

KUWAIT

I. INTRODUCTION

The State of Kuwait is situated at the north- eastern part of the Arabian Peninsular bounded by Iraq from the north and west, Saudi Arabia from the West and South and the Arabian Gulf from the east .

It has a surface area of 18000 sq Km extended between 28° 30´ and 30° 05´ north latitude and between 46° 33´ and 48° 36´ east longitude .The climate in Kuwait is harsh as it goes up to 60° C in summer and it reaches as low as -3° C in Winter.

The Environment Public Authority (EPA) in Kuwait is the focal point to follow up all the environmental treaties and conventions that the country is a party to

Air & Noise Pollution Monitoring Department on another hand is responsible for monitoring and investigating atmospheric pollution and related issues .

II. HISTORY:

- 1970 : After Stockholm Declaration – Occupational Health and Hygiene Unit Was established within MOH.
- 1980 : Environment Protection Council (EPC).
- 1982 : Protection Department (EPD) was established..
- 1986 : A- Air Pollution Monitoring Stations were established.
B- First informal Ozone committee was established.
- 1987 : UV measurements started in Mansooria Fixed Station
- 1989-1990 : Studies on effects of Solar Radiation ,UVB on health.
- 1990 : Iraqi Invasion
- 1992-1993 : Reestablishment of Ozone Committee -EPC
b-Amiri Decree 135/1992-Ratification Vienna Convention & Montreal Protocol.
- 1994 1- Reclassification of Kuwait as an Article 5 Country.
2- Ratification of London & Copenhagen Amendments.
3- UVA, UVB Solar Continuous monitoring .
- 1995-1996 : : Establishment Of EPA .
- 2000 : UVA, UVB continuous Monitors in Shuwaik

III. AIR POLLUTION MONITORING STATIONS :

In 1984 Environment Protection Council (EPA today) established 3 fixed Stations . Now there are six air pollution monitoring stations around the country (as shown in the Map) . The main Pollutants measured in these stations are :

- | | |
|---|------------------------|
| 1- SO ₂ , H ₂ S | 2- NO, NO ₂ |
| 3- THC- CH ₄ , N-CH ₄ | 4- O ₃ |
| 5- CO | 6- CO ₂ |
| 7- NH ₃ | 8- SPM |

The stations also are equipped with metrological sensors such as Temperature- Wind Direction & wind Speed – Relative Humidity-Atmospheric Pressure –Solar Radiation and UV.

The Table below shows the location of each station with the main pollutant monitored .

	Station	Longitude	Latitude	Pollutants ppb	UV W/m ²	Uva W/m ²	Uvb W/m ²	Solar W/m ²
1	Mansooria	48° 00	29° 22' 30	Sox- Nox-O3- CO -THC-SPM	Yes	Yes	Yes	Yes
2	Rabia	47° 56'	29° 18'	Sox- Nox,O3- Co -THC- SPM	-	-	-	-
3	Reqqa	48° 6'	29° 7'30	Sox- Nox,O3- Co -THC, NH3- SPM	-	-	-	-
4	Jahra	47 40'	29 20'	Sox- Nox,O3- Co CO2- THC,SPM	-	-	-	-
5	Um Al –Haiman	48° 8'	28° 58'	Sox- Nox,O3- Co CO2- THC,NH3- SPM	-	-	-	-
6	Um Al Aish	47° 45'	29° 50'	Sox- Nox,O3- Co THC	-	-	-	-
7	Shuwaik	47° 56'	29° 20'	So2-SPM	-	Yes	Yes	-

IV. UV MONITORS :

Ultra Violet radiation is the part of electromagnetic spectrum that has wavelength between 200 and 400 nm . In biomedical literature this is divided into the UVA, UVB, UVC bands .

UVA:400-320nm

UVB: 320-285nm

UVC : 285-200nm.

Although UV represents 3% of all total radiations of the Sun , and what reaches the earth is UVA & UVB no UVC , UVB still has great effects on life on our planet Earth. UV monitoring in Kuwait started in 1987, Two ways of monitoring were used:

1- Spot Monitoring .

2- Continuous Monitoring .

1. On Spot UV Monitoring

The Air pollution department In Shuwaik Industrial Area used Portable sensors such as (IL—442{400-320nm}) & (Mutzhas Meter- {380-320 nm}) were used to measure **UVA**. The **UVB** was measured by (Polysulfone Films). Technicians used to take the devices out in an open area, focus it to the sun and try to get the best reading. This was carried out during noon from 11:30 to 12 o'clock daily and was very hard to carry out during summer days under the burning sun. Now this method is no more in use as continuous monitoring devices were installed.

2. Continuous Monitoring

During 1987 (EP-Lab-UV detector (290-386) continuous monitors were fixed in Mansooria Ambient Air Quality Monitoring Station for monitoring UVA-UVB as total. However, in 1994 (SKU 420-{ 380-315nm} for UVA) and (SKU 430 { 315-280} for UVB) were installed instead of the old measurements are expressed in W/m^2 .

As for Shuwaik Industrial area, during June 2001 another monitor for UVA- UVB was installed –(UV- Biometer 501) . UVB is measured by (MED/HR) where $1 \text{ MED/HR} = 5.83 \times 10^{-6} (W / Cm^2)$.

MED: Minimum Erythema Dose per hour.

The (UV-Biometer) can indicate the effectiveness of solar radiation for the induction of sun burn, phytoplankton mortality and can be used for global monitoring especially in conjunction with information about ozone thickness ,cloud cover and air Pollution .



UV and Solar being measured at Shuwaik industrial Area

V. SOLAR RADIATION :

Four out of six stations have solar radiation Monitors. All the monitors are working on continuous bases.

VI. TROPOSPHERIC OZONE :

Kuwait started to monitor tropospheric ozone since 1984. No column Ozone or stratospheric ozone has been monitored till date. Ozone concentrations in Kuwait at its maximum during (10 –17 o'clock) in summer seasons specially June were incidents of concentrations above the hourly standards (1 hr = 80 ppb) are likely to occur.

The figures shows the concentration of Tropospheric Ozone is the during June ,Solar radiation and UV, UVB

VII. STUDIES & RESEARCHES ON UV EFFECTS :

Ministry of Health has researches on the effect of UV on Human health .Some of these researches are:

- 1- Solar Middle Ultra Violet Radiation In Kuwait
- 2- Spectro radiometric Assessment of The Solar UV-B And it's Biological Effectiveness In Kuwait . These researches were done by M .Kollias and A- Baqer.

These researches were carried out by Kuwait University and Ministry of Health and funded by EPC.

VIII. RECOMMENDATION:

- 1- UNEP should consider organizing regional Ozone Officer meetings on the issues of Vienna Convention in the same way as applied Meeting to Montreal Protocol .
- 2- Kuwait needs technical assistance from UNEP ,WMO in the following areas :
 - i- Selection and installation of stratospheric Ozone Monitors.
 - ii- Analyses of existing data in order to evaluate and prepare a UV Index for Kuwait.
 - iii- Encourage , support on going researches & studies on effects of UVB, Tropospheric, Stratospheric Ozone on human and environment in the Gulf Co-operation Countries (GCC).
