



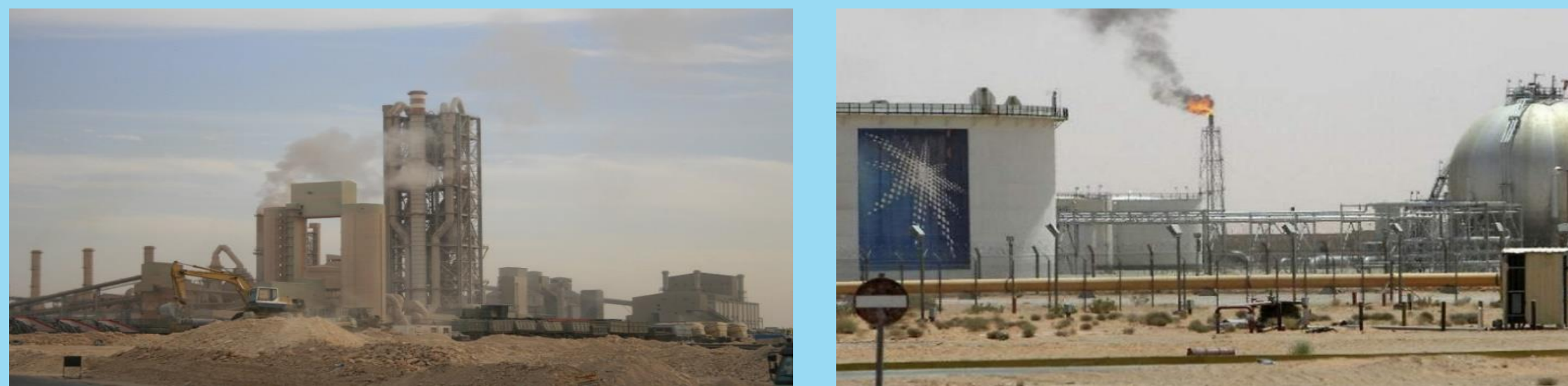
ABSTRACT

Urban air pollution is rapidly becoming a major environmental problem of public concern in several developing countries of the world. It can influence public health and local/regional weather and climate. Ambient air pollution in Riyadh is a substantial environmental and health concern. The present study was undertaken to assess the particulate air quality in Riyadh. Using an air quality index (AQI) which is a numerical system that is used to indicate to relevant stakeholders what the current and forecast air quality is and likely to be along with the possible associated effects on the health of the exposed population. World health organization (WHO) considers six pollutants for estimating AQI; nitrogen dioxide (NO₂), ground level ozone (O₃), particulate matter (PM), carbon dioxide (CO), sulfur dioxide (SO₂).

The concentration of six standard pollutants is measured daily by 11 air quality stations distributed over Riyadh, A comparison was made for Riyadh in terms of air quality from different aspects. All though the impact of the cement industry on cities is very detrimental to human health. the research have concluded that the Al-Yamama cement factory is the biggest polluter in the city of Riyadh. After investigating and conducting field visits and inquiring about the Yamama cement plant to provide us with the plant's emissions data, the answer was the informations are not available, which made us to search for similar plants around the world and study the concentration of their emissions and roughly compare them to the Yamama plant's emissions concentration in terms of the amount of emissions, wind speed, height of chimney and the surrounding neighborhoods of the plant. It appears that the major sources of pollutant affecting Riyadh include industrial sources along with contributions from mobile sources and wind-blown dust. However, the air quality index (AQI) is based on six standard pollutants is lower than the standard limits except the element particulate matter (PM), which exceeds the standard limits.

PROBLEM STATEMENT

Riyadh is witnessing a remarkable development in many economic, tourist, industrial, and population aspects Its area is constantly increasing. The pollution appeared due to the large number of factories and the multiplicity of their activities, including cement factories, the large number of people whose depends entirely on cars, and the dust storm that occurs in some months of the year. Its damages and effect humans, animals, agricultural crops, water quality and distorts environmental beauty.



OBJECTIVES

- Understanding problemetric of air pollution.
- Study air pollution environmental impacts.
- Define air pollutants.
- Learn about air quality index (AQI).
- Collecting data related to air pollutants.
- Statistics and analysis of air pollutants information.
- Case study: Yamama cement factory in Riyadh.
- Air pollutants measuring station
- Methods to reduce air pollution

