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AIR QUALITY MONITORING MONTHLY REPORT
OCTOBER 2009

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2. INTRODUCTION

This report covers analyser performance and guideline compliance for the following air quality monitoring sites in the City of Cape Town.

- ATLANTIS
- BOTHASIG
- CITY HALL
- FORESHORE
- GOODWOOD
- KHAYELITSHA
- KILLARNEY
- MOLTENO
- SOMERSET WEST
- TABLE VIEW
- WALLACEDENE

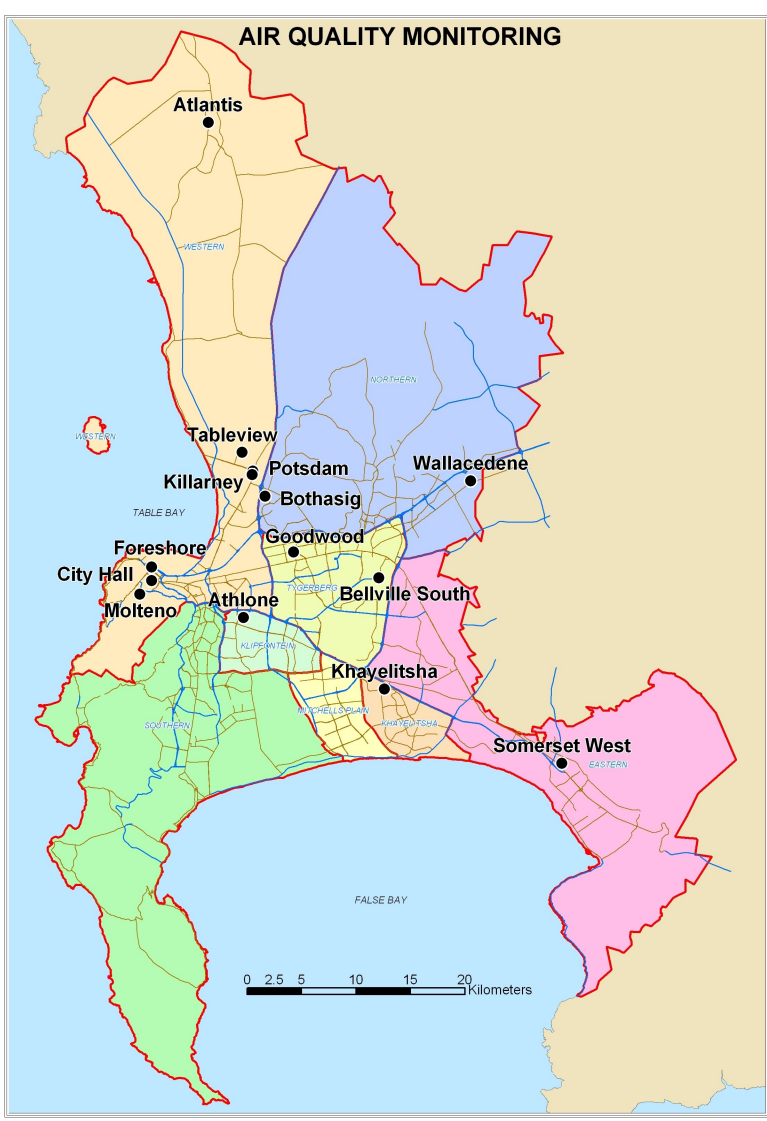


Figure 1. Map of Air Quality Monitoring Network.

middle scale (Atlantis, Bellville South, Killarney and Potsdam), neighbourhood scale (Khayelitsha and Table View and Somerset West) and regional scale (Goodwood and Moltano). The different scales is presented in Table 1.

Air Quality Monitoring Sites.

SPATIAL SETTING	CLASSIFICATION	EXAMPLES	CITY SITE
Micro Scale	0 – 100 m from source To characterize emissions from nearby source.	Vehicular emissions. Dust from construction.	City Hall Foreshore
Middle Scale	0.1- 0.5km from source Used to assess effects of control strategies and monitor air pollution episodes.	Industry wants to monitor impacts on air quality after installing scrubbers on stack.	Atlantis** Bellville South* Killarney Potsdam**
Neighbourhood	0.5 – 4km from source Suburban areas around urban centre. Population exposure to ambient air pollution.	Small emitters in a neighbourhood. Residential heating. Dust from congested traffic.	Khayelitsha Wallacedene
Urban	> 4km from source Characterise conditions over an entire metropolitan area. Used to assess trends in citywide air quality	A mixture of particles from many sources. Congglomeration of emissions from many sources.	Bothasig Table View Somerset West*
Regional	Many kilometres from source. Characterize air in large homogeneous area. Background air quality.	Pollution generated in urban and industrial areas many kilometres away. Naturally occurring pollution.	Goodwood Moltano
Global	Characterize air pollution for entire globe.	Pollution transported between continents	none

* Site decommissioned due to power problems

** Site is managed on behalf of an external client



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implementation of the new National Air Quality Standards has adopted the European/UK guidelines in its State of the when these limits are exceeded. See Table 2 for the

Table 2. City of CT and SANS Air Quality Standards for protection of human health.

