Sub-regional workshop on Better Air Quality in North Africa, 23-25 November 2009.

Air Quality criteria in Libya.

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Air Quality in North Africa (Libya)

Introduction :

Total area of Libya is about 1775000 square km. the coast extends for 1950 kms along the southern coast of Mediterranean sea on North Africa.

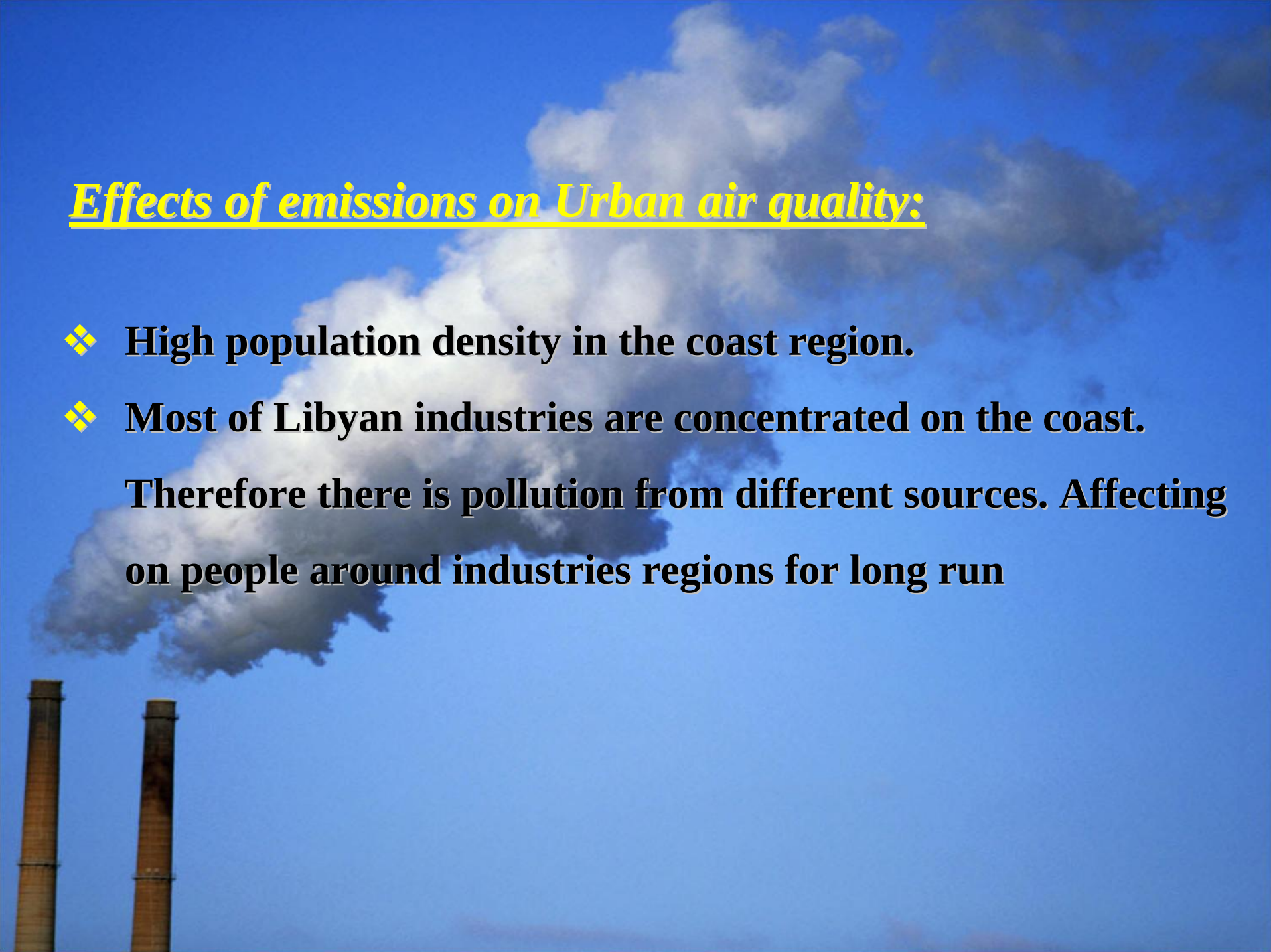
Libya is an extensive and wide spaced country the population are distributed along and cross this vast extension, making it difficult for any planner or executive to deliver services for all.