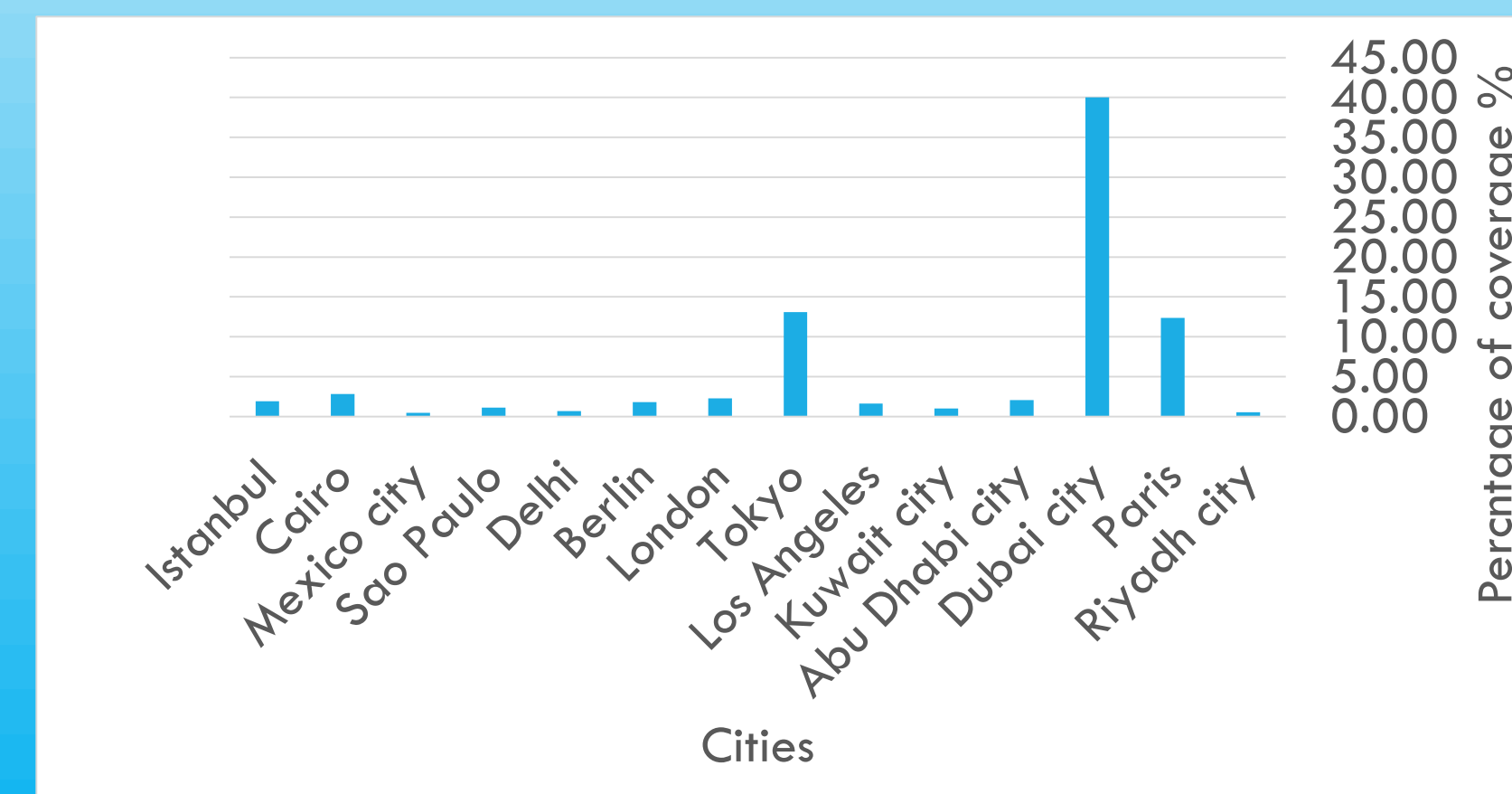
NUMBER OF STATIONS REQUIRED FOR RIYADH CITY

The measurement of air quality in cities with high reliability requires a study at the number and locations of the air quality stations for cities, as the choice of the corresponding place for the station is a large part of the accuracy and reliability of the data at the station. By analyzing the randomly selected data at table below to compare it with Riyadh city with an average area equivalent to 1213 km², its found that the average coverage of the air quality station is 74.3 km² at average number of stations 25 , which concludes that the city of Riyadh must almost triple the number of its current 11 stations to 41 stations to achieve better air quality coverage.

City	Area (Km ²)	Number of station	Area coverage per stations (Km ²)	Percentage of coverage (%)
Riyadh city	1973	11	179.4	0.56
Paris	105	13	8.1	12.38
Dubai city	35	14	2.5	40.00
Abu Dhabi city	972	20	48.6	2.06
Kuwait city	200	2	100	1.00
Los Angeles	1222	20	61.1	1.64
Tokyo	627	82	7.6	13.08
London	1572	36	43.7	2.29
Berlin	892	16	55.8	1.79
Delhi	1484	10	148.4	0.67
Sao Paulo	2707	30	90.2	1.11
Mexico city	2072	10	207.2	0.48
Cairo	1761	50	35.2	2.84
Istanbul	1360	26	52.3	1.91
Average	1213	25	74.3	5.84