Pollutant	1-hr average $\mu\text{g}/\text{m}^3$		8-hr average $\mu\text{g}/\text{m}^3$		24-hr average $\mu\text{g}/\text{m}^3$		Annual average $\mu\text{g}/\text{m}^3$	
	UK/CT	SANS	UK/CT	SANS	UK/CT	SANS	UK/CT	SANS
SO ₂ *	350	350	-	-	125	125	30	50
O ₃	-	200	98	120	-	-	18	-
CO	-	30	10 000	10 000	-	-	-	-
NO ₂	200	200	-	-	-	-	30	40
H ₂ S	-	-	-	-	9	-	-	-
PM-10	-	-	-	-	50	75	50	40
Benzene	-	-	-	-	-	-	5	5

* 15-minute UK guideline = 266 $\mu\text{g}/\text{m}^3$

*10-minute WHO guideline = 500 $\mu\text{g}/\text{m}^3$

Results from the monitoring stations showed that the PM-10 daily guidelines were exceeded on ten (10) days during October 2009. On six of these ten days the daily PM-10 concentration levels exceeded the European/UK guideline of 50 $\mu\text{g}/\text{m}^3$; while the SANS PM-10 daily guideline of 75 $\mu\text{g}/\text{m}^3$ was exceeded on four days, namely 1, 10, 21 and 25 October 2009. There were two days when elevated PM-10 levels were measured in Khayelitsha, Goodwood and Cape Town on the same day. See Table 3 for details. The worst day for October was on the 21st when the daily average PM-10 concentrations reached 145 $\mu\text{g}/\text{m}^3$ in Khayelitsha. Due to a build-up and carry over of pollution elevated PM-10 levels were measured at Khayelitsha, Goodwood and Cape Town the next day again (22nd October 2009). The diurnal plot of the PM-10 hourly means on the 21st and 25th of October as measured at Khayelitsha shows that the elevated PM-10 concentrations could be attributed to re-circulation of pollution combined with a build-up of particulate matter from local emissions. (Figures 2 and 3).

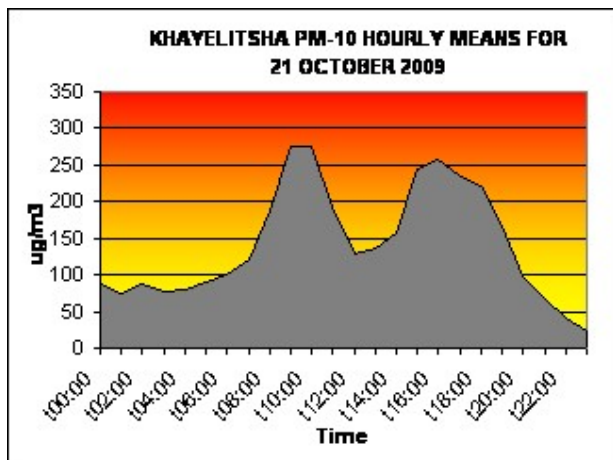


Figure 2. Daily average PM-10 = 143 $\mu\text{g}/\text{m}^3$

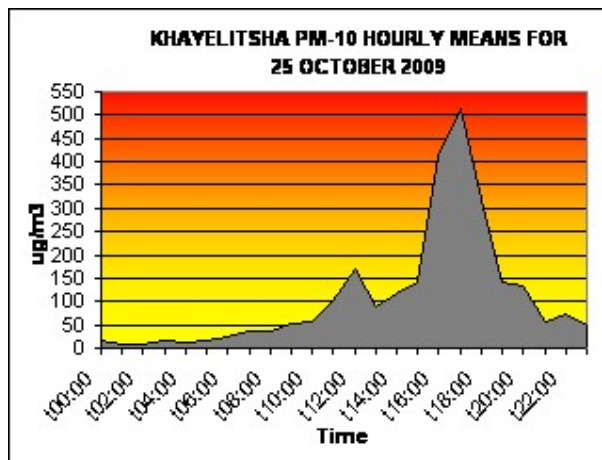


Figure 3. Daily average PM-10 = 106 $\mu\text{g}/\text{m}^3$



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			GUIDELINE VALUE ($\mu\text{g}/\text{m}^3$)	PERIOD	VALUE ($\mu\text{g}/\text{m}^3$)	REASON
Oct						
01/10	PM10	KHAYELITSHA	86	24hr	76	5,7
02/10	PM10	KHAYELITSHA	86	24hr	57	1,7
03/10	PM10	KHAYELITSHA	86	24hr	62	5,7
10/10	PM10	KHAYELITSHA	86	24hr	86	5,7
19/10	PM10	KHAYELITSHA	86	24hr	55	1,6
20/10	PM10	KHAYELITSHA	86	24hr	74	1,6,7
	PM10	CAPE TOWN	50	24hr	66	1,7
21/10	PM10	CAPE TOWN	50	24hr	61	1,7
	PM10	GOODWOOD	50	24hr	54	7
	PM10	KHAYELITSHA	50	24hr	143	1,4,7
22/10	PM10	CAPE TOWN	50	24hr	52	1,7
	PM10	GOODWOOD	50	24hr	50	1,7
	PM10	KHAYELITSHA	50	24hr	57	1,7
25/10	PM10	KHAYELITSHA	50	24hr	108	1,4,7
26/10	PM10	KHAYELITSHA	50	24hr	58	4,8
	PM10	WALLACEDENE	50	24hr	58	4

Moderate High Very High * Top 10 value

- Inversion** - Temperature inversions resulted in secondary elevated air pollution concentrations.
- Domestic fire** - Household wood-fires used for heating influenced PM10 levels.
- Nearby Industries** - The plume from the Industries influenced SO₂ levels at the site.
- Build-up** - A build-up of air pollution from the previous day contributed to elevated pollution levels.
- Smog** - Hot and stable atmospheric conditions favourable to photochemical smog.
- Re-circulation** - Re-circulation of dust resulted in elevated levels.
- Local emission** - Emissions from local sources.
- Re-suspension** - Wind blown dust
- Specific emissions** - Emissions from building operations in close proximity to monitoring station.

4. METEOROLOGICAL OBSERVATIONS



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at Goodwood, Tableview, Bothasig and Atlantis during the observation and wind speed will be reported in the future.

INSTRUMENT STATUS

Data completeness was evaluated against the US EPA requirements of 80% for the review period and presented in Table 4. All these analyzers are US EPA approved and are run in accordance to US/EPA methods and SANAS ISO 17025 requirements as specified in the SANAS TR07-02 standard.

