



T0107

## Draft Monthly Report: January 2007

Prepared for

**RBCAA**

AQ002

30 April 2007



## EXECUTIVE SUMMARY

The RBCAA monthly report for January 2007 is presented. The ambient air monitoring system as maintained by Ecoserv is accredited to ISO 17025:2005 by the South African National Accreditation Service (SANAS) for the measurement of SO<sub>2</sub> and PM<sub>10</sub>. Measurement of other pollutants reported does not fall within this accreditation. The applicable quality controls and measurement methods are listed in Appendix 1.

### SO<sub>2</sub> guideline exceedances

There were no measured exceedances of the DEAT standards or SANS limit values during the reporting period.

Even though there were no measured exceedances during the reporting period, the HAWK model predictions show that other areas may have experienced exceedances within the month of January. It is not practical to measure actual SO<sub>2</sub> concentrations everywhere and as a result, the HAWK model is used as a predictive measure for determining the levels of SO<sub>2</sub> in Richards Bay. The model output is set to predict the maximum SO<sub>2</sub> concentrations and therefore the worst case scenario, which may not always be the case in a particular area. Details of the model parameters are provided in Appendix 8.

### Monthly average SO<sub>2</sub> concentrations

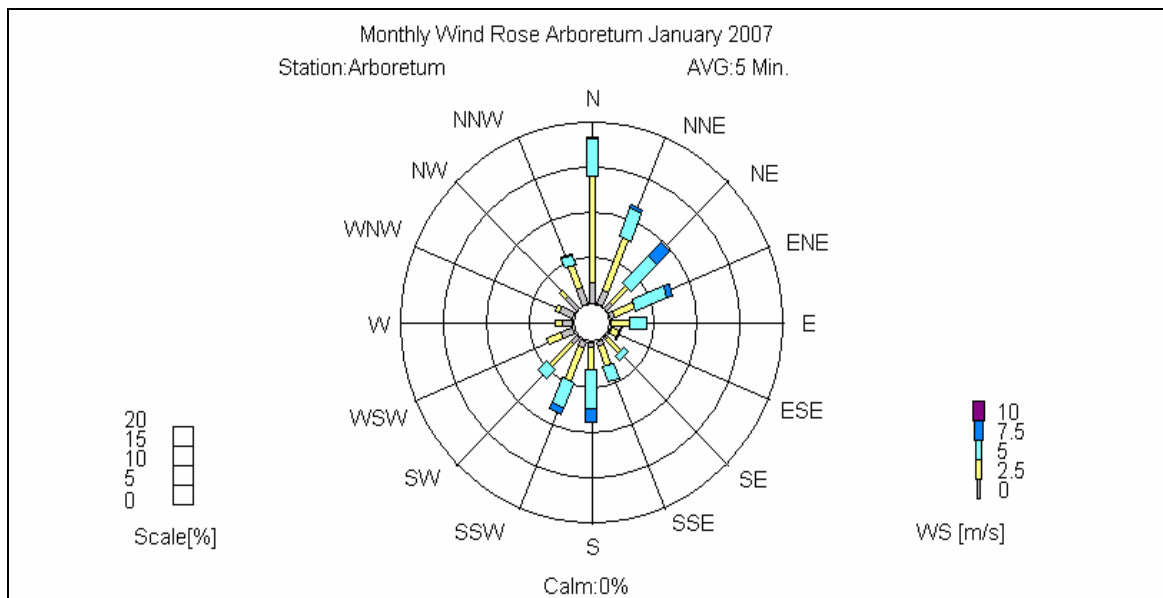
Arboretum:	2.6 ppb
Harbour West:	5.6 ppb
Brackenham:	1.8ppb
CBD:	5.6 ppb
Scorpio:	4.8 ppb

## Data capture and analyser performance

The data capture is representative of the operation of that particular station, whereas the pollutant data capture rate indicates the analyser reliability.

DATA CAPTURE (%) FOR RBCAA SYSTEM DURING JANUARY 2007					
Station	Data (%)	SO <sub>2</sub> (%)	PM <sub>10</sub> (%)	Ozone	TRS (%)
Arboretum	79.5	73.5			
Harbour West	100	99.8			
Brackenham	97.3	66.4		97.3	
CBD	95.8	95.6	0		95
Scorpio	84.7	99.8			

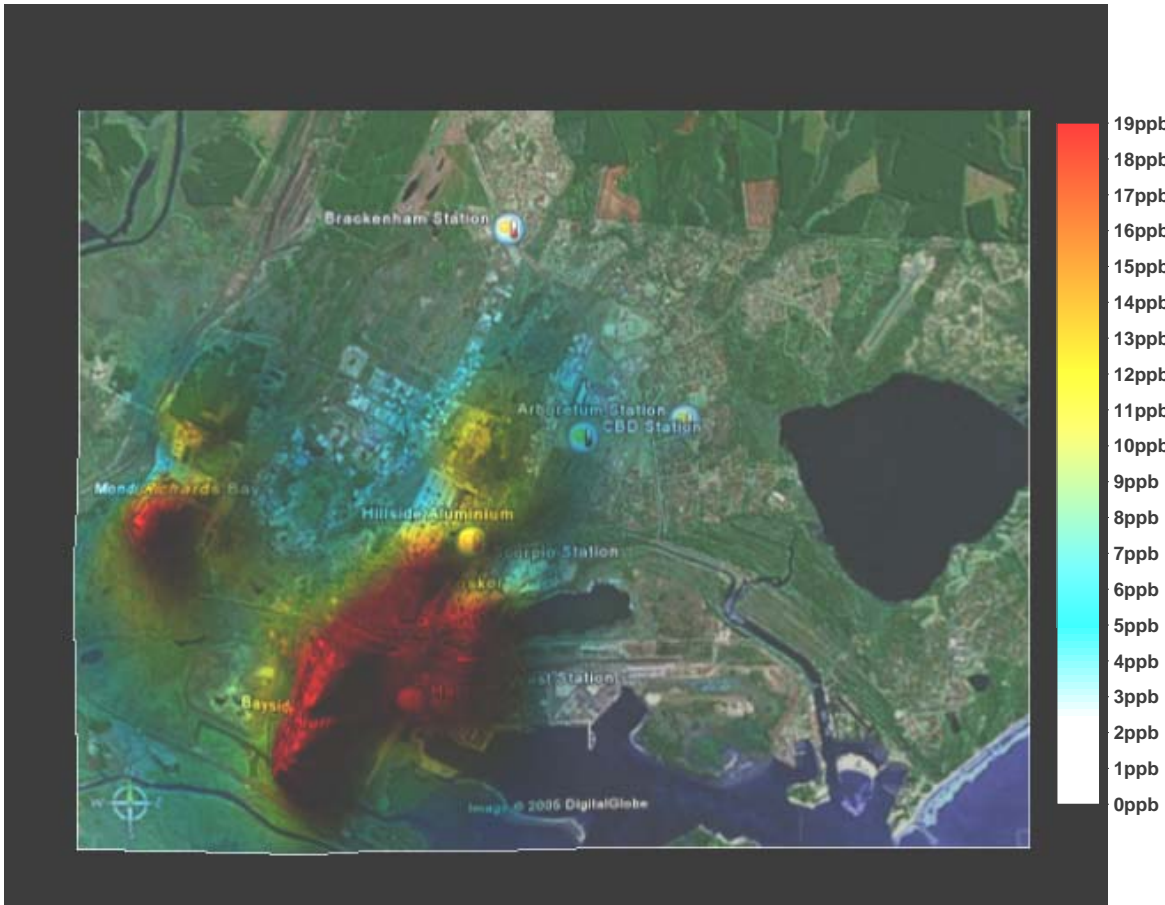
## Wind rose for Arboretum for January 2007



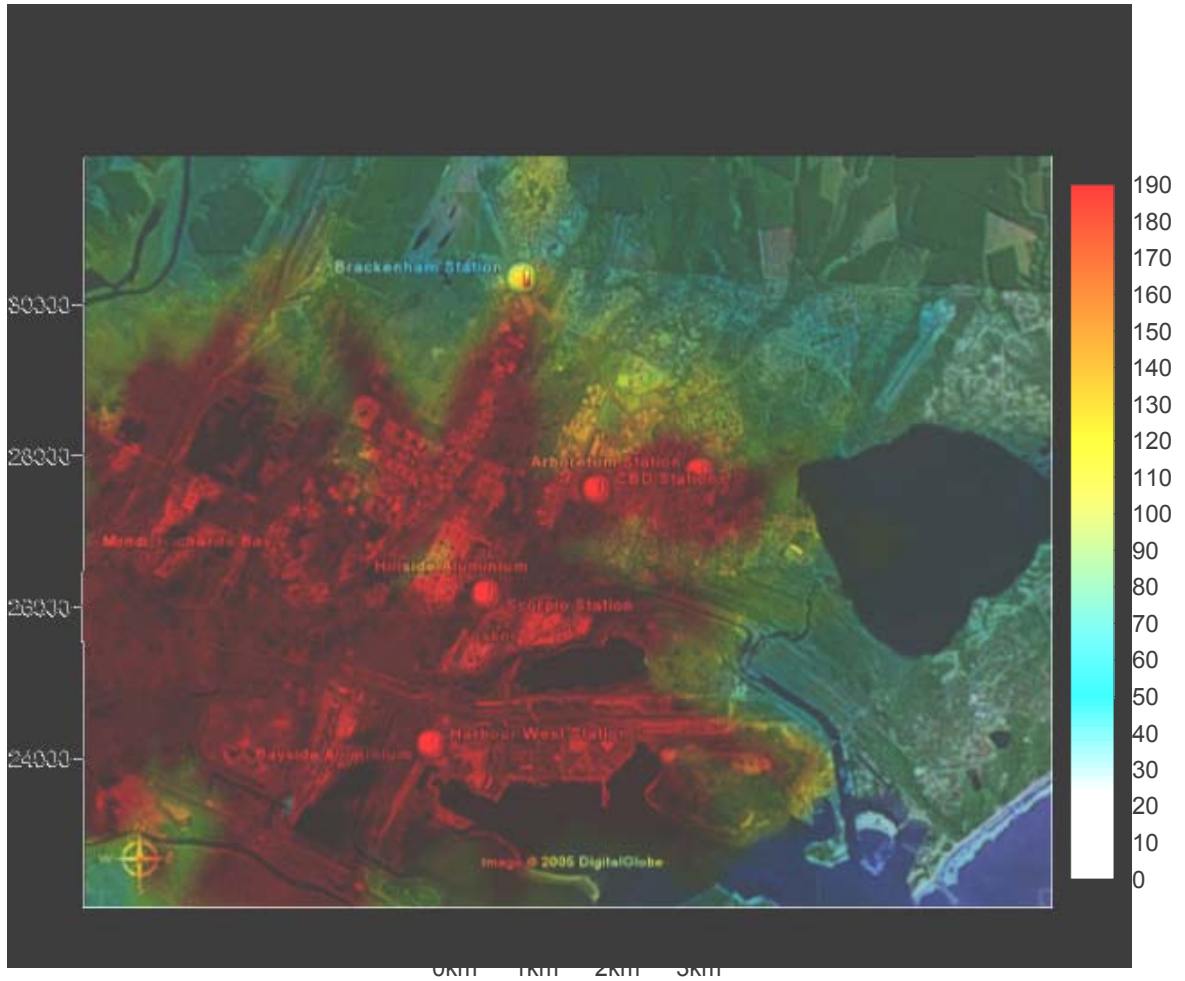
Calm = winds <0.5m/s

Winds blew predominantly from the north to ENE and south to SSW. Wind speeds were stronger from the SSW to south, associated with the passage of coastal lows and cold fronts and from the north-east, associated with high pressure offshore.

January 2007 Monthly Average SO<sub>2</sub> Concentration Dose Map (Concentrations in ppb)



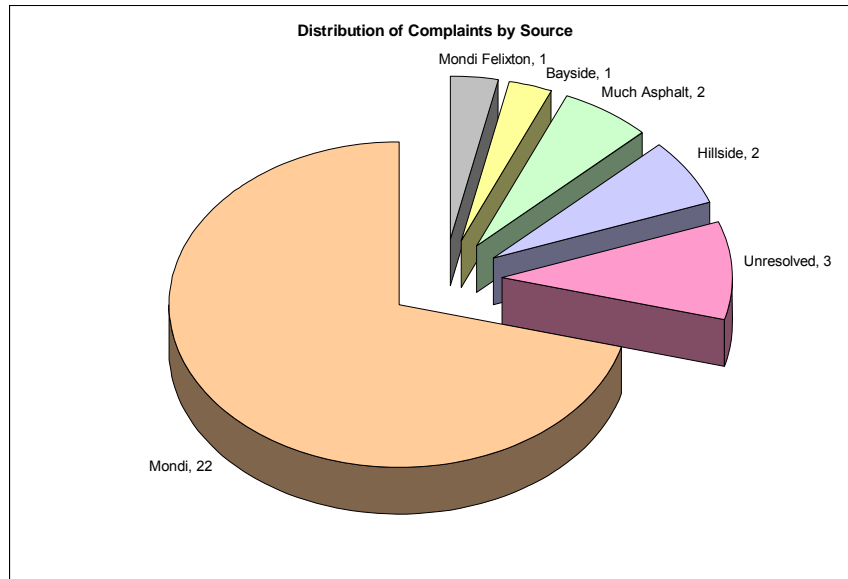
January 2007 Maximum 10 Minute Average SO<sub>2</sub> Concentration Dose Map (in ppb)



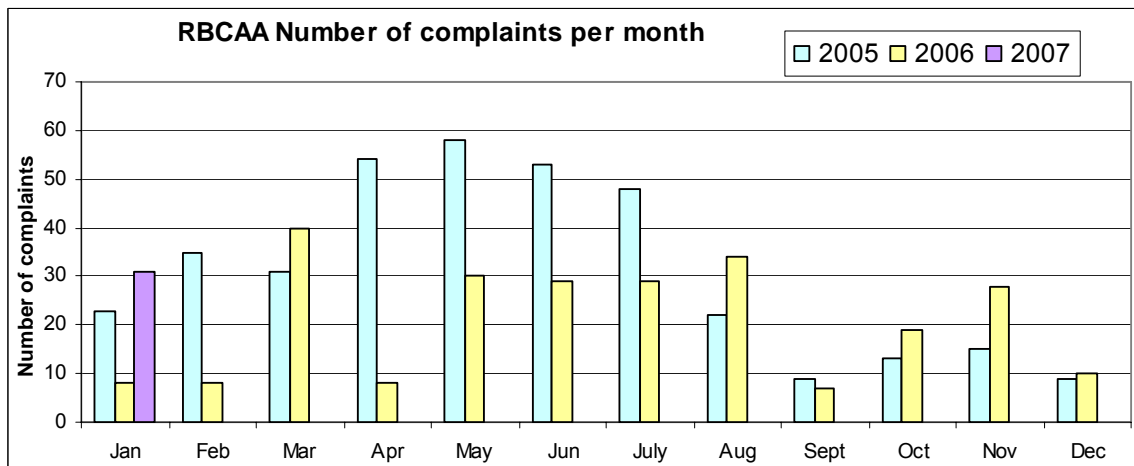
### Air quality complaints

A total of 31 air quality complaints were received for the month. The distribution by source is given below and the historical count of complaints by month is also reflected.