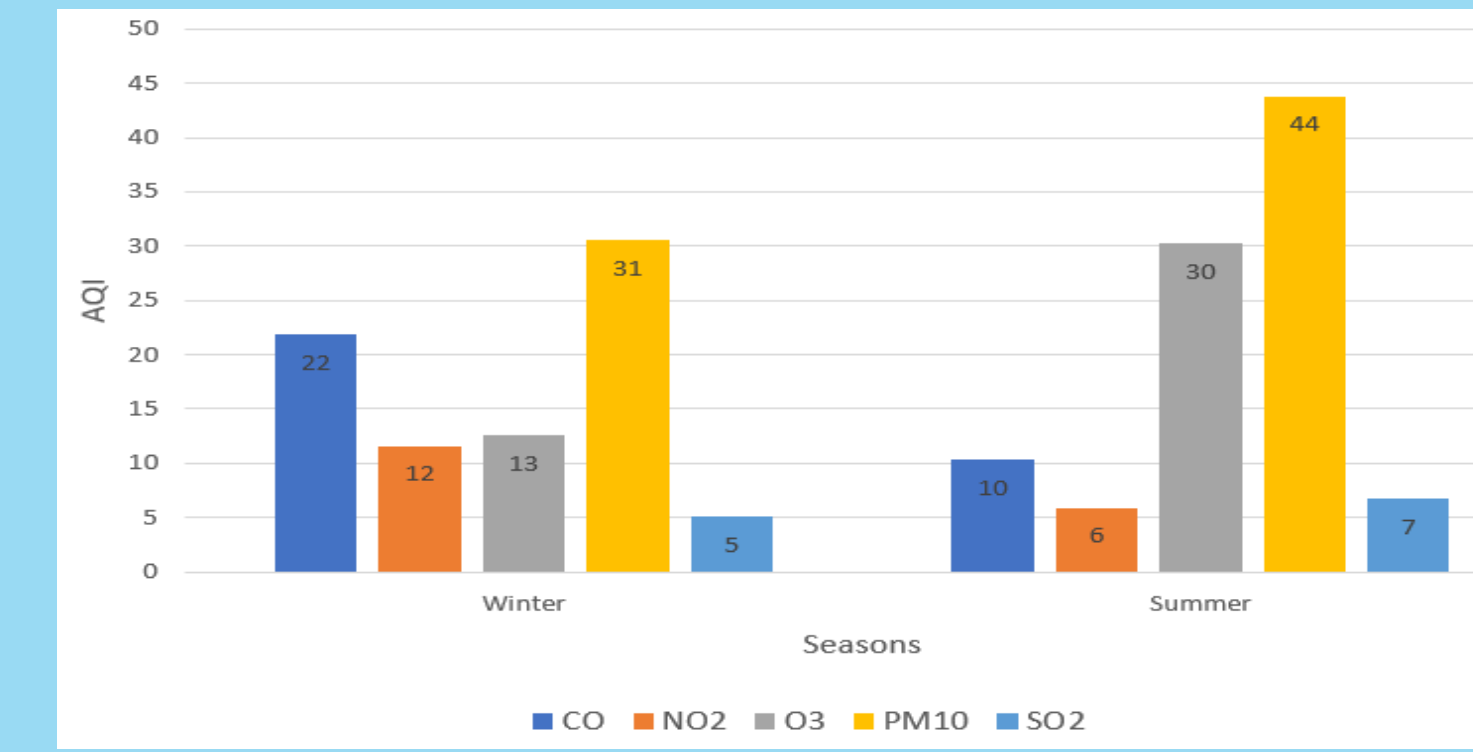
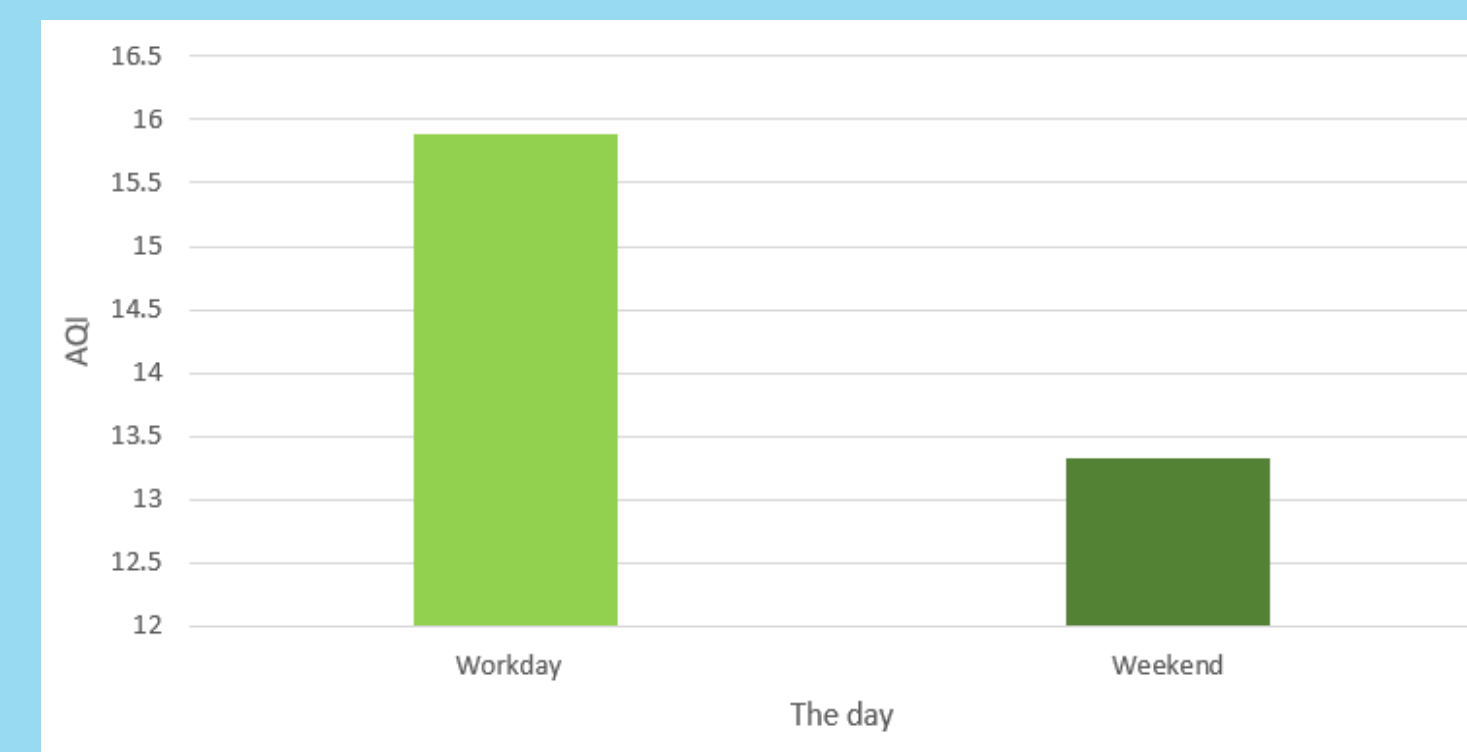
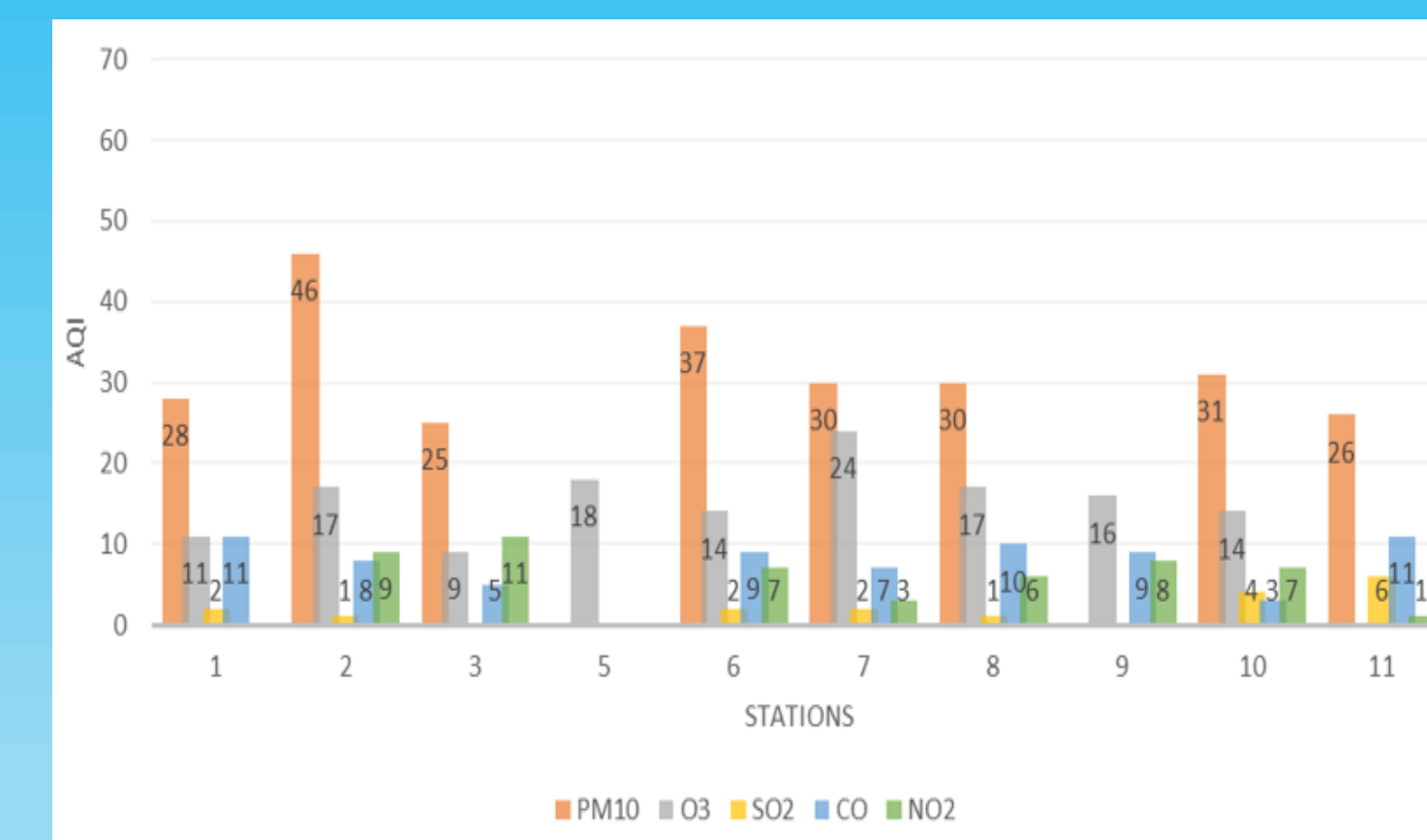
