollutants :

City

Denver 44.030486

Mexicali 43.570262

Tijuana 42.143918

Burbank 40.069328

Phoenix 39.170227

Fontana 37.197959

Scottsdale 37.056813

Welby 36.289129

New York 36.220152

Los Angeles 35.142508

Name: NO2 AQI, dtype: float64

- Denver, Mexicali, Tijuana, Burbank, Phoenix, Fontana, Scottsdale, Welby, New York, Los Angeles highest city of NO2 Pollutant.

Top 10 Highest City of SO2 Pollutants :

City

Beaver Falls 12.606383

Reading 12.424242

Charleroi 11.574881

Greensburg 11.456471

New Castle 11.194400

York 11.089369

Detroit 10.738095

Johnstown 10.352976

Pittsburgh 10.009772

St. Louis 9.840376

Name: SO2 AQI, dtype: float64

- Beaver Falls, Reading, Charleroi, Greensburg, New Castle, York, Detroit, Johnstown, Pittsburgh, St. Louis are the Highest City of SO2 Pollutant.

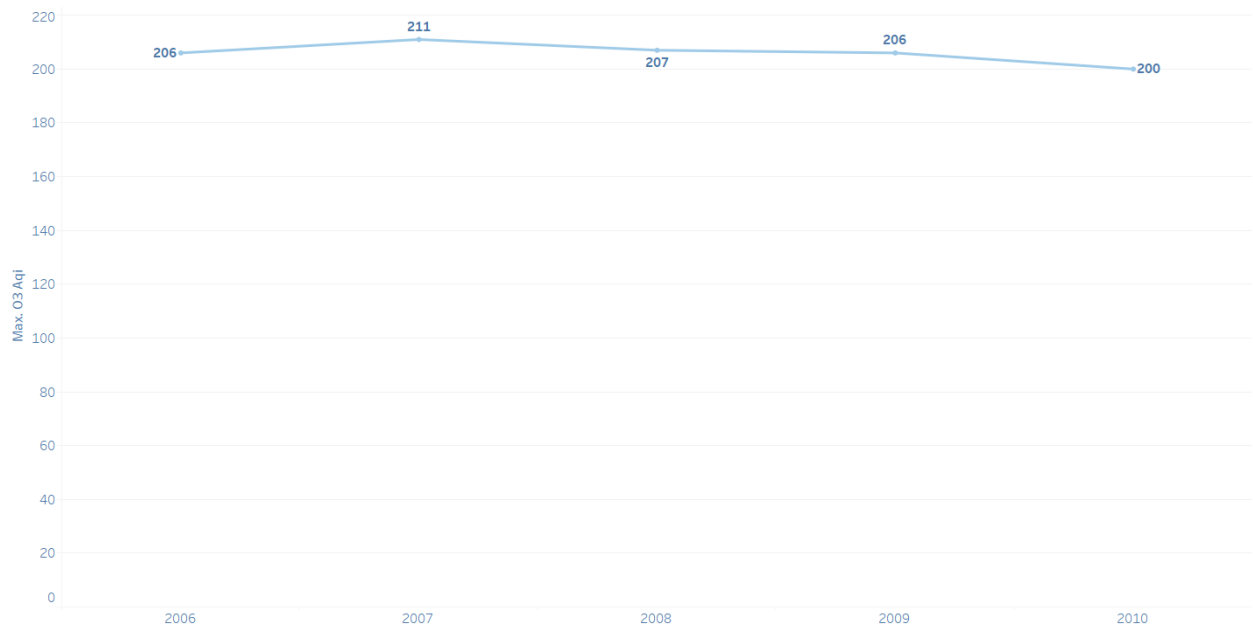
5.What is the Maximum CO, NO2, SO3 and O3 AQI by year (2006-2010)?

Maximum CO AQI By Year (2006-2010)



The trend of maximum of Co Aqi for Date Local Year. The data is filtered on Action (State), Action (City with max CO Aqi) and Action (CO Units). The Action (State) filter keeps 36 members. The Action (City with max CO Aqi) filter keeps 98 members. The Action (CO Units) filter keeps 1 member. The view is filtered on Date Local Year, which keeps 2006, 2007, 2008, 2009 and 2010.