Emission **: (mobile and fixed sources)**

There are many sources of air pollutants which including six common gases. (VOC, s - Cox –Nox - Sox-HC- PM).

1- Oil sector:

- **Desert oil field Burning N.G (GOSP)**
- **Coast oil field refineries petrochemical complexes.**
- **Partially control air pollutants emissions (sensors)**



Effects of emissions on Urban air quality:

- **High population density in the coast region.**
- **Most of Libyan industries are concentrated on the coast. Therefore there is pollution from different sources. Affecting on people around industries regions for long run**

This table (1) shows the pollutants resulting from burning N.G in al-Wahat area.

Pollutants	Avg. concentration	WHO
PM	26.35mg/m3	265mg/m3
O3	0.045ppm	0.12ppm
CO	1.49ppm	9ppm
SO2	0.121ppm	0.14ppm
NOx	141,33ppm	130ppm
H2S	2.48ppm	.14ppm
HC	3.03ppm	0.24ppm
Source :TCEP survey 2001.		

2- Power stations:

Emissions of Electric power plants are factors in three major environmental issues:

- **Acid rain.**
- **Urban air quality.**
- **Global climate change**

Table (2) Comparison between H.F.O and N.G

PM/ton		HC emission/ton		NOx emission /ton		SO2 emission /ton		CO emission/ton		Fuel consumption/ton		year
H.F.O	NG	H.F.O	N.G	H.F.O	N.G	H.F.O	N.G	H.F.O	N.G	H.F.O	N.G	
2571	0.65	321.38	0.04	32633	26	491.967	0.45	1631.65	0.715	2472197.5	2236	2000
2653	0.64	331.67	0.04	33677	25.5	507.72	0.44	1683.9	0.71	2551359	2219	2001
2669	129	333.74	8.5	33888	5114	510.893	88.5	1694.42	142	2567302	444706	2002
2729	118	341.23	8	34648	4689	522.349	81	1732.42	130	2624873	407733	2003
2467	167	308.4	11	31314	6604	472.o91	114	1565.73	184	2372317	574290	2004
2564	217	320.5	14	32543	8596	490.622	149	1627.19	239	2465437.9	747466	2005
1739 1685	255 3322	217.482	17	22082	10146	332.915	175	1104.14	282	1672942	882300	2006
19077	4209.3	210.64	217	21387	131744	322.43	2279	1069.4	3665	1620270	11456056	2007
1685	3322	2385	275.58	242172	166945	3651	2887.4	12109	4643.4	18346699	14517006	Total

Strategies for reducing air emissions from electric power.

- **Conservation demand for electricity.**
- **Fuel used.**
- **Movement of pollutants and recipient (atmosphere)**

3- Transportation:

- No. of motor vehicles Rose from 465000 vehicle in 1983 to 2.500.000 vehicles in 2000. Consumption fuel (Diesel /gasoline)

This table(3) shows the pollutants resulting from the Consumption of (1000 L) of fuel in motor vehicles engines.

NO2 tons	CO tons	NOx tons	CH4 tons	CO2 tons	Transportation Sector.
215	1145	2650	211	28000	1994
203	2413	7074	418	52000	1999
230	1532	2580	742	25000	2006

source: General planning council 2007.