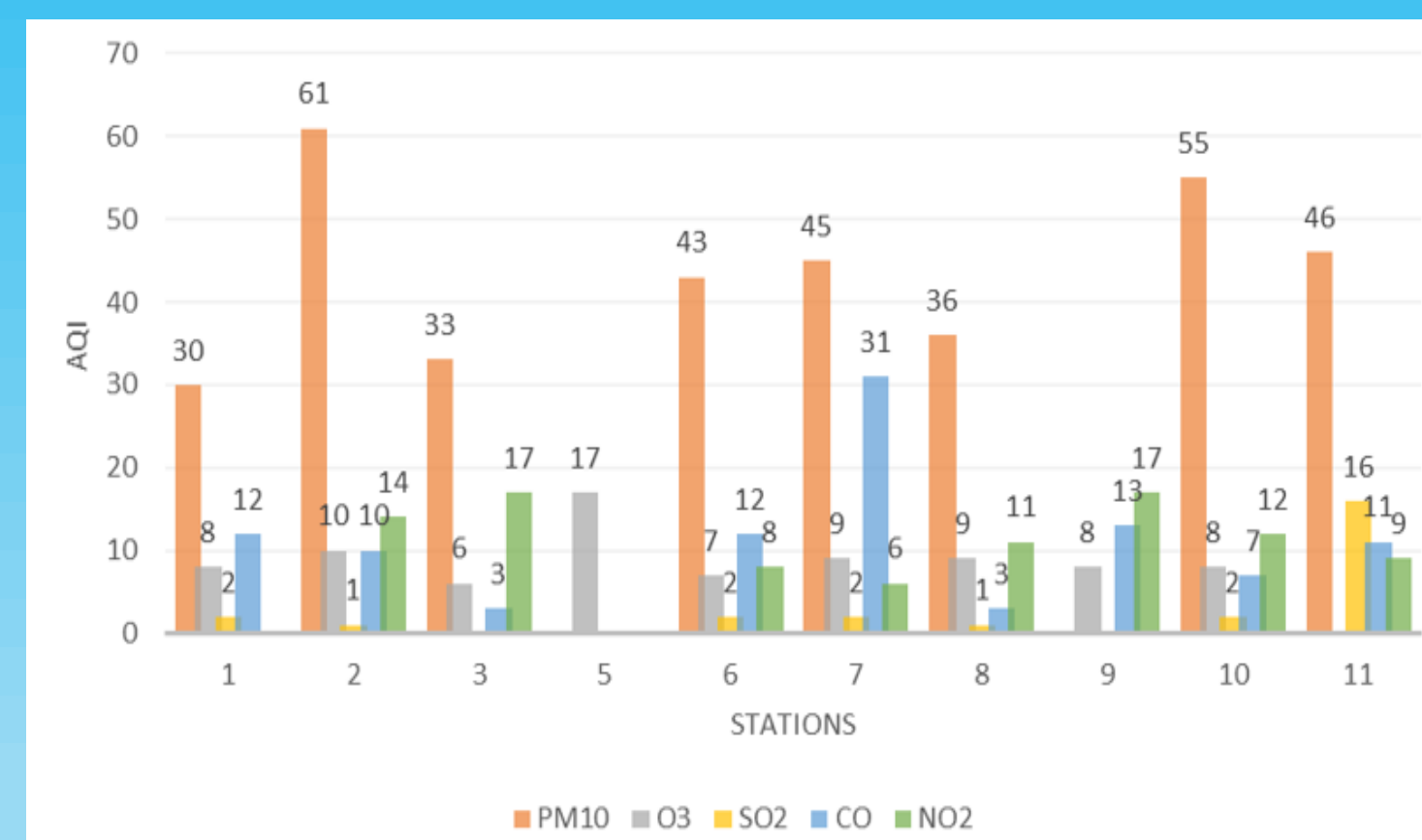
1231 km² / 1973 km² = 25 Stations / X stations