### Air quality complaints by source



### Comparison of number of air quality complaints per month



**PM<sub>10</sub> data**

The TEOM was taken off line during the month of November 2006 due to interference noted on the analyser. Notes on the operational issues are detailed in Appendix 6.

**TRS data**

Total reduced sulphur measurements give an indication of odours. TRS data from the CBD station is presented in Appendix 7.

**Ozone data**

Ozone measurements from the Brackenheim station are presented in Appendix 7. There were no guideline exceedances, with the maximum hourly average of 49 ppb being only 41% and 48% of the NEMAQA and SANS hourly average limits, respectively.

## REPORT DETAILS

REFERENCE	AQ002
REPORT TITLE	Monthly report: January 2007
DATE SUBMITTED	30 April 2007
CLIENT	Sandy Camminga P O Box 21229, Richards Bay, 39001  (035) 786 0076
PREPARED BY:	Quentin Hurt, Lance Coetzee and Mia Antoni ECOSERV 6 Sookhai Place Derby Downs Westville Durban Tel: (031) 2791400 E-mail: info@ecoserv.co.za
SIGNED	
APPROVER	Quentin Hurt                      Signed:
STATUS	Final
NOTICE	This report has been prepared by ECOSERV (Pty) Ltd with all reasonable skill, care and diligence within the terms of the contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client. We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.  This report is confidential to the client and we accept no responsibility of whatsoever nature to third parties to which this report or any part thereof is made known. Any such party relies upon the report at their own risk.



## TABLE OF CONTENTS

Description	Page
1 INTRODUCTION	10
2 PREVAILING WIND CONDITIONS	11
3 MONITORING AND MODELLED RESULTS	12
3.1.1 <i>Monthly SO<sub>2</sub> averages and comparison to Hawk prediction</i>	13
3.2 Daily Average Information	15
3.2.1 <i>Maximum daily SO<sub>2</sub> averages and comparison with Hawk prediction</i>	15
3.2.2 <i>Measured daily average SO<sub>2</sub> during January</i>	16
3.2.3 <i>Maximum daily average dose map for SO<sub>2</sub></i>	17
3.3 Hourly Average Information	18
3.3.1 <i>Maximum hourly SO<sub>2</sub> averages and comparison with Hawk results</i>	18
3.3.2 <i>Maximum hourly average dose map for SO<sub>2</sub></i>	19
3.3.2 <i>Measured hourly average SO<sub>2</sub> trends</i>	20
3.4 Maximum 10-Minute average SO <sub>2</sub>	23
3.4.2 <i>Maximum 10-Minute average dose map for SO<sub>2</sub></i>	24
4 AIR QUALITY COMPLAINTS	25
4.1 Field Observations	25
4.2 Distribution of Complaints by Source	26
4.4 Complaints by type	27
5 COMPLIANCE WITH GUIDELINES	28
APPENDIX 1 SANAS Requirements	28
APPENDIX 1 SANAS Requirements	29
APPENDIX 2 Data capture and analyser performance	30
APPENDIX 3 Diurnal SO <sub>2</sub> Trends	31
APPENDIX 4 Meteorological data	32
APPENDIX 5 Air Quality Complaints Log	34
APPENDIX 6 PM <sub>10</sub> data	39
APPENDIX 7 TRS Data	40
APPENDIX 8 Ozone Data	42
APPENDIX 9 Hawk Dispersion Model Parameters	44

## 1 INTRODUCTION

This report summarises the sulphur dioxide (SO<sub>2</sub>) monitoring data gathered by the RBCAA monitoring network for the month of January 2006. The SO<sub>2</sub> monitoring network consists of five monitoring stations situated at Brackenham, Arboretum, Harbour West, Scorpio (intersection of John Ross Highway and West Central Arterial) and CBD situated near the Municipal building. The monitoring system as maintained by Ecoserv is accredited by the South African National Accreditation Service (SANAS) for the measurement of SO<sub>2</sub> and PM<sub>10</sub>. The applicable quality controls and measurement methods are listed in Appendix 1. The measured results pertain to instantaneous samples drawn from air passing the above fixed stations, and care should be taken when extrapolating these results to surrounding areas. All results are reported at standard temperature and pressure. Measured SO<sub>2</sub> concentrations over various time scales are compared to percentile concentrations predicted by the Hawk air pollution dispersion model. The Hawk model SO<sub>2</sub> concentrations are based on ambient meteorological conditions and an emission inventory. Opinions, interpretations, meteorological data and Hawk model findings presented in this report do not form part of the SANAS accreditation.

Modelled SO<sub>2</sub> concentrations, using the Hawk dispersion model, are presented and results are compared to the monitored concentrations. It is also the intention of this report to highlight certain incidents and exceedances of air quality standards. The National Environment Management Air Quality Act, Schedule 2 standards for SO<sub>2</sub> (Act 39 of 2004, published 24 February 2006) are listed in Table 1.

TABLE 1 : NATIONAL AMBIENT AIR QUALITY STANDARDS				
Pollutant	10-minute average	1-hour average*	24-hour average	Annual average
Sulphur dioxide (SO <sub>2</sub> )	191 ppb	134 ppb	48 ppb	19 ppb

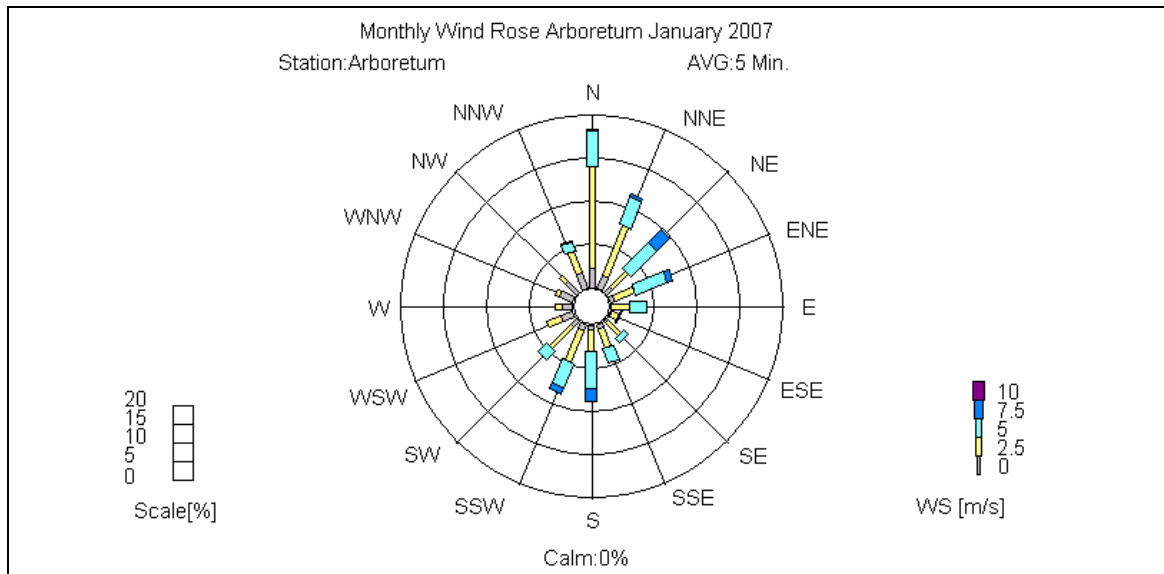
\* SANS 1929 Standard published by DEAT 9 June 2006 for comment

Additional pollutants measured as part of the RBCAA monitoring programme include total reduced sulphurs (TRS) at the CBD station and ozone (O<sub>3</sub>) measured at the Brackenham station, the results of which are presented in Appendix 7 of this report.

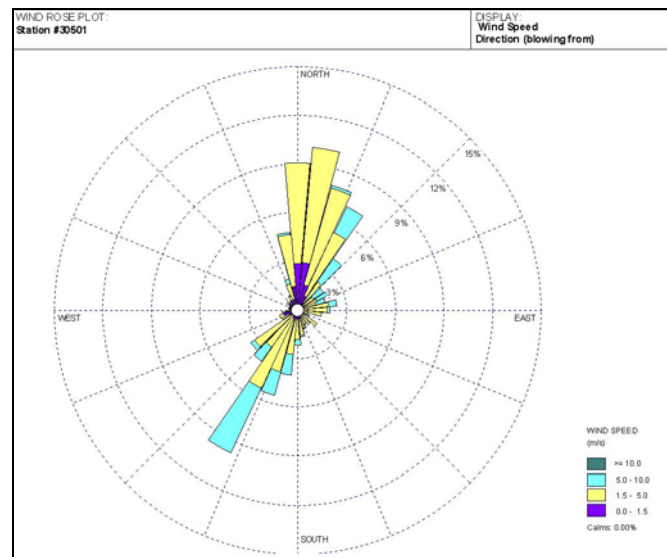
## 2 PREVAILING WIND CONDITIONS

**Figure 1: 5-minute average wind rose for the Arboretum station for January 2007, with comparison to the previous year.**

(a) Arboretum January 2007 (Average wind speed = 4.4 m/s, calm = winds < 0 m/s)



(b) Arboretum January 2006 (Average wind speed = 3.0 m/s)



The wind pattern for January 2007 was similar to the previous year, although average wind speeds were higher during January this year. The wind from the westerly quadrant proved important in determining the air pollution distribution pattern for the month, with areas to the south east of the major sources exhibiting higher concentrations.

### 3 MONITORING AND MODELLED RESULTS

In this section of the report, SO<sub>2</sub> concentrations measured at the fixed monitoring stations and SO<sub>2</sub> concentrations predicted by the Hawk dispersion model are compared. The Hawk dispersion model uses meteorological and topographical data, and an emission inventory to simulate the prevailing conditions in order to estimate the concentration of SO<sub>2</sub> at any given point within the area of interest. This requires the use of certain assumptions resulting in a variation between the modelled and measured SO<sub>2</sub> concentrations presented.

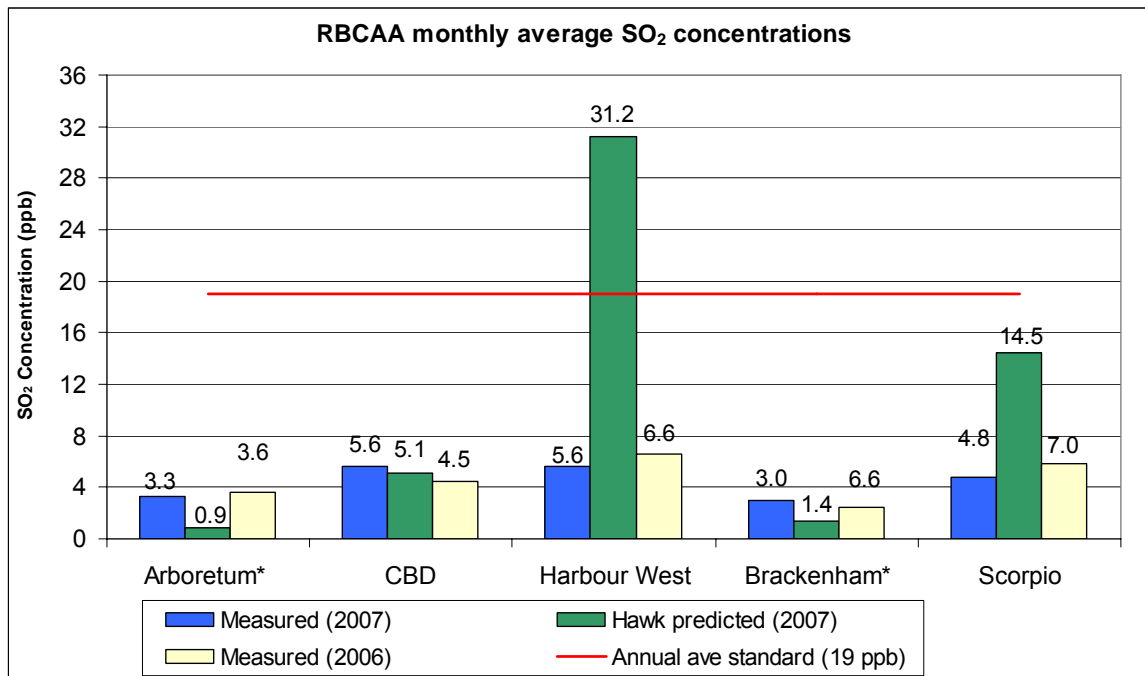
The dose maps generated using the Hawk model represent the cumulative concentrations predicted at pre-defined receptor grid points by means of concentration isopleths, averaged over the required time period. This is represented as representative shading overlaid on an aerial photograph of the Richard's Bay region. The predicted concentrations presented in these dose maps are estimated using the Hawk Dispersion model and may vary from actual concentrations, particular for stations less than 1 km from major sources. All model-predicted concentrations have been adjusted to the 95% percentile. The area within a respective shading band indicates that the area was exposed to SO<sub>2</sub> concentrations corresponding with the respective shading concentration.