Table 4. Data availability for October 2009.

SITE LOCATION	% DATA RETRIEVAL
Bothasig	100 % for all pollutants monitored.
Bellville South	0 % for all pollutants monitored due to site decommissioned.
City Hall	0 % for all pollutants monitored due to broken sample inlet.
Foreshore	100 % for PM-10 and VOC's.
Goodwood	100 % for all pollutants monitored.
Khayelitsha	97 % for PM-10
Killarney	0 % for all pollutants monitored due to site decommissioned.
Molteno Reservoir	97 % for ozone.
Somerset West	0 % for all pollutants monitored due to power problems at the site.
Table View	100 % for SO ₂ . NO _x at C&M for repairs. H ₂ S not logging properly due to software problems. PM-10 broken.
Wallacedene	100 % for all pollutants monitored.
Atlantis	Instrument faulty sent to manufacturer as still under warranty

Table 5 gives a summary of the different monitoring stations with details on maintenance, calibrations and instrument status.

Table 5. Summary of maintenance and calibration of analysers*

SITE LOCATION	
Atlantis	Faulty analyser sent to C&M for repairs
Bothasig	SO ₂ , H ₂ S and NO _x analyser maintained and calibrated October 2009 next calibration round Jan 2010.
Bellville South	Station to be commissioned soon waiting steps to enter monitoring station easily.
City Hall	The site is inactive due to broken inlet awaiting quote for new inlet system.