$$\text{Number of stations (x)} = (1231 * 25) / 1973 = 41 \text{ Stations}$$

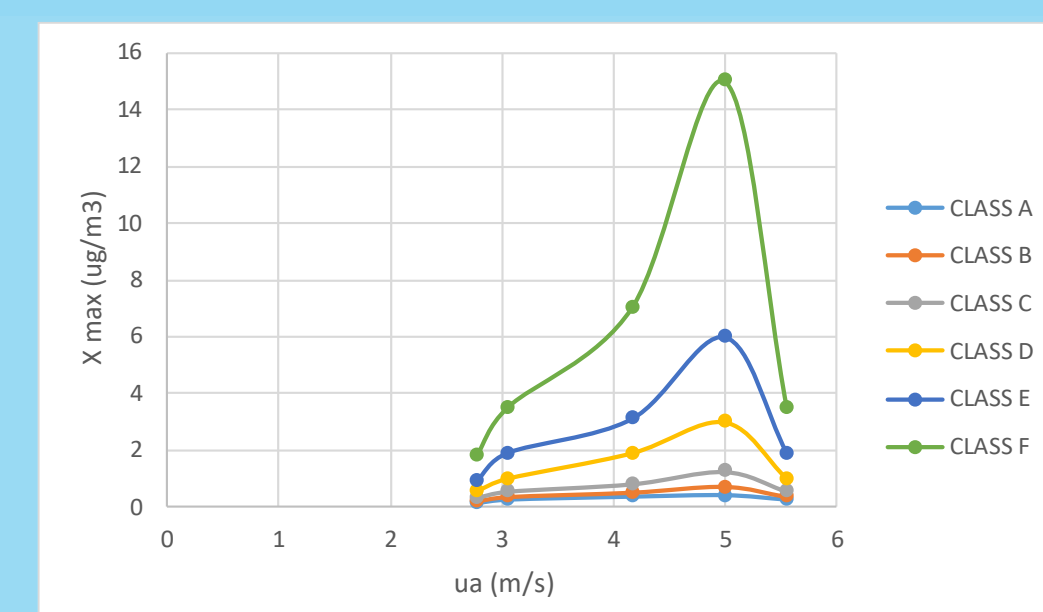
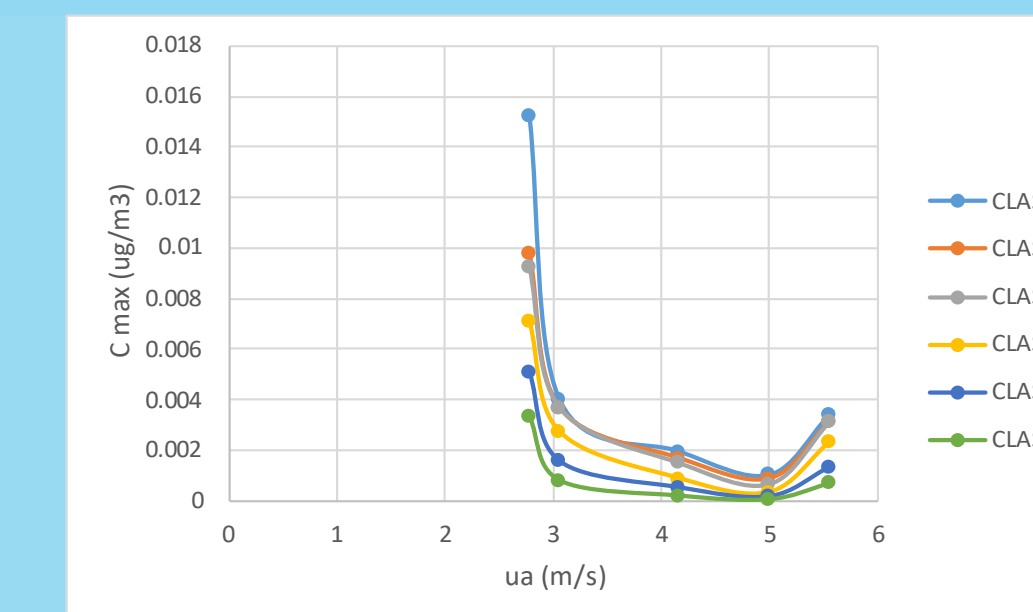