The National annual average standard of 19 ppb is applied to monthly averaging periods in the dose maps presented since there is no monthly average SO<sub>2</sub> standard. This results in the comparison of predicted and guideline SO<sub>2</sub> concentrations being more conservative.

### 3.1.1 Monthly SO<sub>2</sub> averages and comparison to Hawk prediction

The monthly average SO<sub>2</sub> measured at each of the RBCAA stations and the Hawk predicted average for the month is shown in Figure 2. The monthly average for the same period the previous year (where available) is also provided.

**Figure 2: Monthly average SO<sub>2</sub> concentrations measured at fixed stations and comparison**



\*January 2007 measured data presented for interest only. Data capture below quality assurance level.

For the purposes of modelling, it was assumed that the Foskor emission was zero for the month of January. This general assumption was based on the fact that the acid plant was out of commission for most of the month.

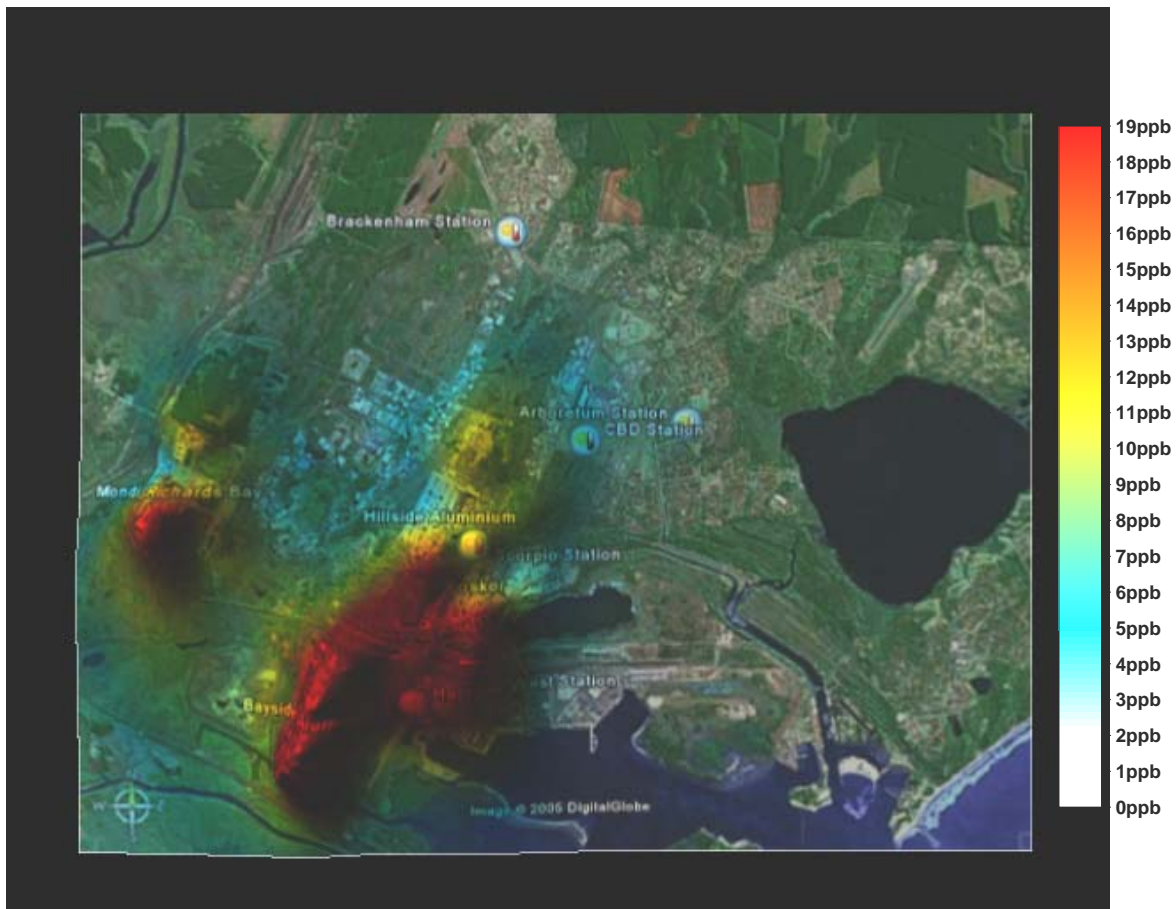
The monthly average SO<sub>2</sub> for January 2007 at the CBD and Brackenham stations was higher than that for the previous year. This was also the case at the CBD during the previous four months. At the remainder of stations the monthly average SO<sub>2</sub> for January 2007 was less than that for January 2006. In the case of the Scorpio and Harbour West stations this may also be due to changes in plant processes as there is a relatively higher frequency of northerly component winds.

There was fairly good agreement between the measured SO<sub>2</sub> concentrations and those predicted by the model for Arboretum, the CBD and Brackenham stations, however the model over-predicted concentrations at the Harbour West station and, to a lesser

extent, at the Scorpio station. The over-prediction at Harbour West was during northerly to north-easterly winds and model response during these winds will need to be investigated. It is recommended that the emissions from the Hillside and Bayside plants in particular be studied as this would have been the major contributor to these concentrations with the Foskor emission omitted.

### 3.1.2 Monthly Average Dose Map for SO<sub>2</sub>

Figure 3: January 2007 monthly average SO<sub>2</sub> concentration dose map (Concentrations in ppb)

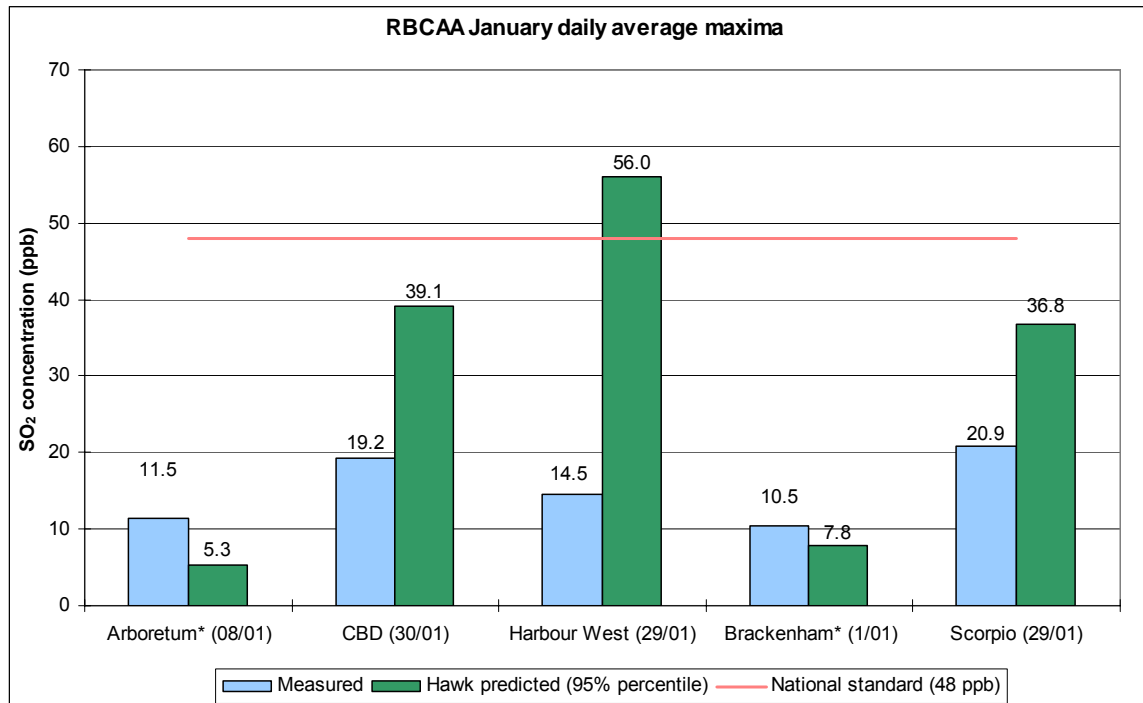


The Hawk dispersion model predicted that area between Bayside Aluminium and Foskor, the area south of Mond and east of Bayside experienced monthly average SO<sub>2</sub> concentrations greater than the National annual average standard (19 ppb) for the month of January 2007. There were no measured monthly averages greater than the annual standard at any of the monitoring stations.

## 3.2 Daily Average Information

### 3.2.1 Maximum daily SO<sub>2</sub> averages and comparison with Hawk prediction

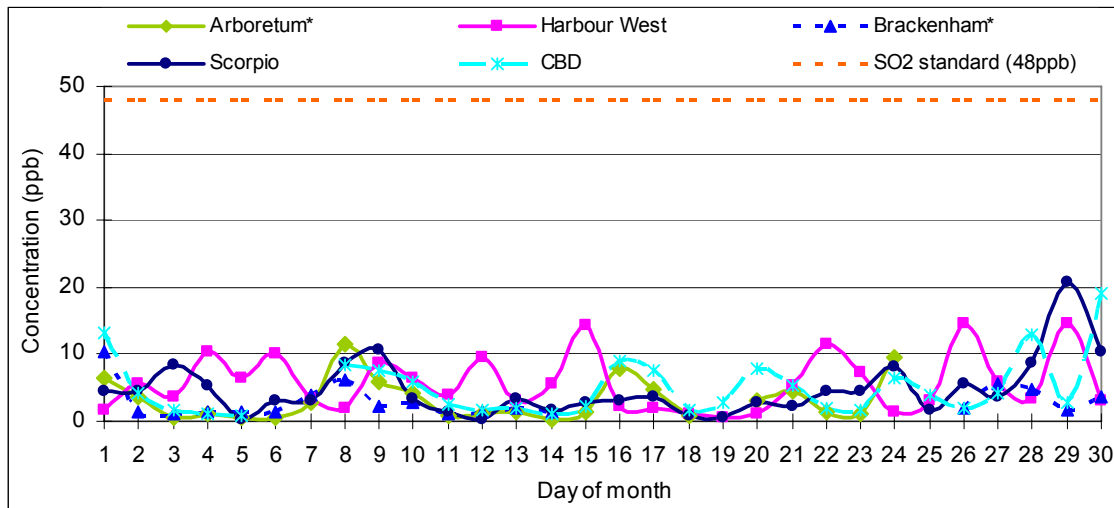
Figure 4: Comparison of Hawk predicted and measured maximum daily average SO<sub>2</sub> concentrations.



The highest daily average concentrations were measured at the end of the month (29<sup>th</sup> and 30<sup>th</sup>) with Scorpio and CBD reporting almost the same concentrations on the 29<sup>th</sup>. Under these conditions the Hawk model tended to over-predict the measured concentrations by almost a factor of two, again pointing to the necessity to review the Hillside and Bayside emission inventories or account for the effect of higher wind speeds over these sources. The over prediction at Harbour West is consistent with previous experience with the model's representation of conditions in the vicinity of this station but the degree of over-prediction is unusual.

### 3.2.2 Measured daily average SO<sub>2</sub> during January

Figure 5: Daily average SO<sub>2</sub> concentrations measured at the fixed stations for January 2007  
(National standard = 48 ppb)



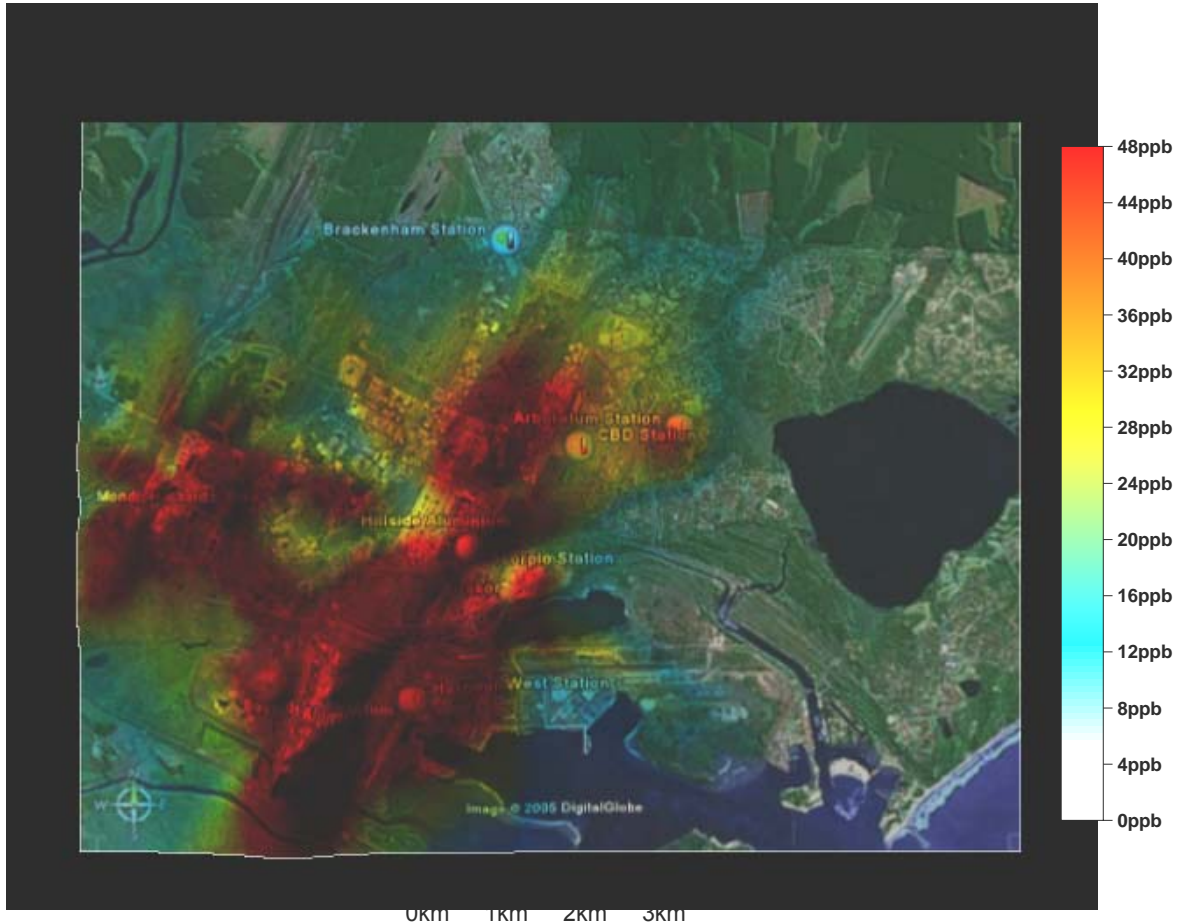
\*Data presented for interest only. Data capture below quality assurance level.