4- Industrial sector:

The most important industry in Libya is:

- **Petrochemical**
- **Cement**
- **Steel and iron**
- **Oil refining industries.**

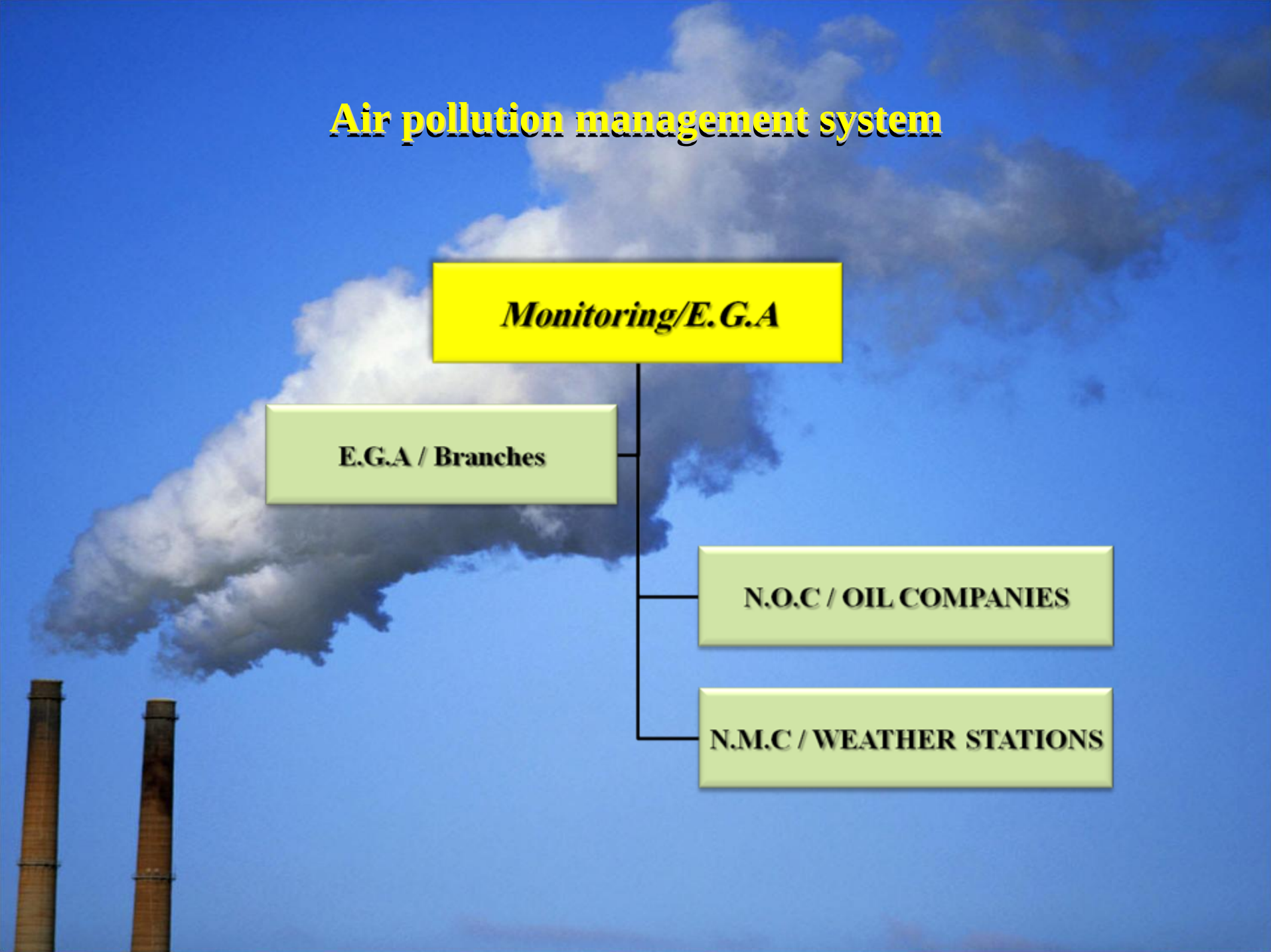
Mean pollutants emissions are: HC, Sox, Cox, NOx, and PM.