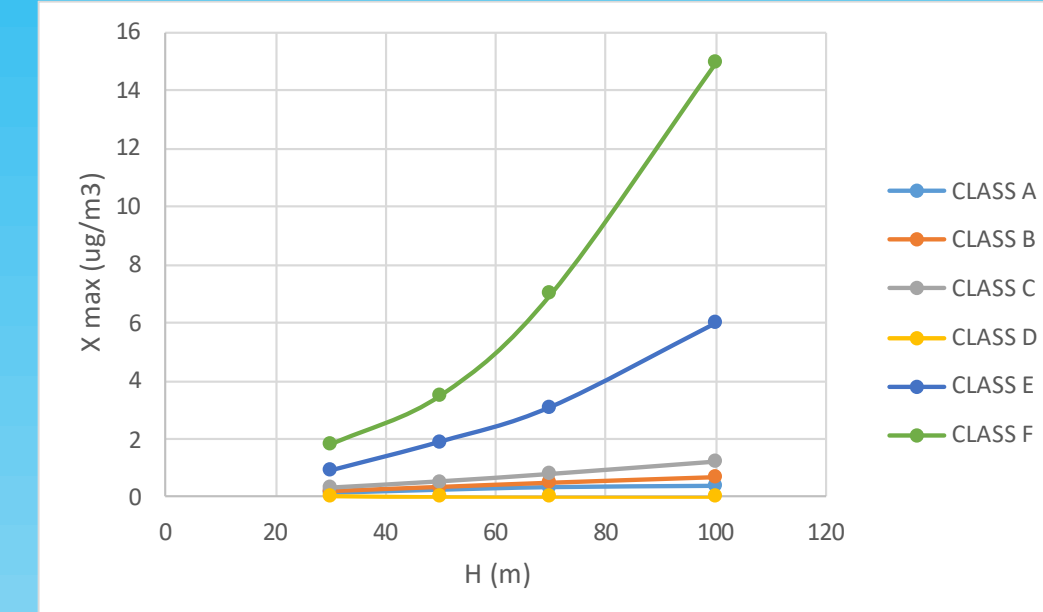
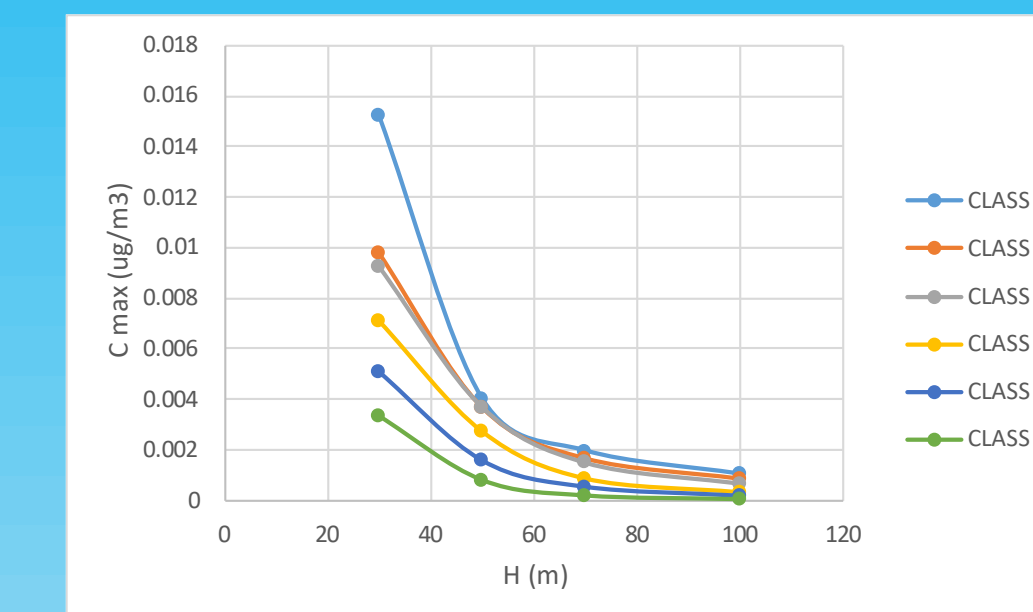
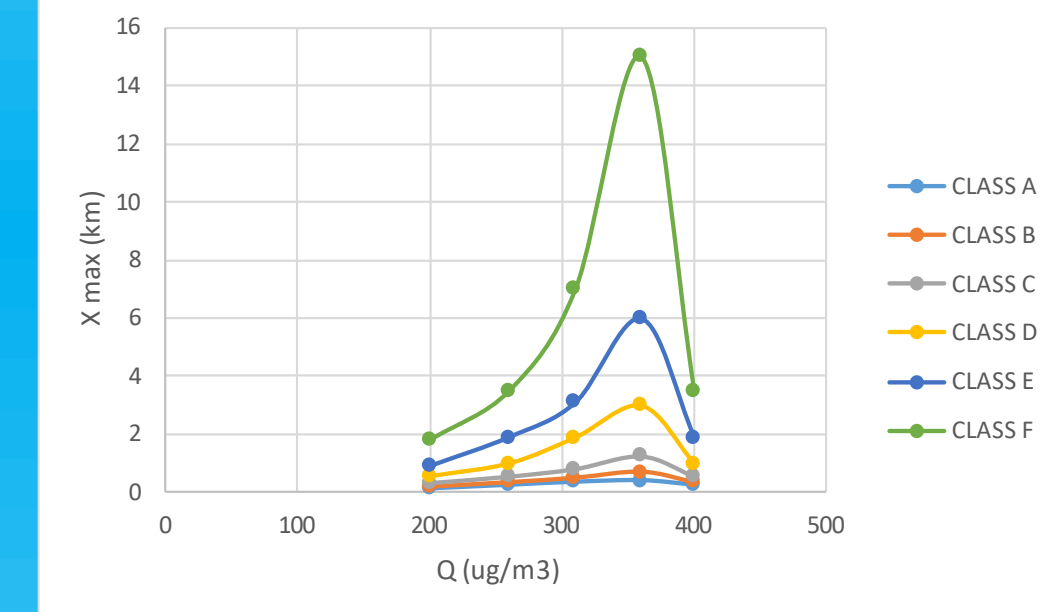
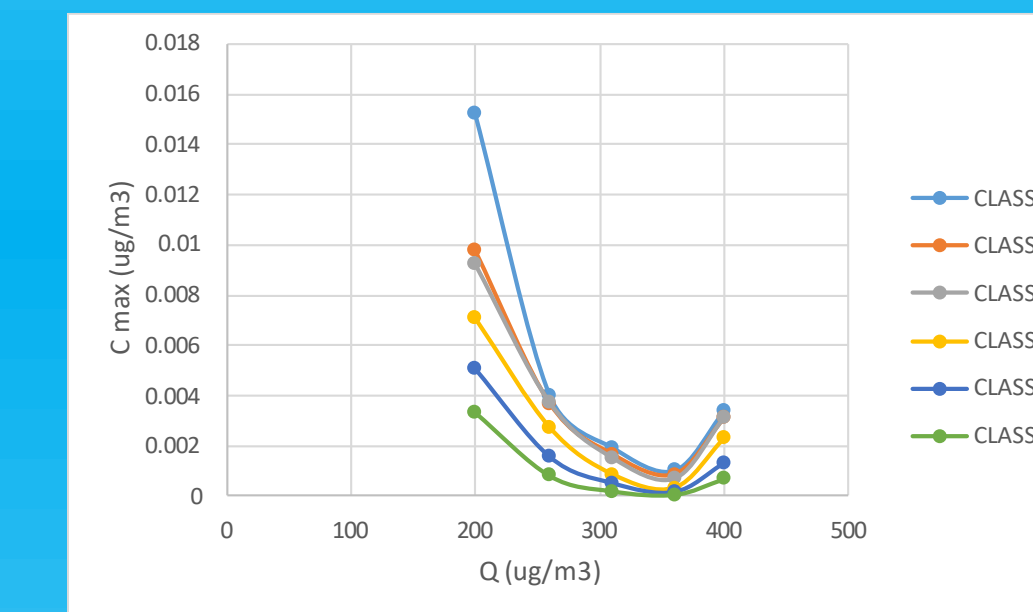