Foreshore	PM-10 analyser filter changed and flow checks performed. VOC analyser calibration still valid after factory calibration done.
Goodwood	NO _x and SO ₂ analysers repaired and calibrated on 27 th October next calibration January 2010. CO analyser not connected to data logger.
Khayelitsha	PM-10 filter changed and flow checks performed in November.
Killarney	Site temporarily decommissioned as refinery needed the additional space.
Molteno Reservoir	Somerset West ozone analyser at Molteno next calibration January 2010

Table View	SO ₂ analysers calibrated. October 2009 next calibration January 2010. C&M for repairs.
	s calibration checks performed with transfer standard October filter changed and flow checks performed. O ₃ analyser faulty, logger can't communicate with CO analyser and therefore not

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6. RESULTS

The monthly means of the pollutants monitored at the various stations are summarised in Table 5. Trend graphs are given to show the pollution trends at the various monitoring stations. All hourly averages of the various pollutants are attached as appendixes.

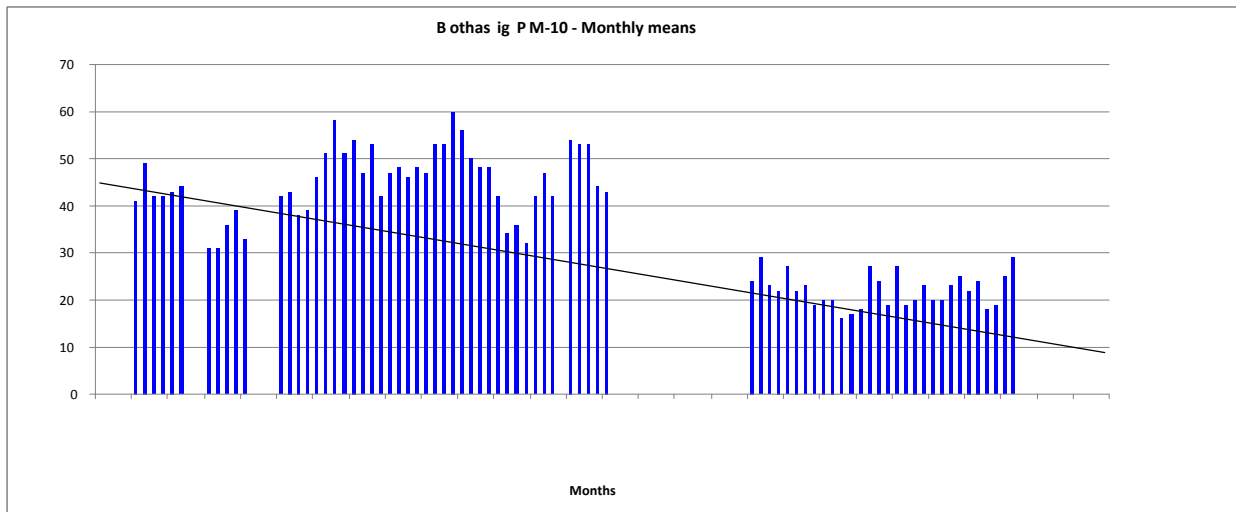
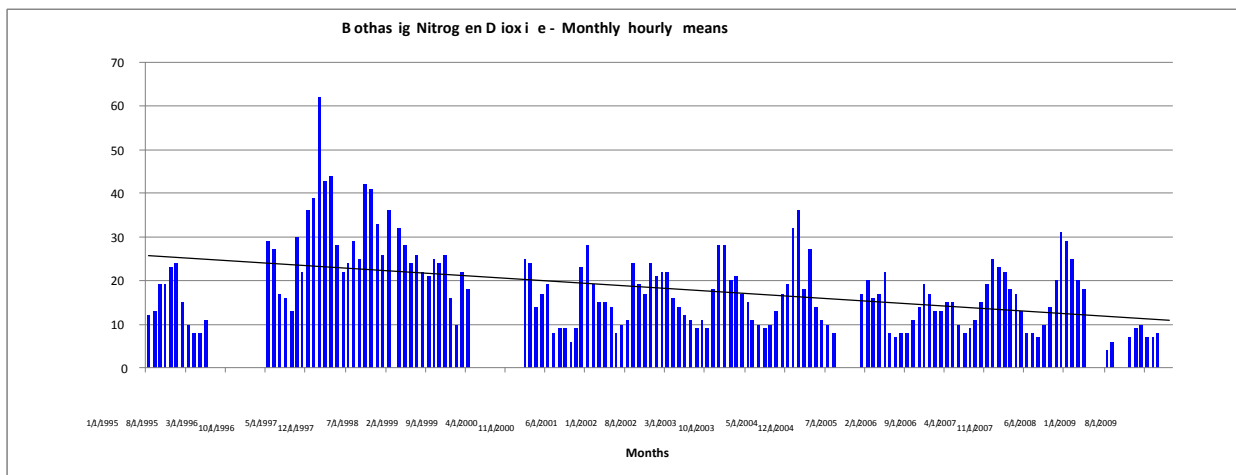
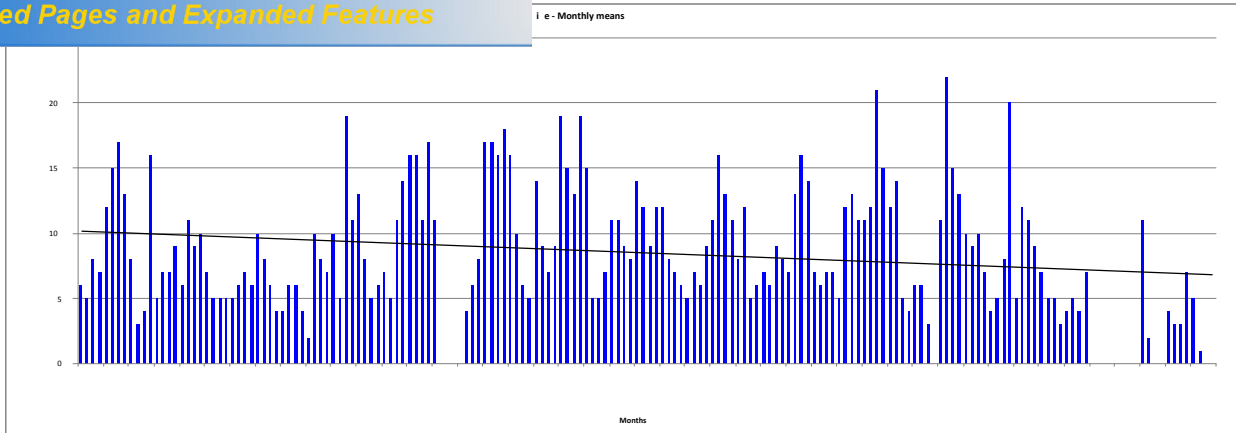
Table 5. Monthly means ($\mu\text{g}/\text{m}^3$) for pollutants monitored at monitoring stations.