The Scorpio and Harbour West stations measured agreeable peaks on occasions (e.g. 9<sup>th</sup>, 26<sup>th</sup>, 29<sup>th</sup>) but trends were out of phase on other occasions (e.g. 1<sup>st</sup> to 8<sup>th</sup>, 12<sup>th</sup>). The peaks at both stations on 9<sup>th</sup> and 29<sup>th</sup> January were associated with north-westerly to NNE winds, and the elevated concentrations at Harbour West on 15 January were associated with light to moderate north-westerly to northerly winds. There is generally good agreement between the trends at the CBD, Arboretum and Brackenham stations, with the CBD station tending to measure higher concentrations than the other two stations. Elevated SO<sub>2</sub> at the CBD, Arboretum and Brackenham stations was generally measured during moderate to fresh south-westerly winds, which corresponds to the direction of industry relative to the stations.



### 3.2.3 Maximum daily average dose map for SO<sub>2</sub>

Figure 6: January 2007 maximum daily average SO<sub>2</sub> concentration dose map (concentrations in ppb).

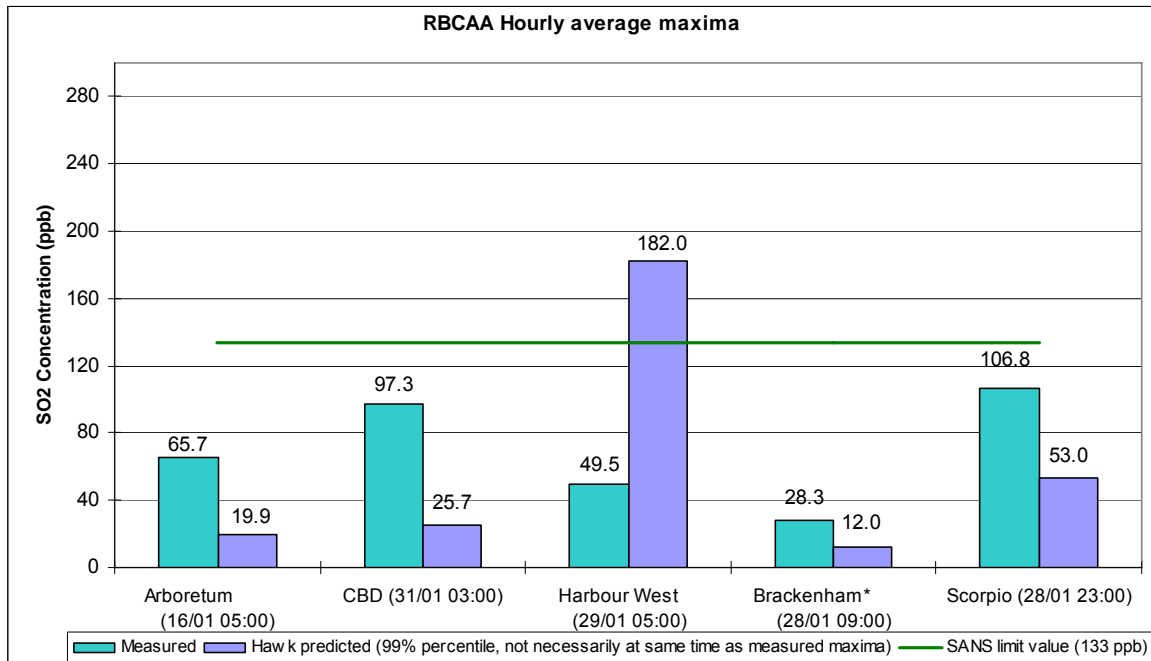


The model predicted that the area northeast and south of the major sources experienced daily average concentration in excess of the guideline. The areas extended about 2 km out from the Hillside and Bayside plants and about 1 km from Mondri.

### 3.3 Hourly Average Information

#### 3.3.1 Maximum hourly SO<sub>2</sub> averages and comparison with Hawk results

Figure 7: Comparison of Hawk predicted and measured maximum hourly average SO<sub>2</sub> concentrations during January 2007



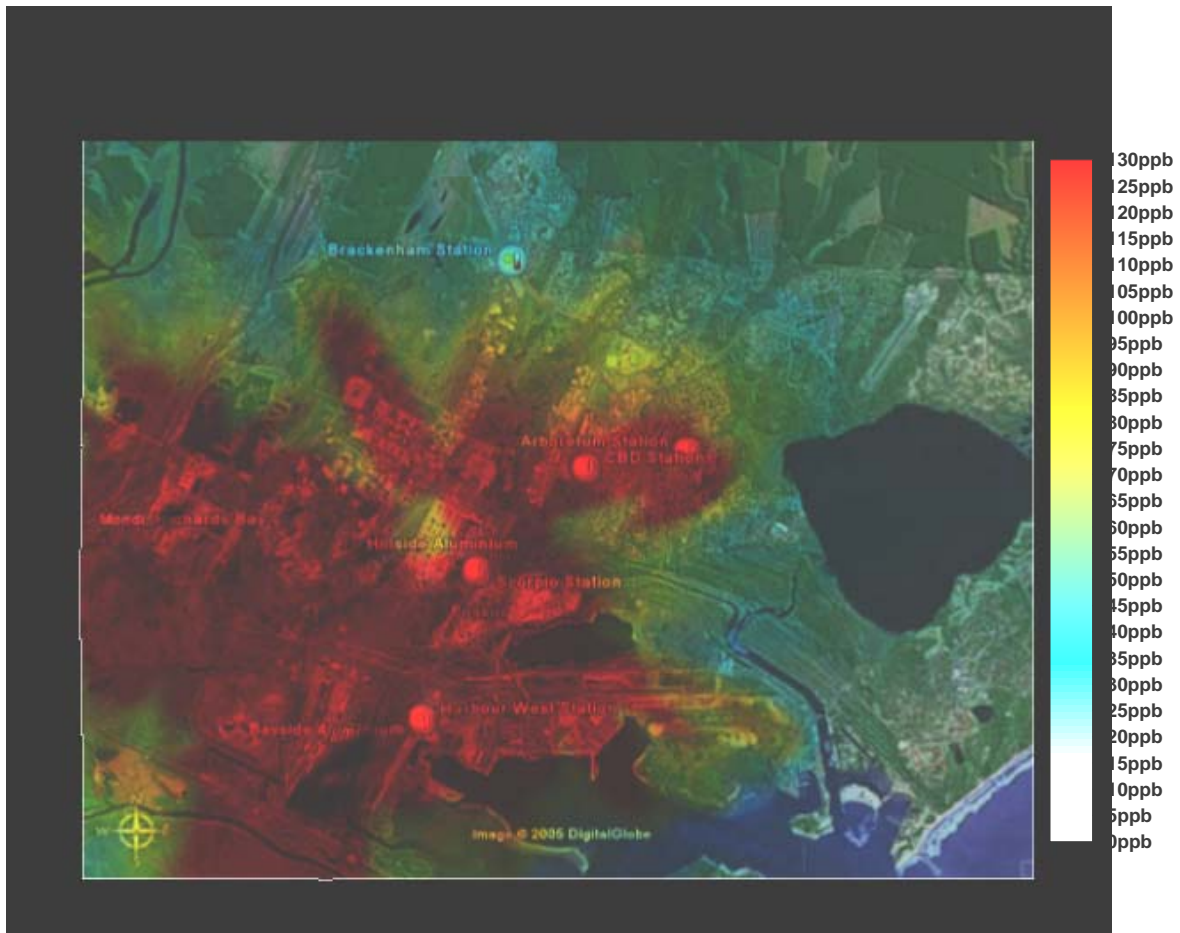
\*Data presented for interest only. Data capture below quality assurance level.

There were no measured hourly average SO<sub>2</sub> exceedances at any of the RBCAA stations. The half guideline (66 ppb) was exceeded at the CBD and Scorpio stations. Although the model predicted exceedances of the SANS 134 ppb limit value, for hourly average SO<sub>2</sub> where no short-term data is available (SANS 1929:2004), at the Harbour West station, there were no measured hourly average SO<sub>2</sub> exceedances at any of the RBCAA stations. The half guideline (66 ppb) was exceeded at the Arboretum and Scorpio stations.

The model under-predicted at all stations, except for Harbour West. The model concentration distribution centred on the area in the vicinity of Harbour West. The selection of the 95<sup>th</sup> percentile cut-off for comparison purposes is too severe in this instance but is maintained for consistency. The dose map distribution contained in the following section indicates that the best model comparison point is higher..

### 3.3.2 Maximum hourly average dose map for SO<sub>2</sub>

Figure 8: January 2007 maximum hourly average SO<sub>2</sub> concentration dose map (concentrations in ppb).



The South African National Standards (SANS) recommends an hourly average limit value of 134 ppb for those networks where short-term (i.e. 10-minute average) data is not available (SANS 1929:2004). This value can be applied to give an indication of air quality over the hourly averaging period. The model predicted that most of the central and industrial parts of Richards Bay experienced maximum hourly average SO<sub>2</sub> concentrations in excess of 134 ppb. A band of high concentration north east of Mondlo and Hillside is also evident. No measured concentrations exceeded the limit value.

### 3.3.2 Measured hourly average SO<sub>2</sub> trends

Figure 9: Hourly mean concentration at the Arboretum station (Monthly average = 3.3ppb)