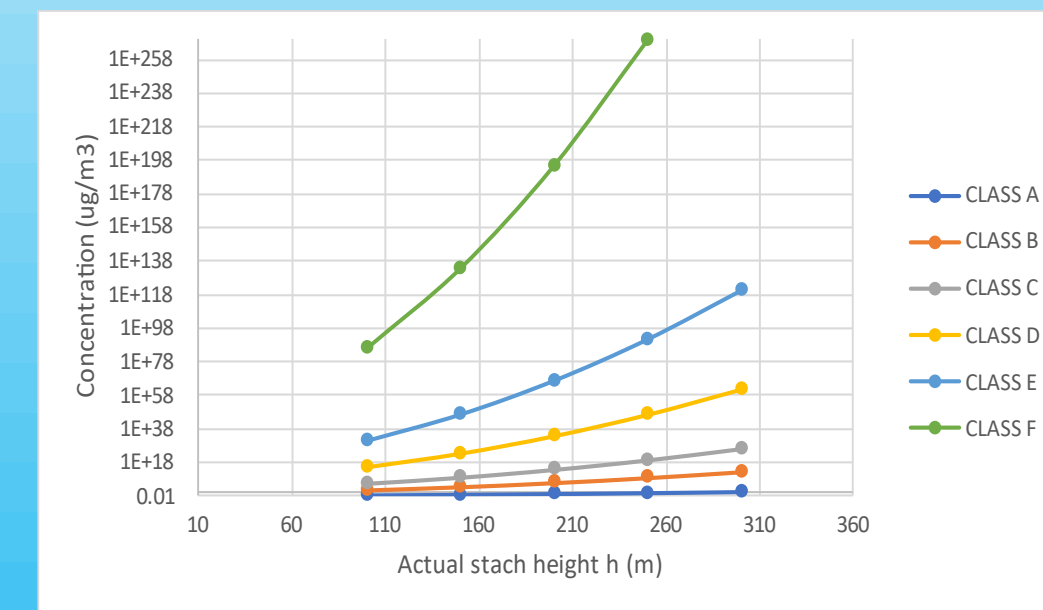
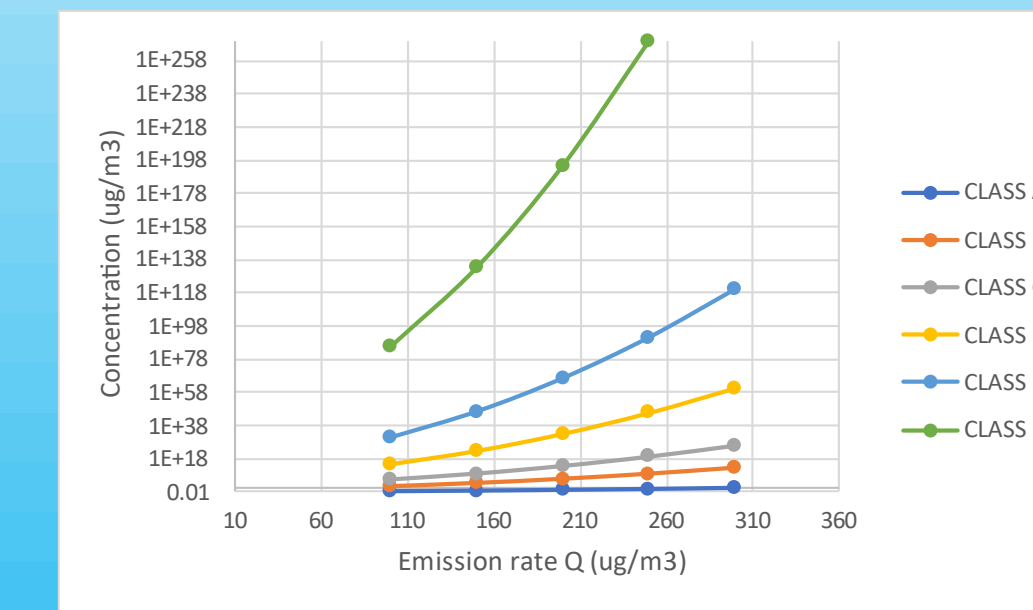
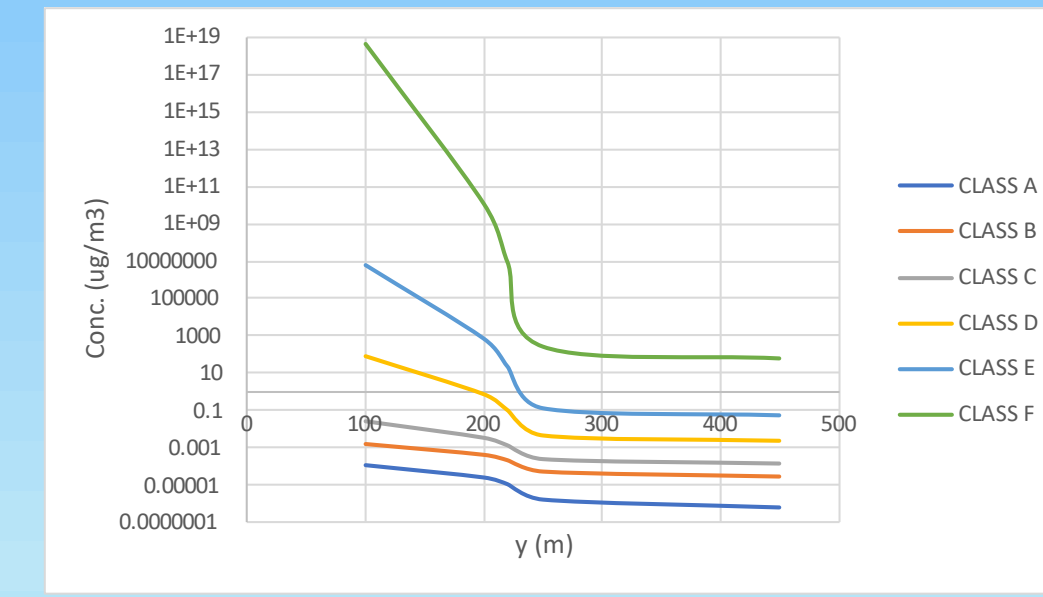
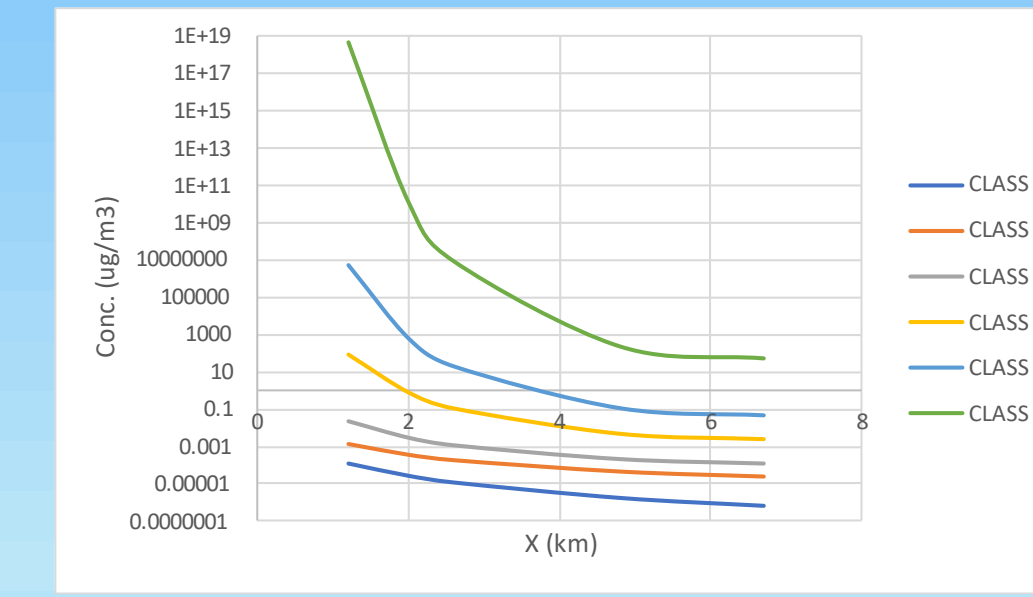