Maximum Ozone(O3) By Year



The trend of maximum of O3 Aqi for Date Local Year. The data is filtered on Action (State), Action (O3 Units) and Action (City). The Action (State) filter keeps 36 members. The Action (O3 Units) filter keeps 1 member. The Action (City) filter keeps 98 members. The view is filtered on Date Local Year, which keeps 2006, 2007, 2008, 2009 and 2010.

Maximum nitrogen dioxide(NO2) by Year



The trend of maximum of No2 Aqi for Date Local Year. The data is filtered on Action (State), which keeps 36 members. The view is filtered on Date Local Year, which keeps 2006, 2007, 2008, 2009 and 2010.

Maximum sulphur dioxide(SO2) by year

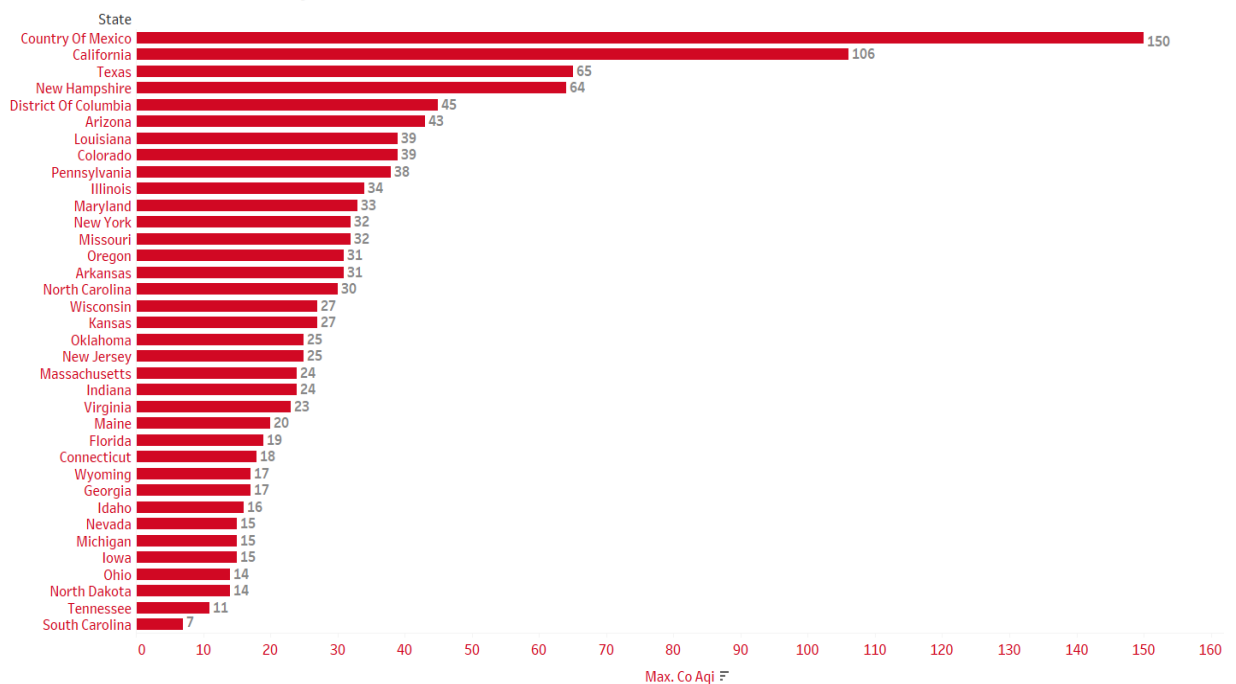


The trend of maximum of So2 Aqi for Date Local Year. The data is filtered on Action (State) and Action (State Code). The Action (State) filter keeps 36 members. The Action (State Code) filter keeps 36 members. The view is filtered on Date Local Year, which keeps 2006, 2007, 2008, 2009 and 2010.