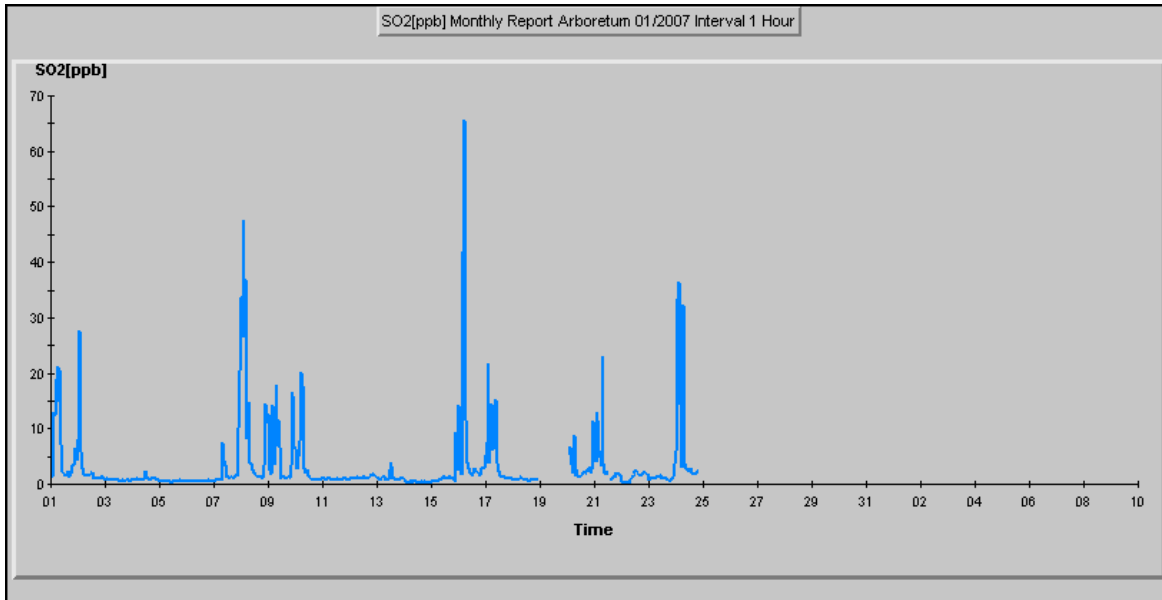
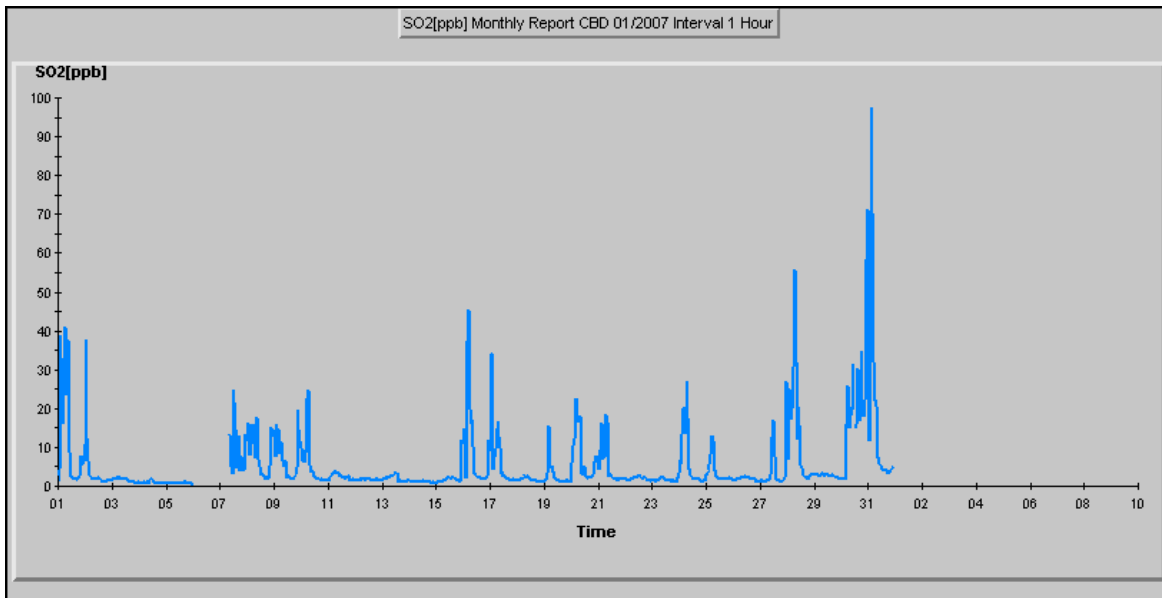
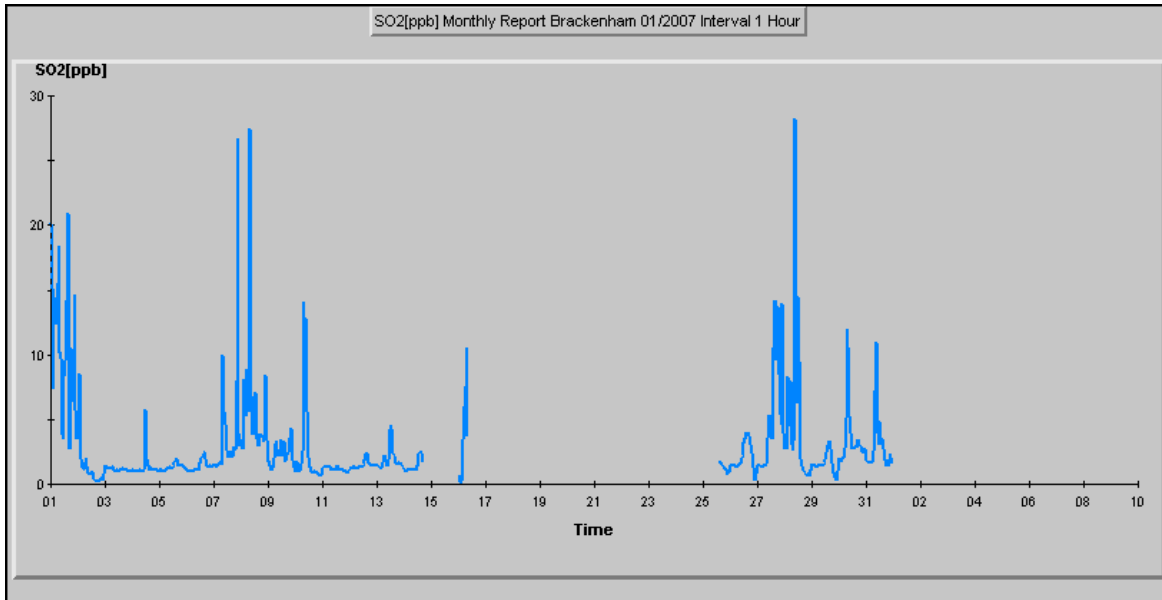
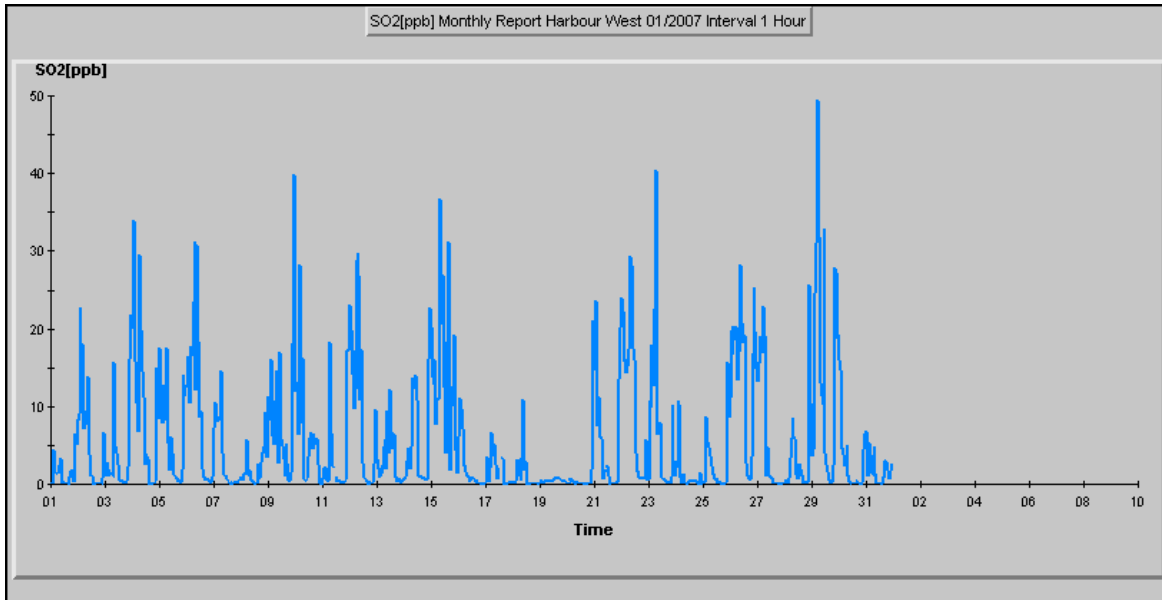
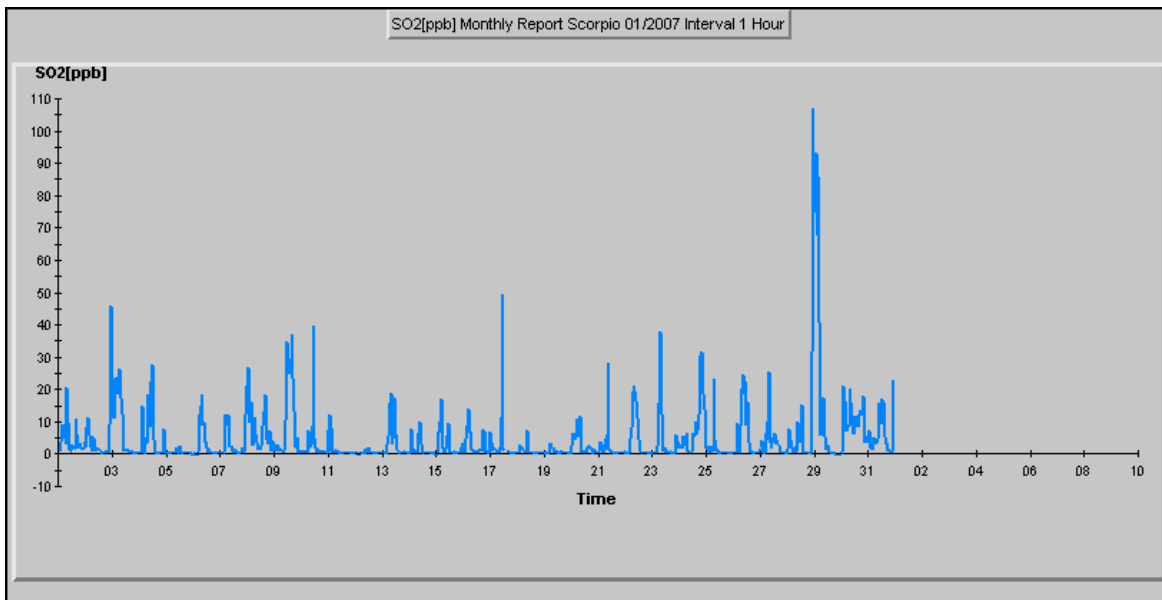


Figure 10: Hourly mean concentration at the CBD station (Monthly average = 5.6ppb)



**Figure 11: Hourly mean concentration at the Brackenhams station (Monthly average = 3.0ppb)**

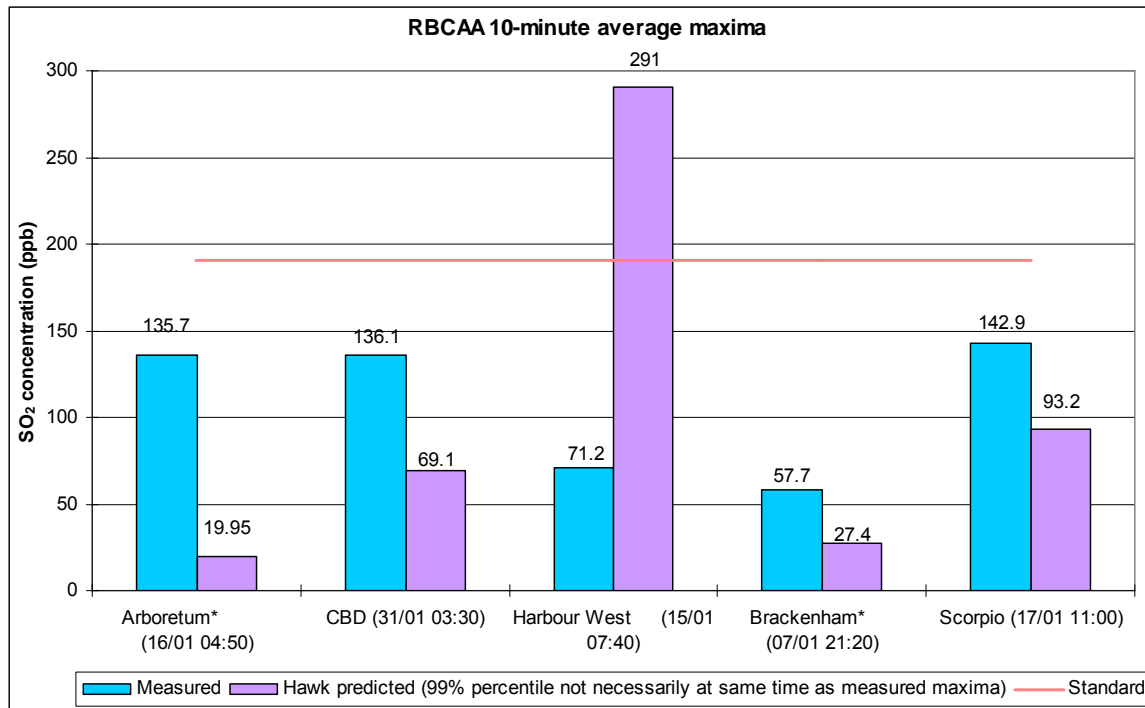
There was general agreement in the trends in hourly average  $\text{SO}_2$  at the Arboretum, CBD and Brackenhams stations, with elevated  $\text{SO}_2$  usually correlated with moderate to fresh southerly to south-westerly winds and low concentrations measured during northerly to easterly winds. For comparison, trends in hourly average wind speed and direction are given in Appendix 4. All stations measured elevated  $\text{SO}_2$  concentrations overnight of 8 - 9 January, associated with fresh southerly to south-westerly winds.

**Figure 12: Hourly mean concentration at the Harbour West station (Monthly average = 5.6ppb)****Figure 13: Hourly mean concentration at the Scorpio station (Monthly average = 4.8ppb)**

Elevated hourly average  $\text{SO}_2$  at the Harbour West station was mainly associated with winds from the north-west to north-east. There was agreement at times in the trends at Harbour West and Scorpio, with both stations measuring elevated hourly average  $\text{SO}_2$  on the 23<sup>rd</sup> and 28<sup>th</sup> January, correlated mainly with periods of moderate north-westerly winds.