For example: Al.Homes cement factory as (sample)

Table(4) Produced dust from cement production factory AL-Homes.

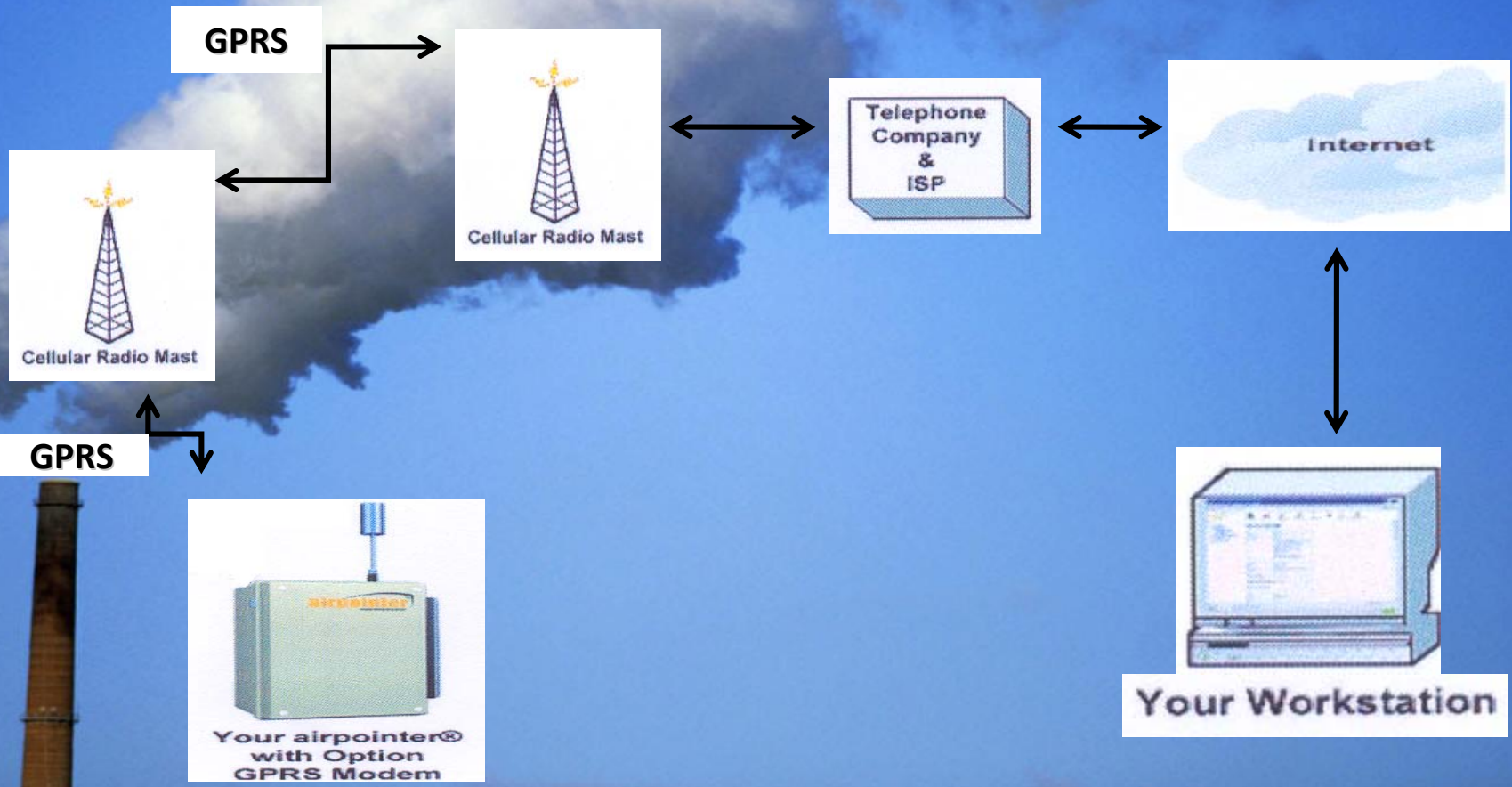
Year	Production (cement) Tons	PM Tons
2000	528.000	71.280
2001	706.900	95.430
2002	566.400	76.460
2003	360.500	48.670
2004	230.400	31.100