CITY SITE	SO ₂	NO	NO ₂	NO _x	PM-10	CO	O ₃
UK Guideline ($\mu\text{g}/\text{m}^3$)	20	-	40	-	50	-	-
SANS Guideline ($\mu\text{g}/\text{m}^3$)	50	-	40	-	50	-	-
Atlantis	-	NV	NV	NV	-	-	-
Bellville South	ND	-	-	-	ND	-	-
Bothasig	1	42	8	41	-	-	-
City Hall	ND	ND	ND	ND	-	ND	-
Foreshore	-	-	-	-	33	-	-
Goodwood	7	13	17	29	27	NV	NV
Khayelitsha	-	-	-	-	50	-	-
Killarney	ND	ND	ND	ND	ND	-	-
Molteno	-	-	-	-	-	-	42
Somerset West	ND	ND	ND	ND	ND	-	ND
Table View	11	NV	NV	NV	NV	-	-
Wallacedene	6	55	14	56	28	NV	NV

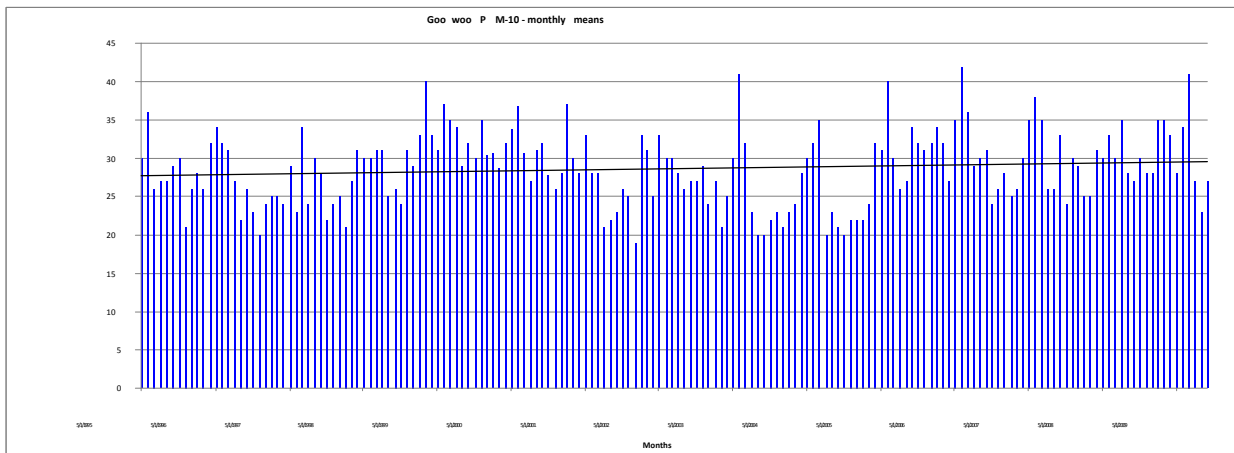
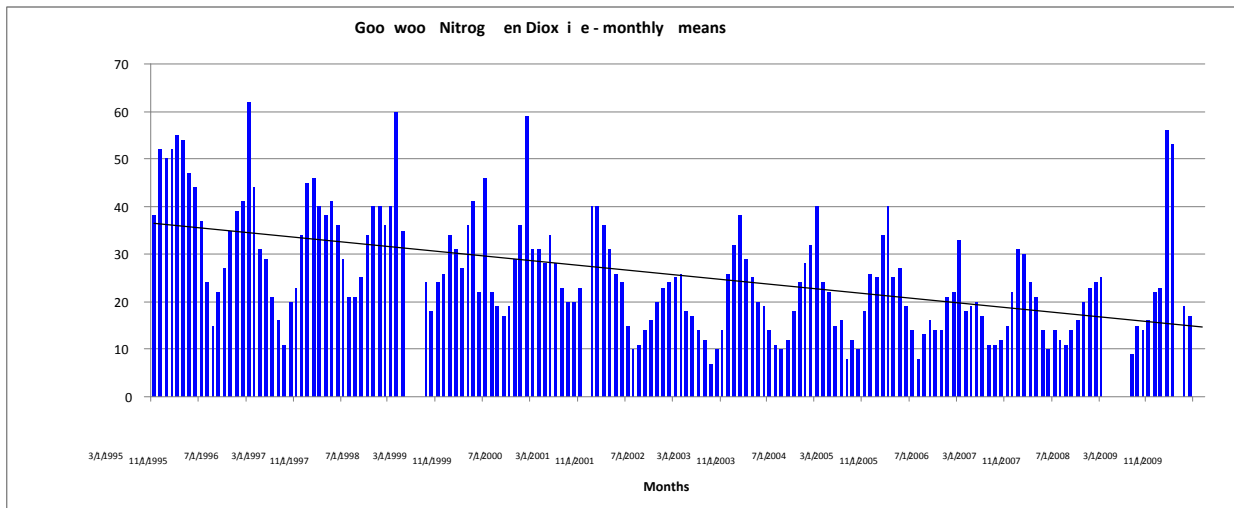
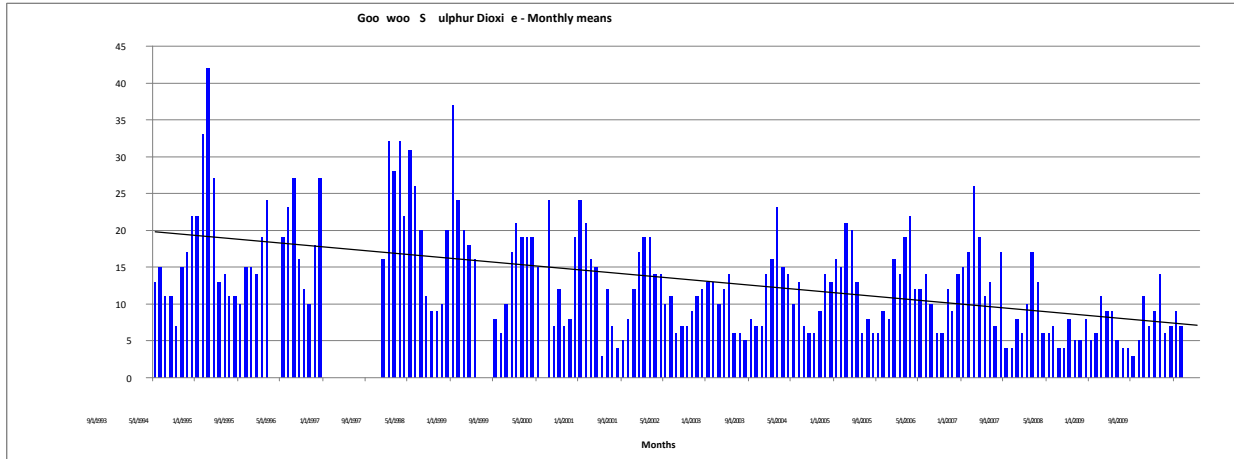
** All values rounded to last significant figure.

NV – No value due to analyser fault ND – No data due to site being off.

ommenced during 1995. Below are trend graphs to show measured since 1995 to present. PM-10 monitoring at lutants show a downward trend.