- Over the year from 2006 to 2010 CO AQI gradually depleting and it came close to 80 ppm in 2009 and slightly Decreased in 2010.Overall change in air quality.
- Over the year from 2006 to 2010 O3 AQI gradually depleting and it came to 206 in 2009 and in 2010 decrease to 200.Overall change in air quality.
- Over the year from 2006 to 2009 NO2 AQI gradually depleting and it's came to 107 in 2009 and from 2019 it remains constant. Overall change in air quality.
- Over the year from 2006 to 2010 SO2 AQI gradually depleting and it came close to 120 in 2009 and above 100 in 2010. Overall change in air quality

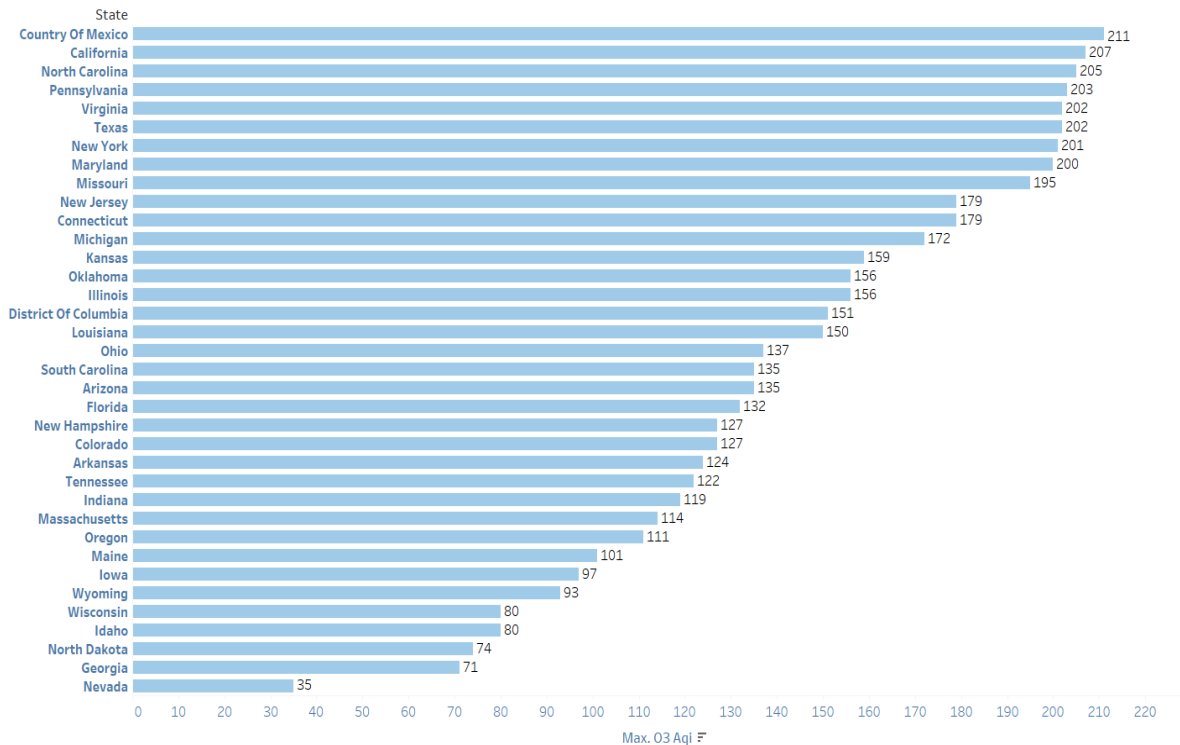
6.What is the maximum CO, NO2, SO2 and O3 AQI in each state?

Maximum Carbon Monoxide By State



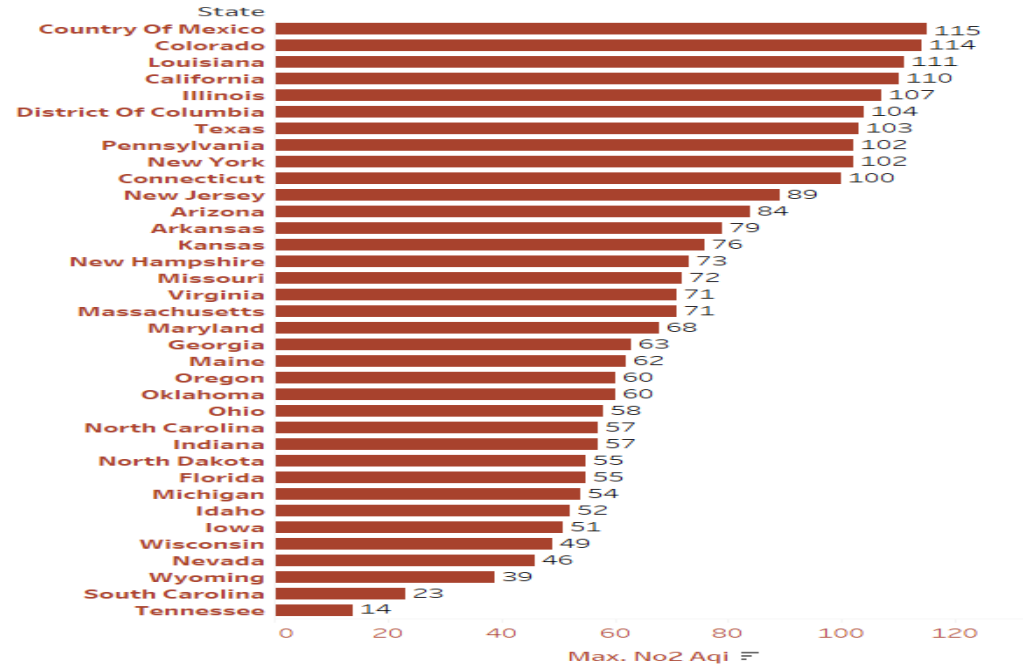
Maximum of Co Aqi for each State. The data is filtered on Action (City with max CO Aqi) and Action (CO Units). The Action (City with max CO Aqi) filter keeps 98 members. The Action (CO Units) filter keeps 1 member.