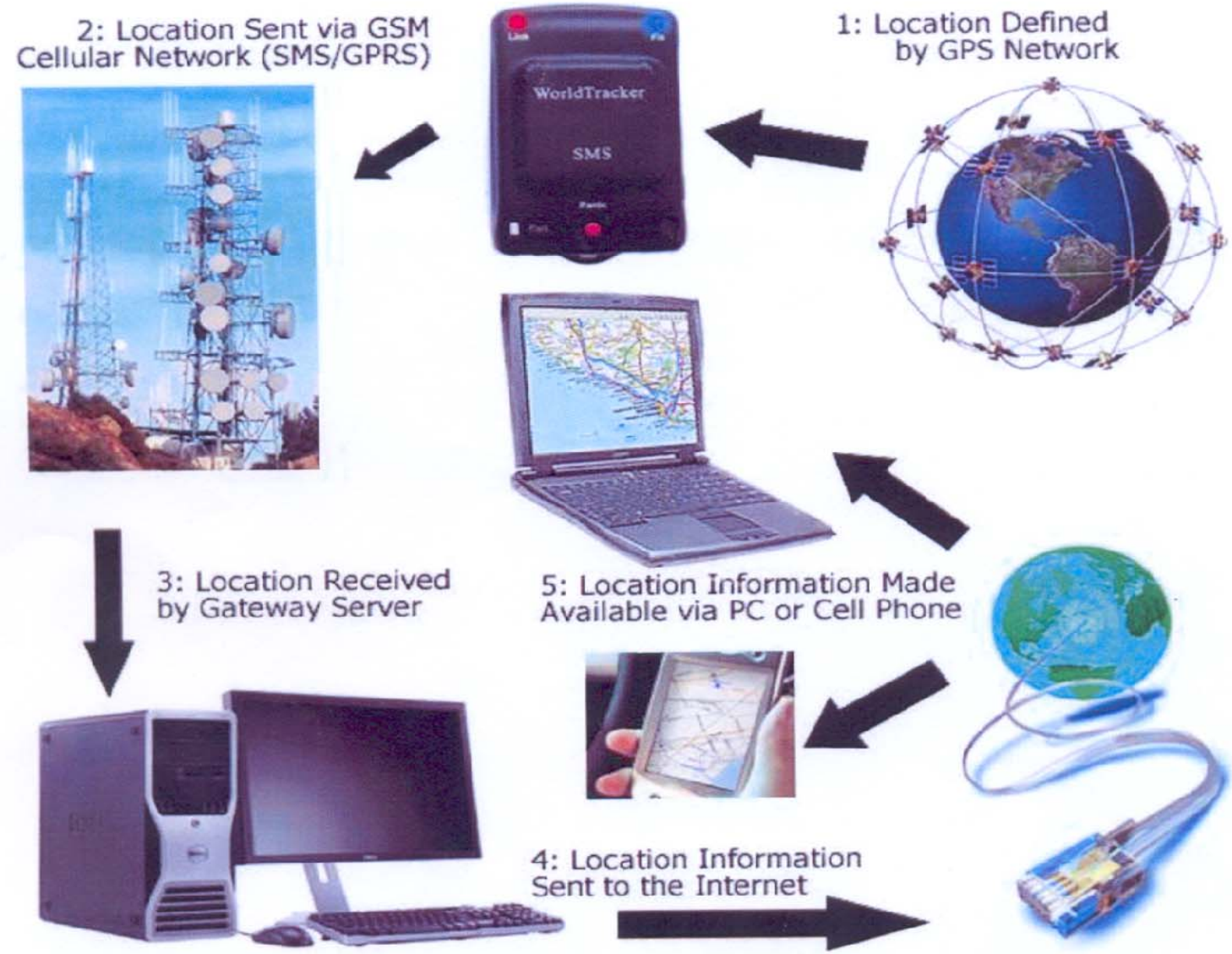
Air pollution management system



- Cooperation between E.G.A. and N.M.C. for measurements and monitoring air pollution.