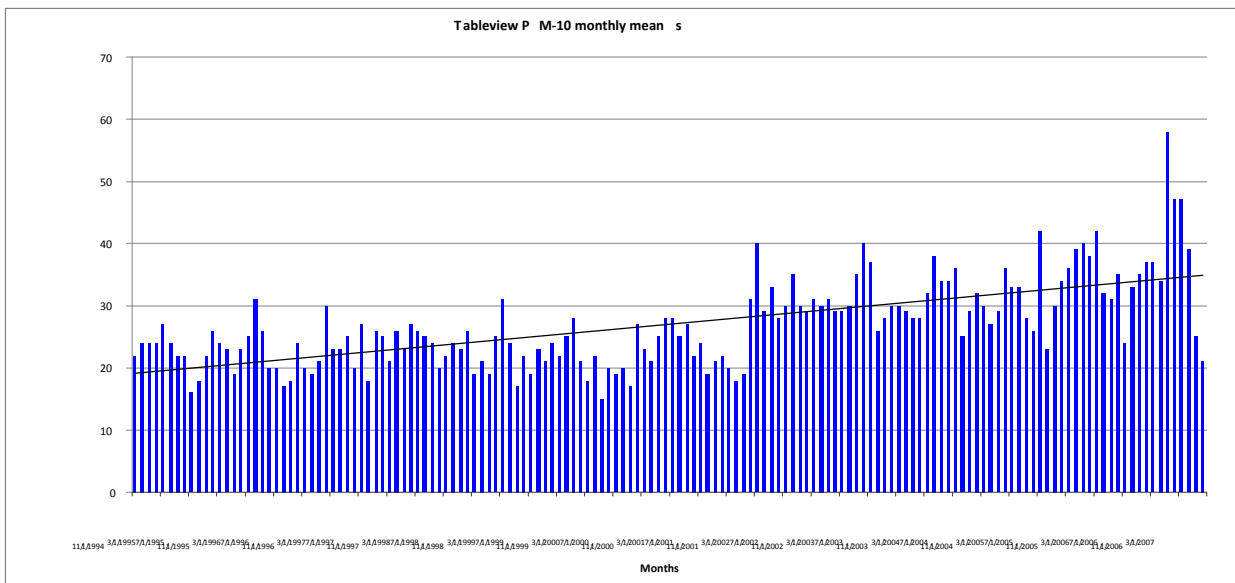
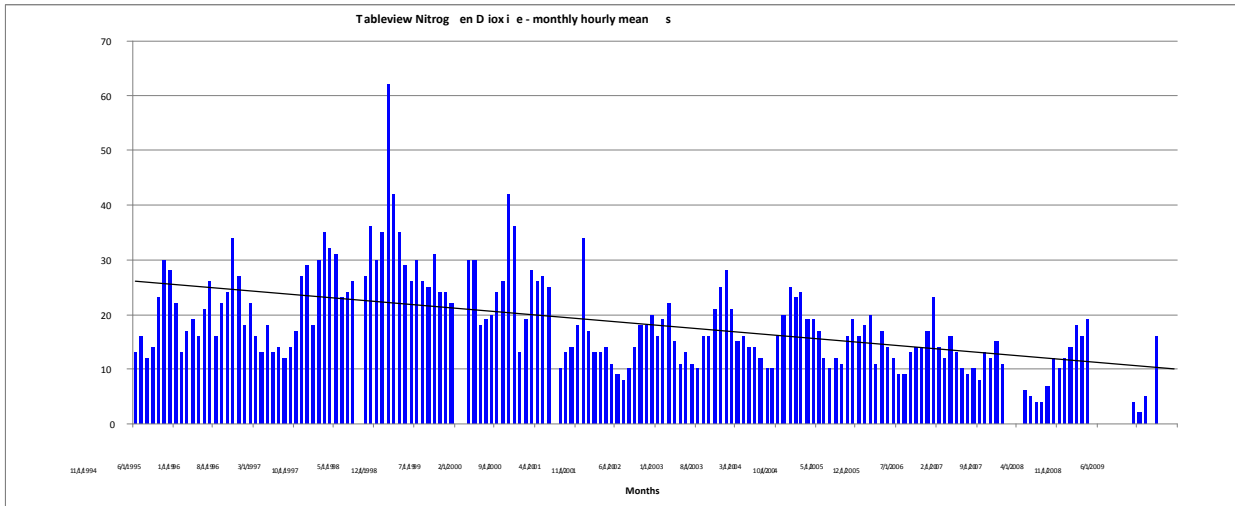
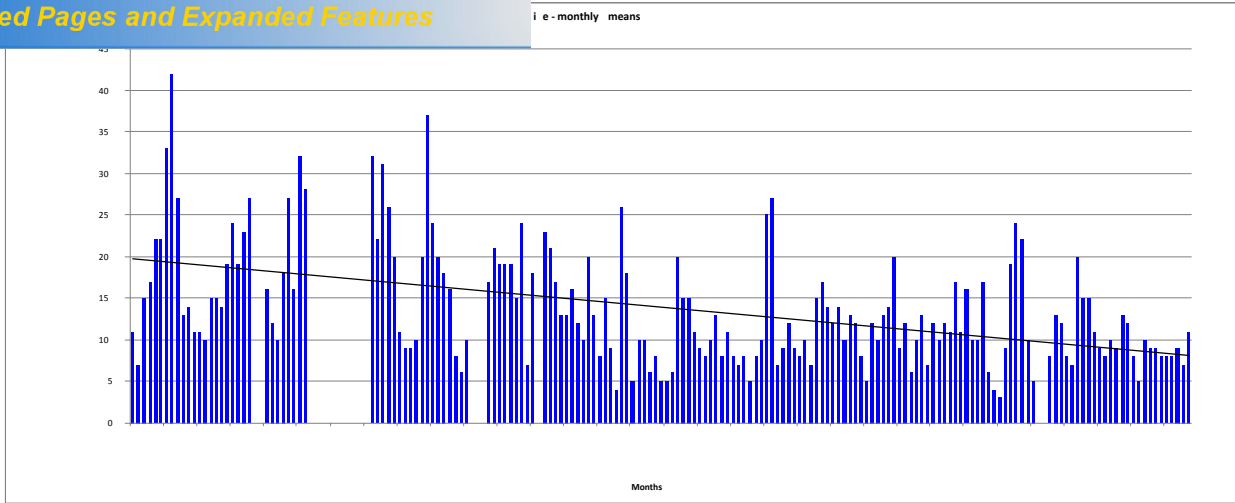
g 1993 while NO₂ and PM-10 started during 1995. Below
 ges for the pollutants measured since the start to present.
 end while PM-10 has a slight upward trend.