### 3.4 Maximum 10-Minute average SO<sub>2</sub>

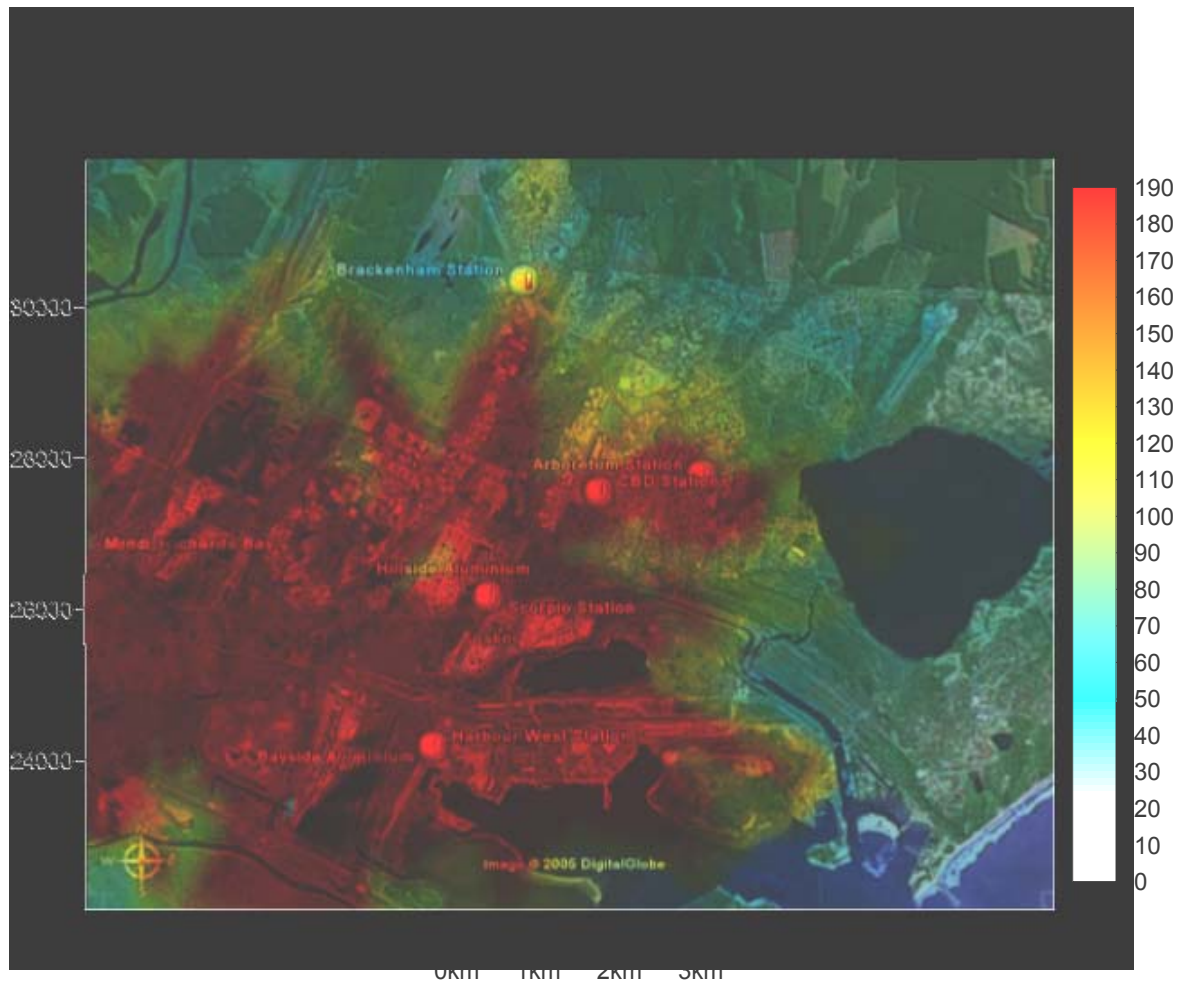
Figure 14: Comparison of Hawk predicted and maximum measured 10-minute average SO<sub>2</sub> concentrations.



As for the hourly average comparison, the choice of a 95<sup>th</sup> percentile cut-off is considered to have been too severe for most stations, except Harbour West, where concentrations tended to peak according to the model. Comparison with the dose map presented in the next section indicates that the best comparative value is likely to have been higher.

### 3.4.2 Maximum 10-Minute average dose map for SO<sub>2</sub>

Figure 15: January 2007 maximum 10-Minute average SO<sub>2</sub> concentration dose map



The model predicted that most of the central and industrial parts of Richards Bay, would have experienced maximum 10-minute average SO<sub>2</sub> concentrations in excess of 191 ppb. The exceedance band extends into Arboretum and Arboretum Extension but not into other residential suburbs. No measured concentrations exceeded the limit value.

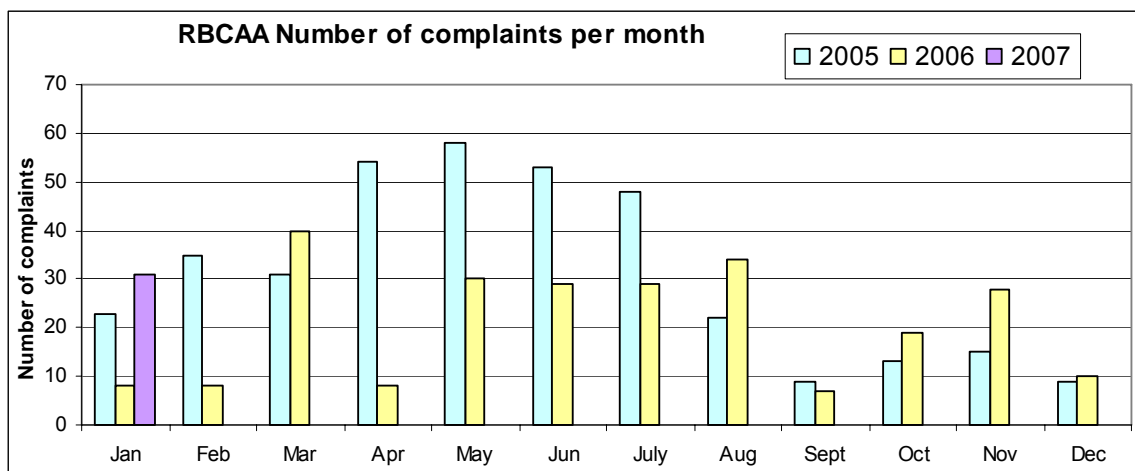


## 4 AIR QUALITY COMPLAINTS

### 4.1 Field Observations

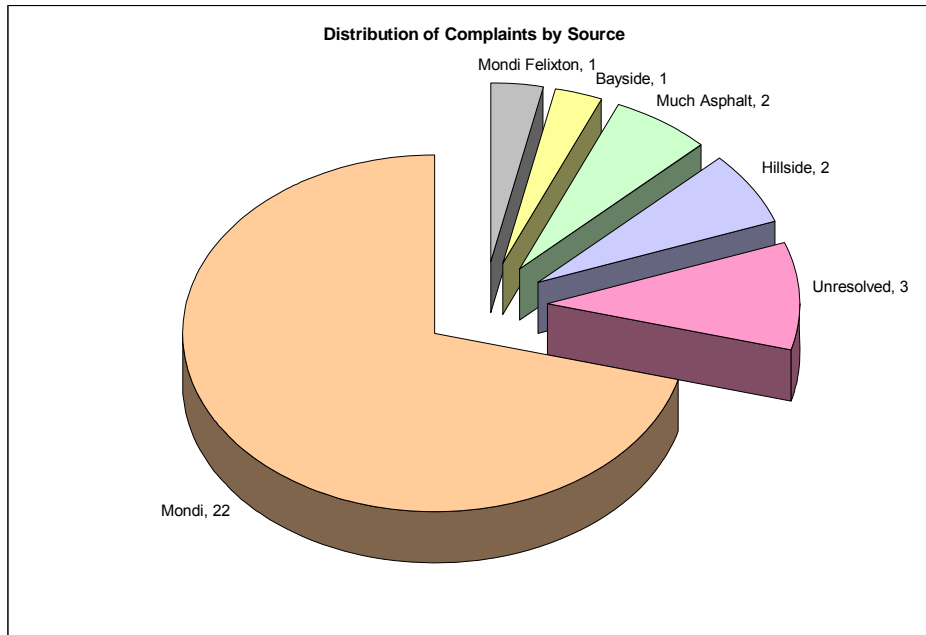
A total of 31 air quality complaints were received for the month of January 2007. The historical count of complaints by month is reflected below. There was a significant increase in the number of complaints logged during January 2007 compared to the same period over the previous two years. One of the reasons for the increase in January may be due to process variations at industrial plants. The complaints are listed in Appendix 5.

Figure 16: Comparison of number of complaints per month



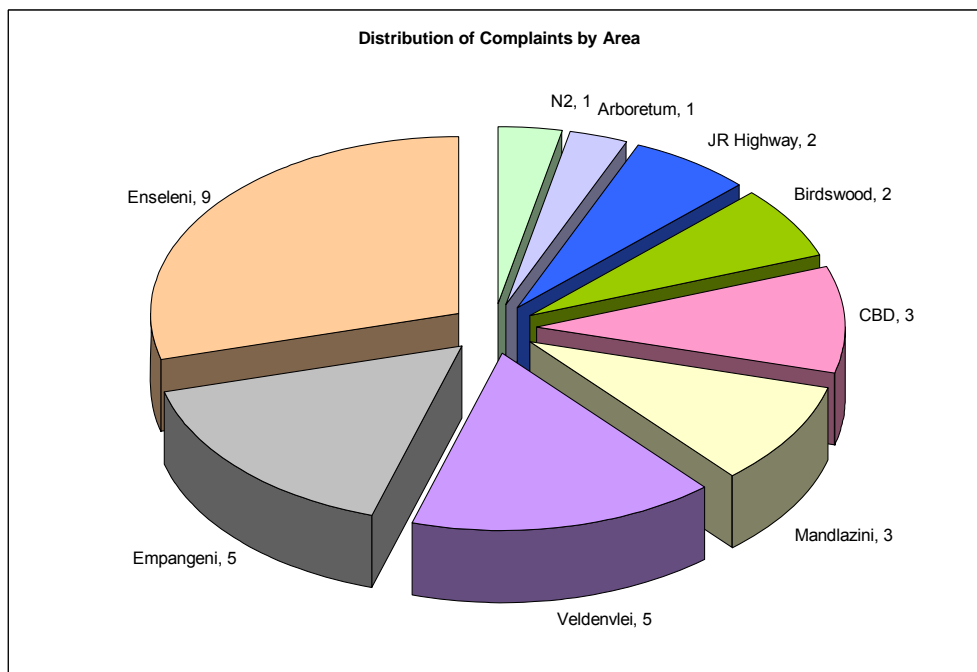
### 4.2 Distribution of Complaints by Source

Figure 17: January 2007 distribution of complaints by source



### 4.3 Distribution of Complaints by Region

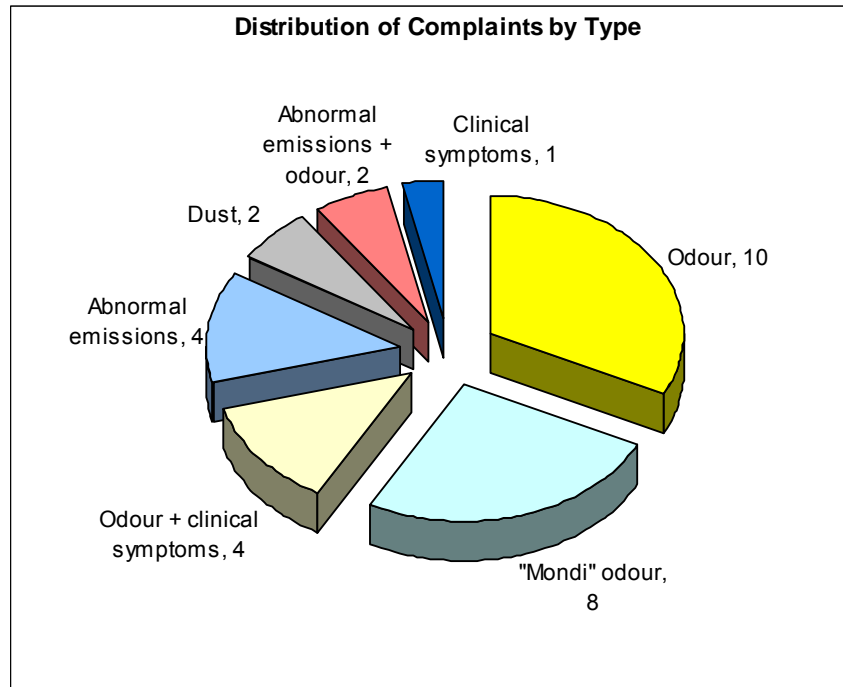
Figure 19: January 2007 distribution of complaints by area



30% of the complaints during January were related to Mondi odour complaints from the Enseleni area. The year-to-date distribution is dominated by odour complaints from the Enseleni, Veldenvlei and Empangeni areas.

#### 4.4 Complaints by type

Figure 21: January 2007 distribution of complaints by type

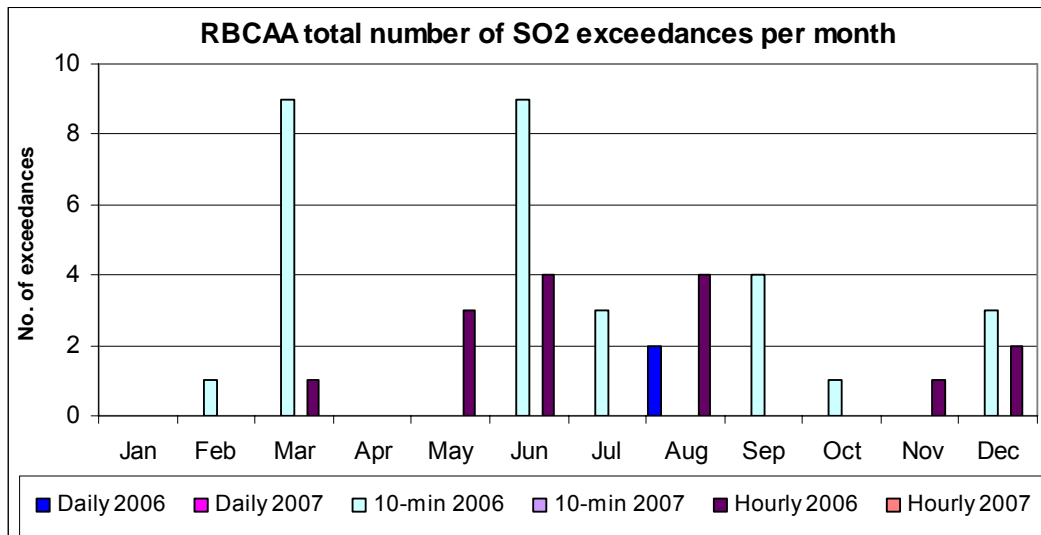


The majority of complaints logged during January have related to odours.