- Monitoring Net work for the whole Libyan cities. (proposal)




2: Location Sent via GSM Cellular Network (SMS/GPRS)
WorldTracker
SMS
1: Location Defined by GPS Network
3: Location Received by Gateway Server
5: Location Information Made Available via PC or Cell Phone
4: Location Information Sent to the Internet

Advantages:

- **Single and multiple gas pollutants monitoring platform.**
- **Up to 4 sensors (SO2-NOx-O3-CO) up gradable.**
- **Meteorological measurement system available.**
- **Compact system easy to use and maintain.**
- **Low power consumption.**
- **Robust, weatherproof and inconspicuous design.**
- **No special site preparation required.**
- **Measurement results remotely available by using a web browser.**

Policy:

Reduction of air pollution concerning the following steps:

3- Development clean energy production methods imposed by international agreements which a challenge that must be taken into consideration in future

Solar energy application oil/gas pipelines (desert).

3- Libyan air quality specification. Recently issue 2007.

❖ Law No. (15) Of 2003 concerning environment protection – chapter 2 articles of this chapter indicate the importance of the preservation of atmosphere and application the required specification and standard for the purity of air.

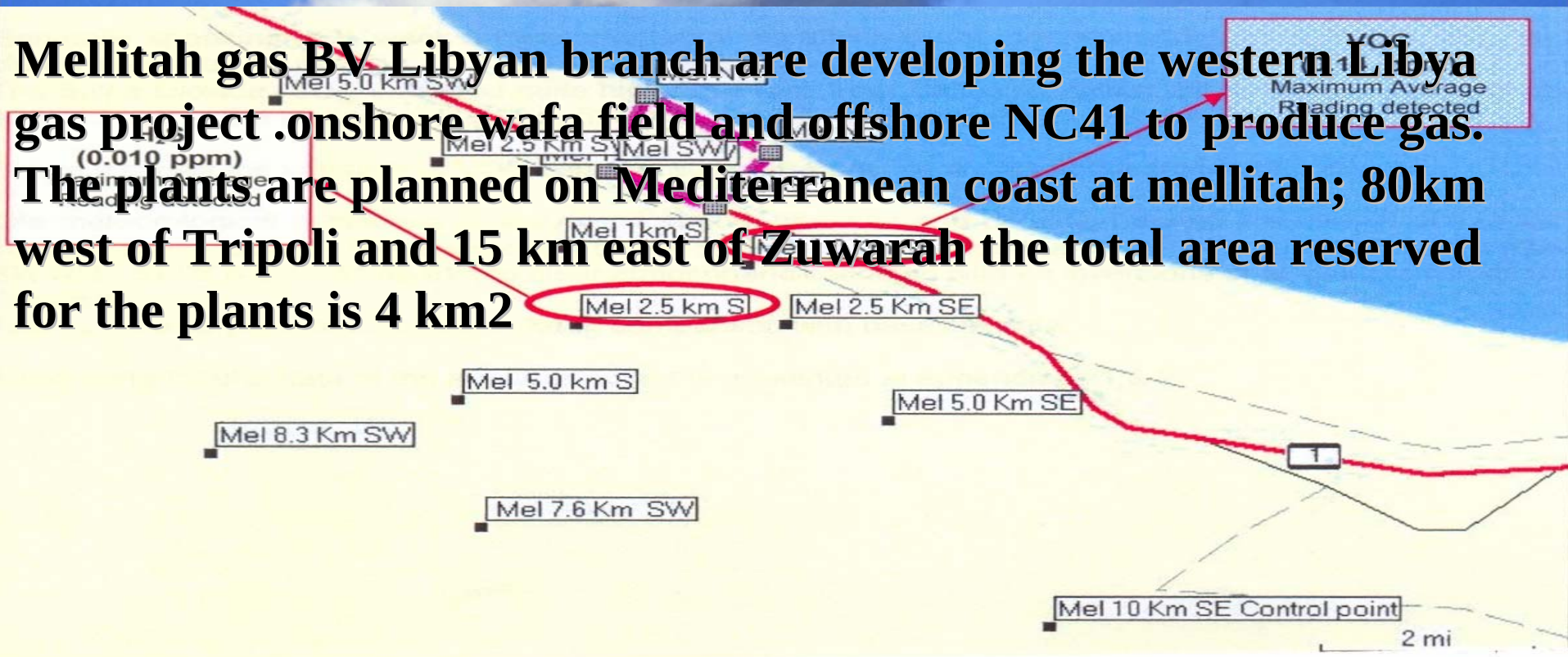
❖ Law No.(11) of 1984 concerning road traffic.