Tableview

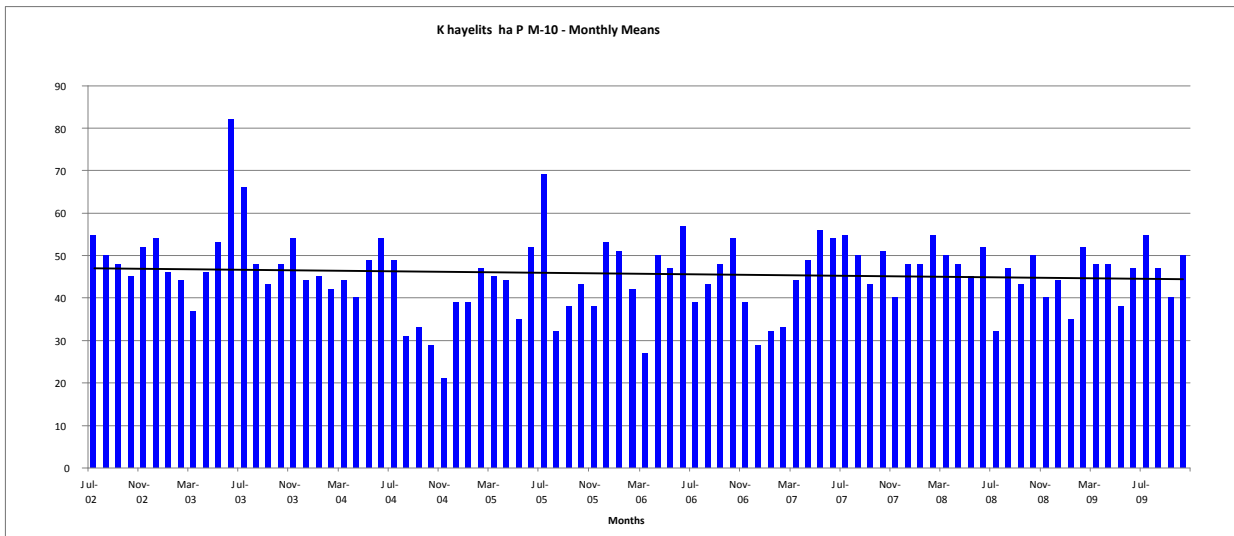
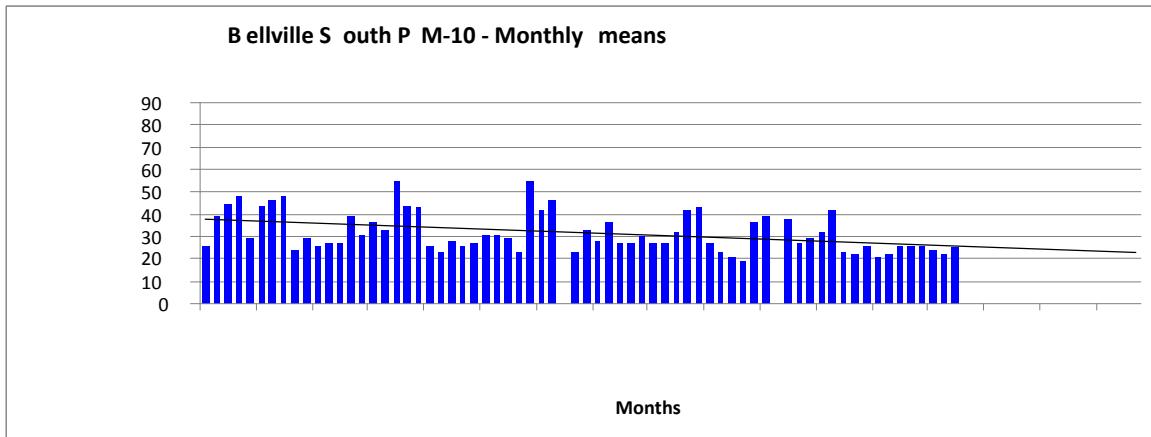
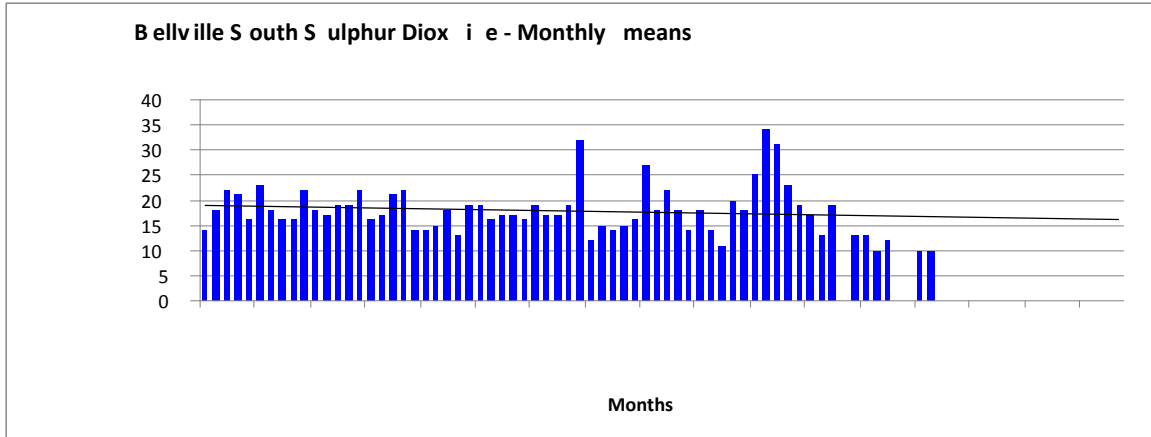
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g 1993 while NO₂ and PM-10 started during 1994. Below
 ges for the pollutants measured since the start to present.
 end while PM-10 has an upward trend.





enced during 2003 while PM-10 monitoring in Khayelitsha (site C). Below are trend graphs to show the monthly they started to present. There is a slight downward trend