Maximum Ozone(O3) By State



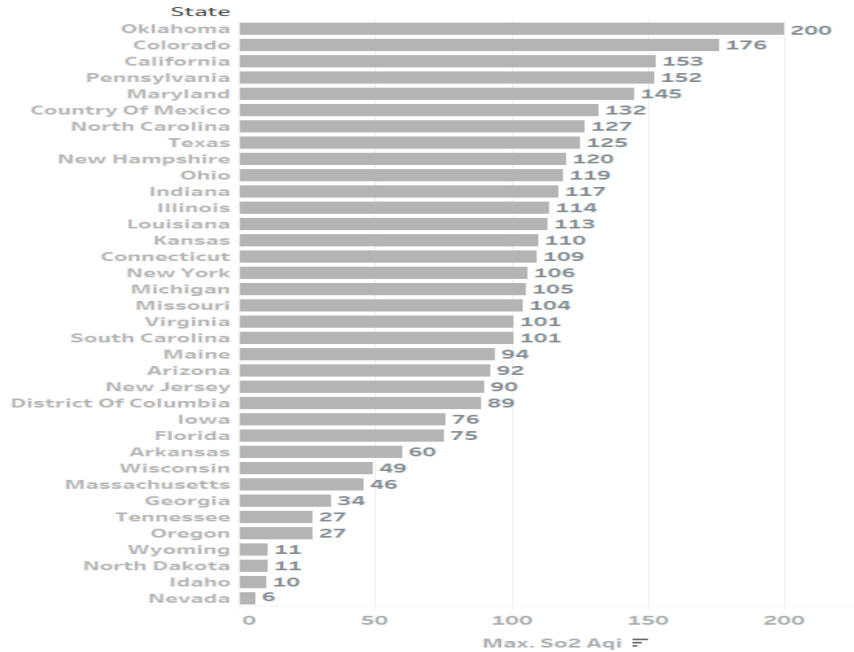
Maximum of O3 Aqi for each State. The data is filtered on Action (O3 Units) and Action (City). The Action (O3 Units) filter keeps 1 member. The Action (City) filter keeps 98 members.

Maximum nitrogen dioxide (NO2) By State



Maximum of No2 Aqi for each State.

Maximum sulphur dioxide(SO₂) By State



Maximum of So2 Aqi for each State. The data is filtered on Action (State Code), which keeps 36 members.

- Country of Mexico, California, Texas, New Hampshire are the states with maximum CO AQI present and highly polluted with CO.
- South Carolina, North Dakota, Tennessee are the states with minimum CO AQI present and least polluted with CO.
- The Country of Mexico, California, North California, Pennsylvania and Virginia have the maximum O3 AQI present and highly polluted with O3.
- Nevada, Georgia, North Dakota, Wisconsin are the minimum O3 AQI present and least polluted with O3.
- Country Of Mexico, Colorado, Louisiana, California have the maximum NO2 AQI present and Wyoming, South Carolina, Tennessee with least NO2 AQI present.
- The Oklahoma, Colorado, California, Pennsylvania have the maximum SO2 AQI present and Idaho, Nevada, North Dakota are with minimum SO2 AQI present.