## 5 COMPLIANCE WITH GUIDELINES

Figure 23 provides a comparison of the total number of SO<sub>2</sub> standard exceedances per month measured at the RBCAA monitoring stations between 2006 and 2007. There were no SO<sub>2</sub> exceedances during the reporting period.

Figure 23: Comparison of number of exceedances per month



# APPENDIX 1

## *SANAS Requirements*

The SO<sub>2</sub> concentrations reported are determined by a United States Environmental Protection Agency (USEPA) equivalent method. At the Arboretum, Harbour West, Brackenham and Scorpio stations the equivalent method number is EQSA-0193-092 and at the Caravan the equivalent method number is EQSA-0495-100. All SO<sub>2</sub> measurements allow for a maximum precision error of 15% of the reported value. A tolerance around the zero point of plus or minus 10 ppb is allowed. All effort is made to reduce the error to a minimum. In terms of quality assurance standards, data collection must be above 80% to be valid for statistical analysis.

Note that the system is accredited for the measurement of SO<sub>2</sub> and PM<sub>10</sub> only. The accreditation does not include the measurement of O<sub>3</sub>, TRS or meteorological variables (e.g. wind, temperature). All opinions, interpretations and Hawk model findings detailed in the report do not form part of the accreditation.

## APPENDIX 2

### *Data capture and analyser performance*

The data capture is representative of the operation of that particular station. The higher the capture rates the more efficient the operation. The data capture is calculated using a variable other than the SO<sub>2</sub> since some SO<sub>2</sub> values (invalid data such as zero and span checks) are omitted from the reporting. The data capture rate shows the percentage of the month where the station as a whole was operational, while the SO<sub>2</sub>, PM<sub>10</sub>, O<sub>3</sub> and TRS capture rates indicate the percentage of valid data received from the respective analysers for the month.

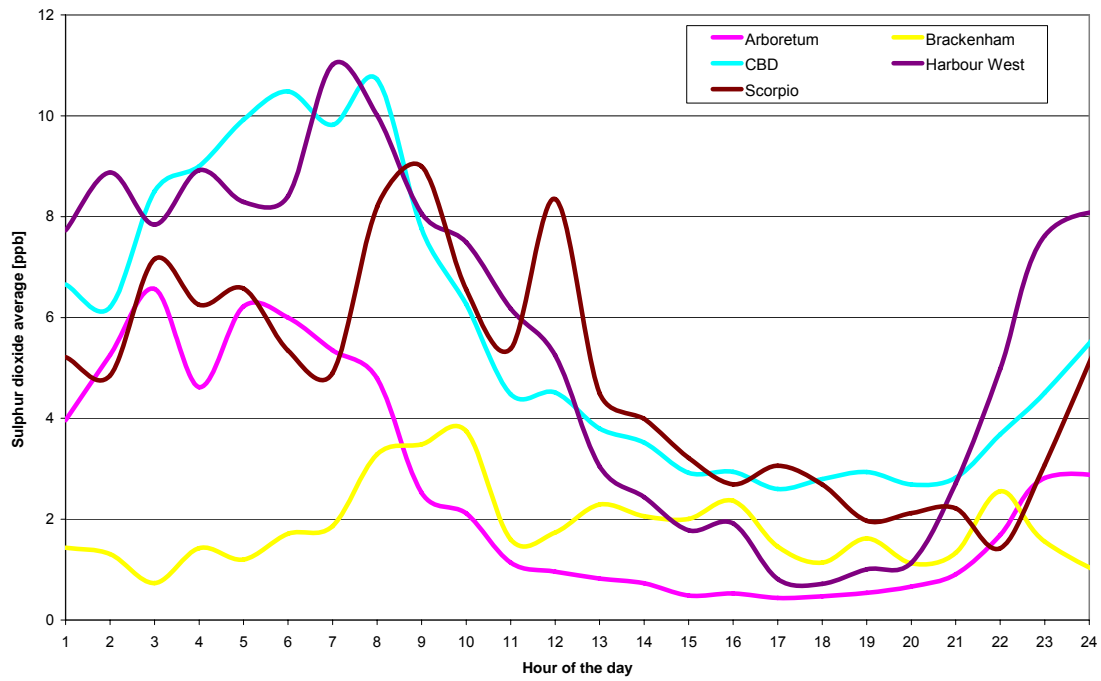
Station	Data (%)	SO <sub>2</sub> (%)	PM <sub>10</sub> (%)	Ozone	TRS (%)
Arboretum	79.5	73.5			
Harbour West	100	99.8			
Brackenham	97.3	66.4		97.3	
CBD	95.8	95.6	0		95
Scorpio	84.7	99.8			

Data capture was excellent for the Harbour West, CBD and Scorpio stations. Data capture at the Arboretum station was low due to an electrical fault at the station that needed to be repaired by the municipality. The Brackenham data capture rate was also low as a result of problems experienced with the analyser ID and the Envidas interface. Slight adjustments for variations around the zero were applied to the SO<sub>2</sub> data from the Arboretum and Brackenham stations to compensate for slight variations in the database response and zero drift of analysers. The adjustments were based on the results of the database response to weekly analyser zero, span and calibrator checks and data trends and are detailed in the database.

The TEOM analyser is with the supplier and is being serviced and stripped to identify the problem.

# APPENDIX 3

## Diurnal SO<sub>2</sub> Trends



# APPENDIX 4

## Meteorological data

CLIMATE STATISTICS FOR RICHARDS BAY FOR JANUARY 2007					
	Temperature (°C)	Total Rainfall (mm)	Pressure (mbar)	Wind speed	RH (%)
Minimum	17		991.9	0.4	35.3
Maximum	35.1		1346.2	10.5	95.2
Average	25		1003.6	4.4	75.6
Long-term mean	<b>25.2</b>	<b>86</b>			<b>76</b>

Note: Wind and temperature are from the Arboretum station, relative humidity is from the Airport station and air pressure from RBM. Rainfall and long-term means are for the Richards Bay Airport.

Figure 1: Hourly average wind direction at Arboretum (18m)

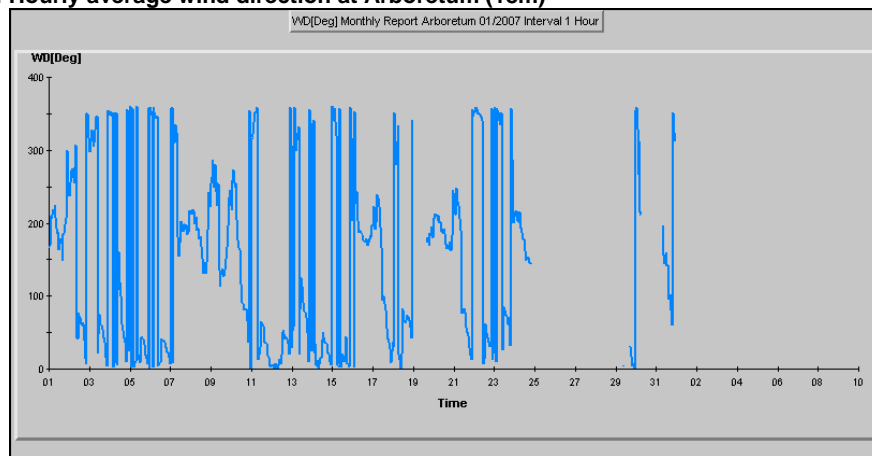
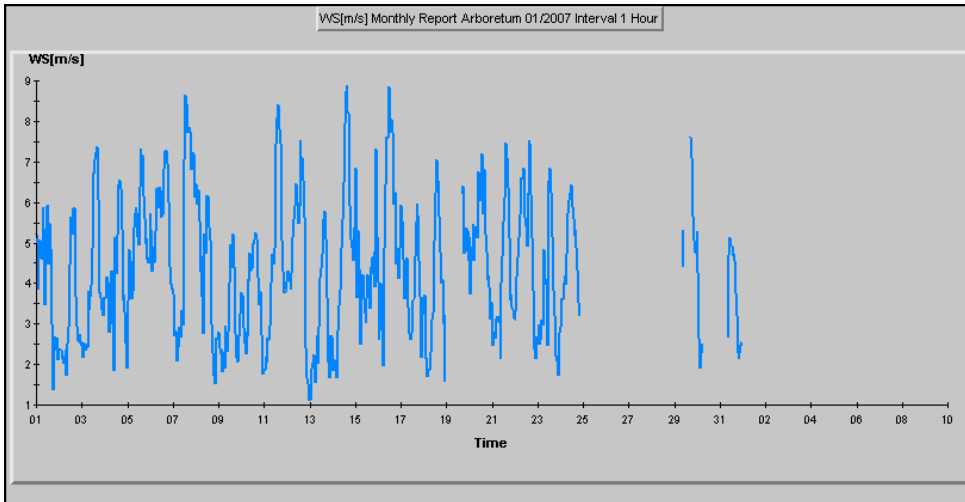


Figure 2: Hourly average wind speed at Arboretum (18m)





## APPENDIX 5

### *Air Quality Complaints Log*

No.	Date and time	Location	Description	Results	Resolution
1.	02 Jan 00h30	Veldenvlei	Strong Mondi odour	Mondi: The lime mud washer was found to be performing inefficiently due to blocking of the filter. This resulted in sodium carryover with the lime mud resulting in high TRS emissions. The corrective measure taken was to water wash the filter thereby reducing the TRS levels. Based on the info above, Mondi was the likely source of odour.	Resolved
2.	9 Jan 08h10	Veldenvlei, Heideheuvel	Mondi odour	Mondi: An internal investigation revealed that a low chip bin level was experienced which resulted in the odour. The drop in the chip bin level was due to stoppages on the chip feed system due to metal detection. Based on the WD and abovementioned information, Mondi was the likely source of the odour.	Resolved
3.	13 Jan 17h15	CBD	Excessive emissions emanating from Mondi	Mondi: On 13 Jan at approx. 17h00, we experienced problems with the conveyor system on precip 6 on Recovery Unit 2. The repairs on the conveyor required precip 6 to be taken out of service. This resulted in excessive visible emissions.	Resolved
4.	13 Jan 17h30	N2 near Canefields	Excessive emissions emanating from Mondi	Mondi: On 13 Jan at approx. 17h00, we experienced problems with the conveyor system on precip 6 on Recovery Unit 2. The repairs on the conveyor required precip 6 to be taken out of service. This resulted in excessive visible emissions.	Resolved
5.	16 Jan 13h50 - 14h45	Enseleni Reserve	Mondi odour	Mondi: We experienced problems with the lime mud washer caused by blockages of the filter. This resulted in soda carryover into the kiln resulting in increased H2S emissions. The corrective action taken was water washing of the lime mud washer. Mondi was the likely source of the complaint.	Resolved
6.	16 Jan 23h30	Enseleni	Overwhelming Mondi odour causing excruciating headache	Mondi: The lime mud washer was found to be performing inefficiently due to blocking of the filter. This resulted in sodium carryover with the lime mud resulting in high TRS emissions. The corrective measure taken was to acid wash the filter thereby reducing the TRS levels. Based on WD and process conditions at the time of the complaint, Mondi was the most likely source.	Resolved
7.	16 Jan 23h30	Enseleni	Overwhelming Mondi odour causing excruciating headache	Mondi: The lime mud washer was found to be performing inefficiently due to blocking of the filter. This resulted in sodium carryover with the lime mud resulting in high TRS emissions. The corrective measure taken was to acid wash the filter thereby reducing the TRS levels. Based on WD and process conditions at the time of the complaint, Mondi was the most likely source.	Resolved

8.	17 Jan 06h15	Veldenvlei, Heideheuvel	Awful Mondi odour	Mondi: We experienced problems in the Recovery Unit 1 process with the air distribution. Unfortunately, the air ports got plugged which resulted in a subsequent oxygen deficiency for burning. This resulted in an H2S peak. The liquor firing rate was reduced and the ports manually cleaned. This resulted in a reduction in the H2S levels (05h35). Mondi was the likely source of odour.	Resolved
9.	17 Jan 07h30	Veldenvlei, Heideheuvel	Very bad Mondi odour causing nausea	Mondi: We experienced problems through the previous day with the lime mud washer. The lime mud filter was water washed which temporarily alleviated the problem. The H2S levels increased in the early parts of the morning and a decision was taken to acid wash the lime mud washer. Mondi was the likely source of odour.	Resolved
10.	17 Jan 09h00	Empangeni (Farm neighbouring Much Asphalt)	Emissions and odour emanating from Much Asphalt was so bad that complainant had to evacuate home.	Much Asphalt: We are currently moving a secondary filtration unit in the form of a 'wet scrubber' onto our site in Empangeni. This unit has arrived on site today, and we have a team with a crane busy erecting it as we speak. We are hoping to have completed all necessary modifications and have it commissioned by the end of the week, so that by next week emissions will have substantially improved. Further to this, we are in the process of commissioning 'Ecoserv' to effect air quality monitoring as well as dust fallout measurements on site and in the affected areas. We trust that these processes will lend themselves towards gaining a position of acceptable balance between our operations and the wellbeing of the local community.	Resolved
11.	17 Jan 09h00	Empangeni (Farm neighbouring Much Asphalt)	Emissions and odour emanating from Much Asphalt was so bad that complainant had to evacuate home.	Much Asphalt: We are currently moving a secondary filtration unit in the form of a 'wet scrubber' onto our site in Empangeni. This unit has arrived on site today, and we have a team with a crane busy erecting it as we speak. We are hoping to have completed all necessary modifications and have it commissioned by the end of the week, so that by next week emissions will have substantially improved. Further to this, we are in the process of commissioning 'Ecoserv' to effect air quality monitoring as well as dust fallout measurements on site and in the affected areas. We trust that these processes will lend themselves towards gaining a position of acceptable balance between our operations and the wellbeing of the local community.	Resolved
12.	17 Jan 12h00	JR Highway	Excessive black smoke emanating from Mondi Felixton	Mondi Felixton: The excessive black smoke emission was sourced from boiler #8. The incident was due to periodical "soot blow" on boiler #8 which is normally conducted by the mill twice a shift for about 15 minutes in order to improve the boiler operation. On this day the mill conducted the "soot blow" @ 11h 52, which coincides with the time of the complaint +/- 12h00. No action was taken as "soot blow" is the operating requirement for all coal boilers. However, the problem was noted and efforts are being made to further improve the performance of the boilers.	Resolved