❖ Law No. (22) Of 1989 concerning industrial organization.

❖ Law No. (13) Of 1991 concerning meteorology.

Case study

Mellitah gas BV Libyan branch are developing the western Libya gas project .onshore wafa field and offshore NC41 to produce gas. The plants are planned on Mediterranean coast at mellitah; 80km west of Tripoli and 15 km east of Zuwarah the total area reserved for the plants is 4 km2



Monitoring –atmospheric emissions:

1-1. objective of air quality monitoring - impacts on the air quality resulting from commissioning of Mellitah. coastal plants .

1-2. Measurements and results . H2S - VOC-Nox-SO2 –CO -O3

Table (5) Comparison of calculated max. Ground level concentration contributions and WHO air quality guidelines

Pollutant	Hourly concentration µg/m3		Annual concentration µg/m3	
	Calculated	Guidelines	Calculated	Guidelines
Nox	**58**	**200**	**3**	**40**
NOx fumigation	**130**	**200**	**-**	**-**
So2	**27**	**125***	**2**	**50**
SO2 flare	**2119**	**5000-10000**	**-**	**-**
H2S	**2**	**150***	**0.2**	**-**
		7**		**-**

* Daily 24 hours.

** Applies to odour.

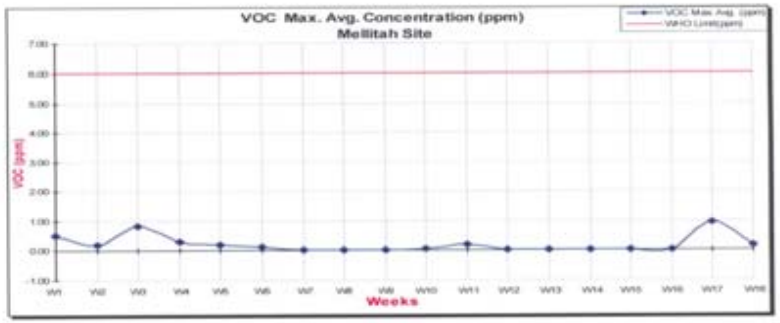


Figure 2 : VOC . Max. Avg. Concentrations (ppm) for the 18 weeks

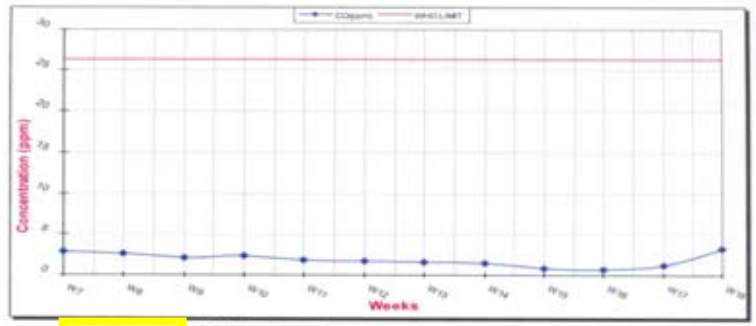


Figure 3 CO Max. Avg. Concentrations (ppm) for the 18 weeks

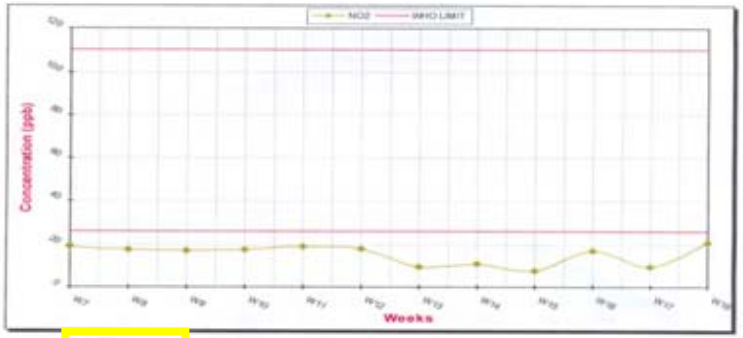
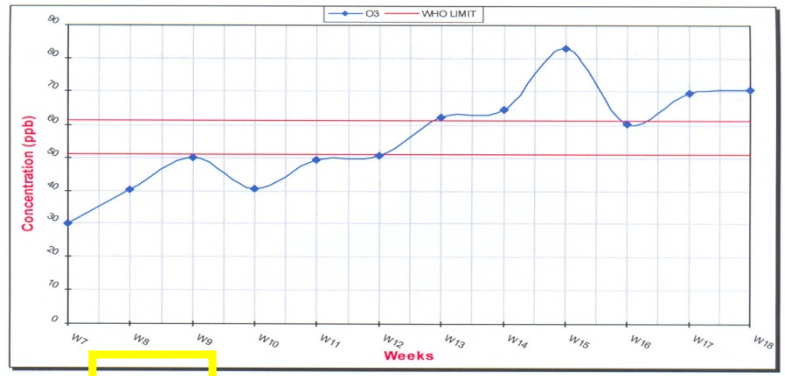


Figure 4 : NO_2 Max. Avg. Concentrations (ppb) for the 18 weeks



O_3 Max. Avg. Concentrations (ppb) for the 18 weeks

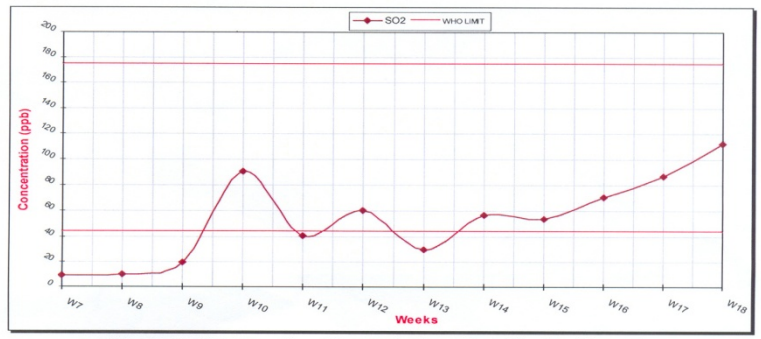


Figure 6 : SO_2 Max. Avg. Concentrations (ppb) for the 18 weeks

CONCLUSIONS :

Present environmental condition, Most environmental and atmospheric pollution sources(HC,Cox,NOx,Sox) are due to the use of petroleum derivatives resulting from oil refining for the production of oil by products used as operational energy ,is unacceptable for health or environment .Serious efforts should be made to provide constant monitoring ,measurement and control equipment ,and to use clean energy in such industries.


Thank you for attention