Foreshore and Molteno

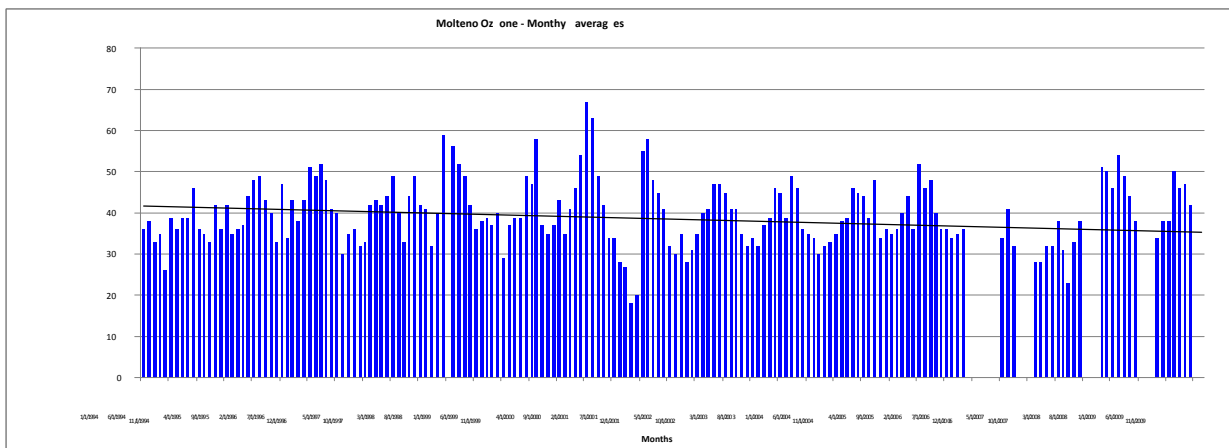
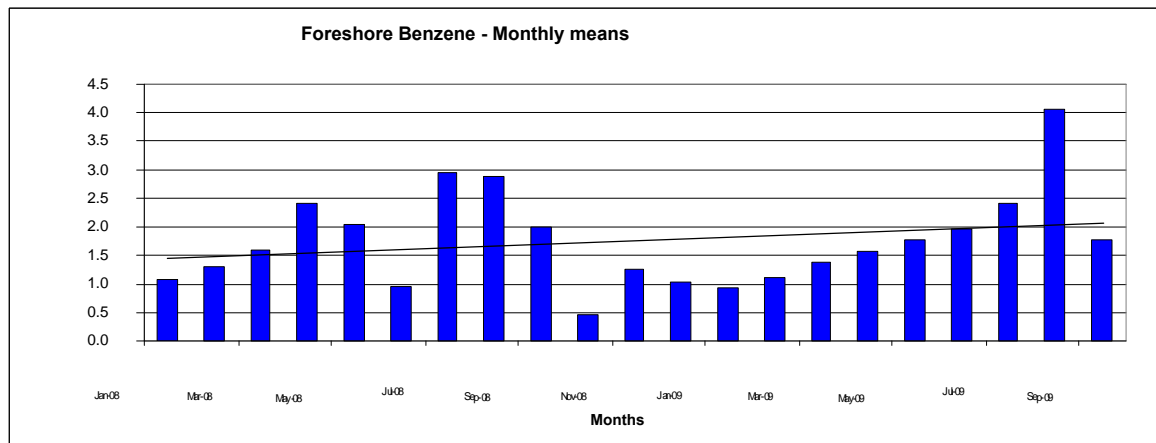
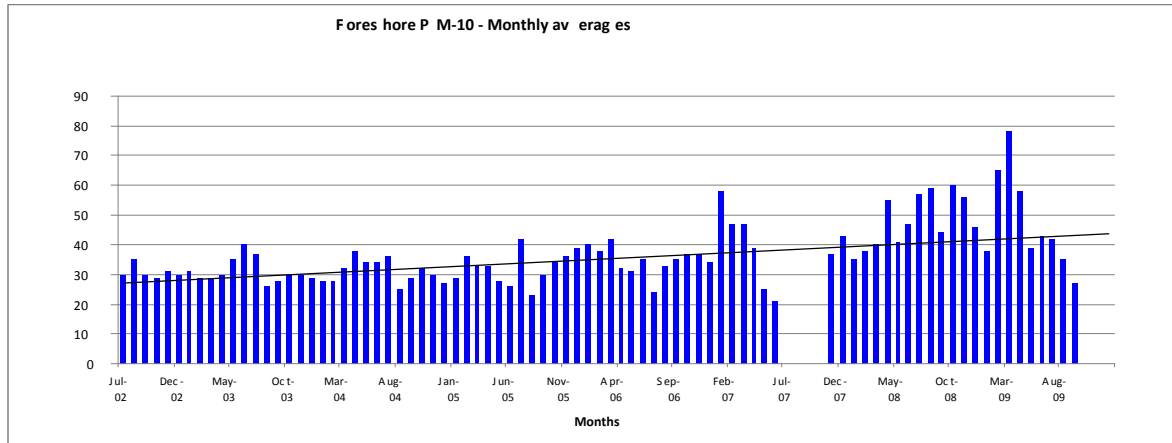
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Monitoring commenced during 2002 with the sampler situated in the Foreshore towards the end of 2007 and VOC monitoring at Molteno started during 1994. Below are trend graphs to show concentrations of pollutants measured since they started to present. There is a slight

upward trend for PM-10 and benzene and a downward trend for ozone.



ational Air Quality Standards (SANS 1929:2009), the City of Cape Town has adopted the European/UK guidelines in its State of the Environment Report (SOE). There were ten days during October where the PM-10 daily guidelines were exceeded and thus reported as episode days. PM-10 concentrations exceeded the European/UK PM-10 daily guideline limit of 50 $\mu\text{g}/\text{m}^3$ on eight days of these days while on the 21st and on the 25th of October the PM-10 levels at Khayelitsha exceeded the SANS PM-10 guideline of 75 $\mu\text{g}/\text{m}^3$.

Cape Town has a typical Mediterranean climate and therefore during the wet winter months there are often days when stable atmospheric conditions occur that are combined with temperature inversions. During these days the pollution from the day to day activities are concentrated below the inversion layer and is often visible as a brown haze . During the dry windy summer days elevated PM-10 levels are measured due to wind blown dust.

During October a slight temperature inversion in the morning combined with wind blown dust resulted in elevated PM-10 levels at the sites as measured.

Meteorological data assists in determining possible air pollution sources within the City. Meteorological equipment will be installed at Goodwood, Table View, Bothasig and Atlantis during the first week of November 2009 and will be reported in the future.

End of Report