DATA ANALYSIS OF AQI FROM DIFFERENT ASPECTS

The process of collecting, arranging and purifying information requires an in-depth analysis and insight to help us reach actual, real results. In the further subsequent parts the data will looked at from more than one prospective and more than one factor to address the AQI of Riyadh city. The AQI react differently depend on season of the year and the time, although air quality in Riyadh at the summer and work day decrease during the heat and human activities which could be harmful on the people and city.



YAMAMA CEMENT PLANT ANALYSIS



THE EFFECT OF YAMAMA CEMENT FACTORY IN RIYADH

Al Yamama Cement Company Saudi Ltd. is a Saudi joint stock company, located in the city of Riyadh in the Kingdom of Saudi Arabia. The capital of the company is one billion three hundred and fifty million Saudi riyals, where the production of the Yamama Cement Company of clinker is 6,000,000 tons, and cement is 6,300,000 tons annually. 781 employees work in the company, according to the statistics of January 2018. And a production capacity of 18,600 tons of clinker / day, or 21,800 tons of cement. Its current location is in the south of Riyadh, in Al-Manakh district, where it is located in a densely populated area, where a branch has been established far from the population area, but it is still operating.

CONCLUSION

- The air quality index (AQI) in Riyadh is moderate and acceptable most of the time.
- The number of air quality monitoring stations needed in the city of Riyadh is 41 located in south and west of Riyadh where the most concentration of population.
- Greening the city and using renewable energies have a significant impact on improving the city's air quality and reducing CO2 emissions.
- The Ymamah cement factory is the main contribute in the increase of PM levels in South of Riyadh which means that the factory most shut down the operation and transfer the factory to another location outside the city.