13.	17 Jan 14h00	Empangeni, Grantham Park, Jameson Rd	Very bad odour, smells like diesel or oil causing very bad headache	Municipality requested to investigate.	
14.	18 Jan 08h55	JR Highway	Visible emissions from Bayside	Bayside: The source of the complaint was a paste leak that occurred at Pot C-5 (Potroom C)	Resolved
15.	18-Jan	CBD	Fine powder	Hillside: This was for a fine powder that was in the CBD area. It was investigated and found to be alumina. This was traced back to a bag leak at Hillside on the afternoon of the 17th January. The leaking bag was changed on the same day.	Resolved
16.	19-Jan	CBD	Fine powder	Hillside: This was for a fine powder that was in the CBD area. It was investigated and found to be alumina. This was traced back to a bag leak at Hillside on the afternoon of the 17th January. The leaking bag was changed on the same day.	Resolved
17.	19 Jan early hrs of morning	Arboretum	Burning throat	Mondi: We experienced problems with air distribution on CRU 1. This was due to the plugging of the air ports on the boiler with subsequent oxygen deficiency for burning. This resulted in an H2S peak. The problem was fixed and the level was brought down to less than 2.5ppm by 03h45. Based on the above info and the WD at the time of the complaint, Mondi was the likely source of the complaint.	Resolved
18.	19 Jan 03h30	Birdswood, Pelican Parade	Pungent sulphur odour	Mondi: We experienced problems with air distribution on CRU 1. This was due to the plugging of the air ports on the boiler with subsequent oxygen deficiency for burning. This resulted in an H2S peak. The problem was fixed and the level was brought down to less than 2.5ppm by 03h45. Based on the above info, Mondi was the likely source of the complaint.	Resolved
19.	19 Jan 04h00	Birdswood	Bad odour	Mondi: We experienced problems with air distribution on CRU 1. This was due to the plugging of the air ports on the boiler with subsequent oxygen deficiency for burning. This resulted in an H2S peak. The problem was fixed and the level was brought down to less than 2.5ppm by 03h45. Based on the above info, Mondi was the likely source of the complaint.	Resolved
20.	19 Jan 04h00	Mandlazini	Bad odour		
21.	19 Jan 04h00	Mandlazini	Bad odour		
22.	19 Jan 04h00	Mandlazini	Bad odour		
23.	19 Jan 05h45 - 06h30	Enseleni	"Cat urine" odour	Mondi: We experienced problems with air distribution on CRU 1. This was due to the plugging of the air ports on the boiler with subsequent oxygen deficiency for burning. This resulted in an H2S peak. The problem was fixed and the level was brought down to less than 2.5ppm by 03h45. Based on the above info and the WD at the time of the complaint, Mondi was the likely source of the complaint.	Resolved

24.	19 - 20 Jan 23h00 - 02h00	Enseleni	Mondi odour causing headache	Mondi: We experienced difficulties on the lime mud washing filter in the Chemical Plant. This resulted in increased TRS level from the lime kiln. Corrective action was taken immediately. Based on the abovementioned wind data and process information, Mondi was the likely source of the odour.	Resolved
25.	20 Jan 07h20	Veldenvlei, Heideheuvel	Mondi "cat urine" odour causing sinus irritation	Mondi: Wind direction – 200 deg (wind direction over the past two hours varied between 200 – 215 deg) Wind speed – 4.6 m/s. Kiln H <sub>2</sub> S – 0ppm (Kiln was offline); CRU 1 H <sub>2</sub> S – 1.8 ppm; CRU 2 H <sub>2</sub> S – 0.1 ppm. Based on the above info, Mondi was not a likely source of odour. Foskor: Based on the wind direction at the time there is a slight possibility that Foskor could have impacted on Veldenvlei. However plant conditions were stable and gypsum slurry pH was less than 8. As a result it is highly unlikely that Foskor was responsible for the strong Mondi smell.	Unresolved
26.	20 Jan 08h25	Enseleni	Mondi odour causing headache	Mondi: Based on the location of the complainant, Mondi is the likely source of odour however the process parameters do not indicate any exceedances.	Resolved
27.	22 Jan 15h40	Empangeni Rail, Builders Market	Very bad Mondi type odour for about an hour	Mondi: An internal investigation revealed that a low chip bin level was experienced which resulted in the odour. The drop in the chip bin level was due to stoppages on the chip feed system due to metal detection. Based on the WD and abovementioned information, Mondi was the likely source of the odour.	Resolved
28.	23 Jan early morning	Empangeni (Farm neighbouring Much Asphalt)	Very bad odour emanating from Much Asphalt causing health problems	Municipality to feedback	
29.	27 - 28 Jan 23h30 - 00h30	Enseleni	Horrible chemical odour	Mondi: An internal investigation revealed that a low chip bin level was experienced which resulted in the odour. The drop in the chip bin level was due to stoppages on the chip feed system due to metal detection. Based on the WD and abovementioned information, Mondi was the likely source of the odour.	Resolved
30.	31 Jan 08h00	Enseleni	Very bad "cat urine" odour	Mondi: An internal investigation revealed that problems were experienced with the incineration of non condensable gases in the incinerator during a water wash of the lime kiln and resulted in TRS emissions. The problem was rectified by 9am on 31 January. Based on the abovementioned information, Mondi was the likely source of the odour.	Resolved

31.	31 Jan 08h45	Enseleni	Awful "guava" odour	Mondi: An internal investigation revealed that problems were experienced with the incineration of non condensable gases in the incinerator during a water wash of the lime kiln and resulted in TRS emissions. The problem was rectified by 9am on 31 January. Based on the abovementioned information, Mondi was the likely source of the odour.	Resolved
-----	--------------	----------	---------------------	---	----------

## APPENDIX 6

### *PM<sub>10</sub> data*

PM<sub>10</sub> refers to the measurement of particulate matter of less than 10 microns. A TEOM instrument at the CBD station (Municipal offices) measures PM<sub>10</sub> data continuously.

#### **PM<sub>10</sub> standards**

Daily average standards for PM<sub>10</sub> are listed below. The SANS recommended PM<sub>10</sub> limit value of 75 µg/m<sup>3</sup> was published for comment by DEAT on 9 June 2006, and can be referred to as a target value at this stage. The National standard of 180 µg/m<sup>3</sup> (as specified in the Air Quality Act, dated Feb 2005) is enforceable.

<b>TABLE 6.1 PM<sub>10</sub> DAILY AVERAGE STANDARDS (µg/ m<sup>3</sup>)</b>		
<b>Pollutant</b>	<b>SANS</b>	<b>National</b>
Particulate matter (PM <sub>10</sub> )	75	180*

\* Maximum of 3 exceedances permissible in a year

No data is presented for the TEOM analyser at the CBD station due to operational issues described in Appendix 2.

# APPENDIX 7

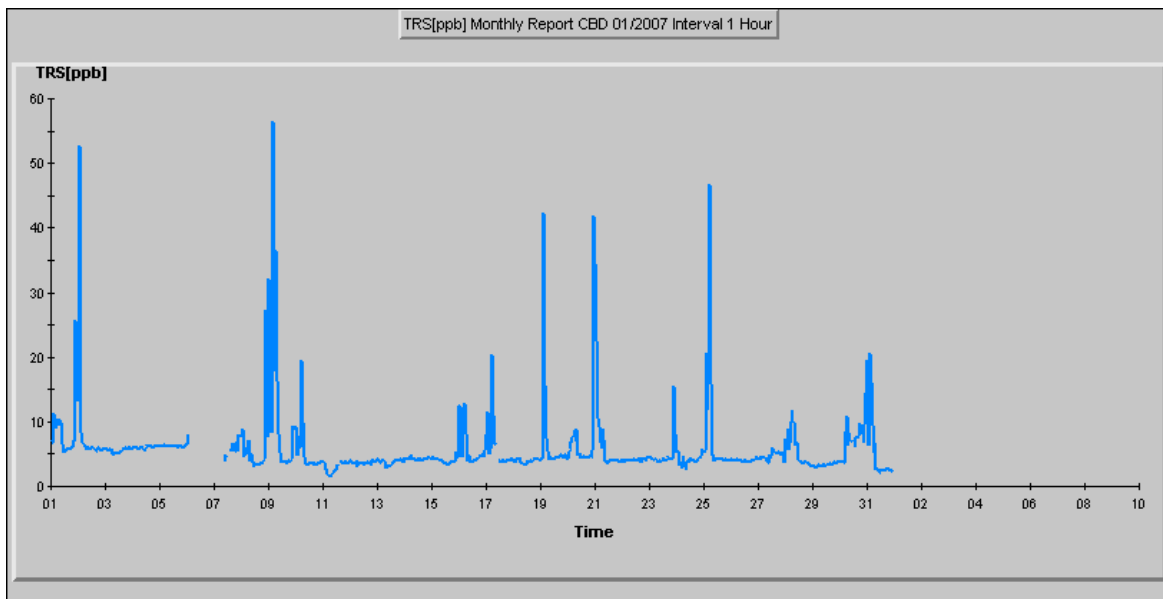
## TRS Data

Total Reduced Sulphurs (TRS) are measured at the CBD station. Trends in hourly and daily average TRS are provided in Figs 1 and 2, respectively. Maximum concentrations for selected time averaging periods are shown in Table 7.1. There are no guidelines or standards for TRS, however the odour threshold is 5 ppb.

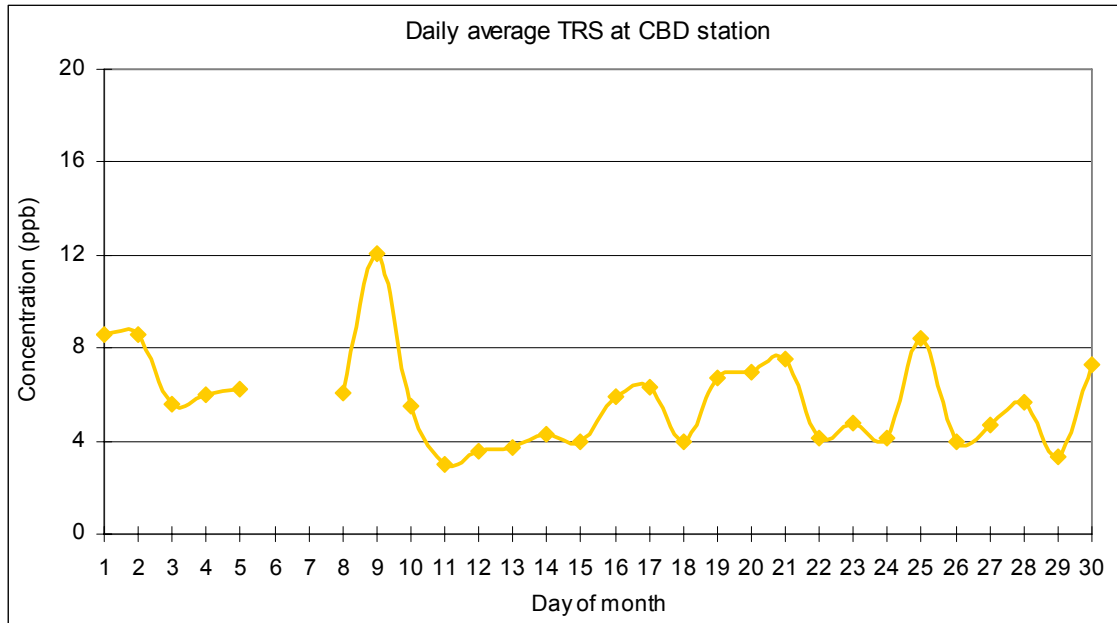
TABLE 7.1 MAXIMUM TRS CONCENTRATIONS (ppb) DURING JANUARY			
	5-minute average	Hourly average	Daily average
TRS (ppb)	153.7	56.5	12.1
Date & time	02/01 01:20	09/01 04:00	09/01

Maximum instantaneous TRS early on the 02<sup>nd</sup> and maximum hourly average TRS on the morning of the 9<sup>th</sup> was associated with fresh SW winds. The source from this wind vector may indicate Foskor.

**Figure 1: Hourly average TRS at the CBD station during January 2007**





**Figure 2: Daily average TRS at the CBD station during January 2007**

The trend in daily average TRS concentrations was similar to that for SO<sub>2</sub>, with peaks in TRS generally correlated with periods of moderate to fresh SSW to south-westerly winds. Peak TRS concentrations were measured during the early morning (Fig. 3).

## APPENDIX 8

### Ozone Data

The standards and target values for the National Environment Management: Air Quality Act (NEMAQA) and South African National Standard (SANS), respectively for O<sub>3</sub> are presented in Table 1.

Table 1: O <sub>3</sub> standards and target values		
	National (NEMAQA) standard	SANS 1929:2004 target
Instant peak	250 ppb	N/A
Hourly average	120 ppb	102 ppb
8-Hour running average	N/A	61 ppb

Data capture for the month of January was 97.3% and the monthly average 4.2 ppb. There were no standard exceedances, with the maximum hourly average of 49 ppb being only 41% and 48% of the NEMAQA and SANS hourly average limits, respectively. The trends in hourly average and daily average O<sub>3</sub> are presented in Figures 1 and 2.

**Figure 1: Hourly average O<sub>3</sub> at Brackenham during January 2007**

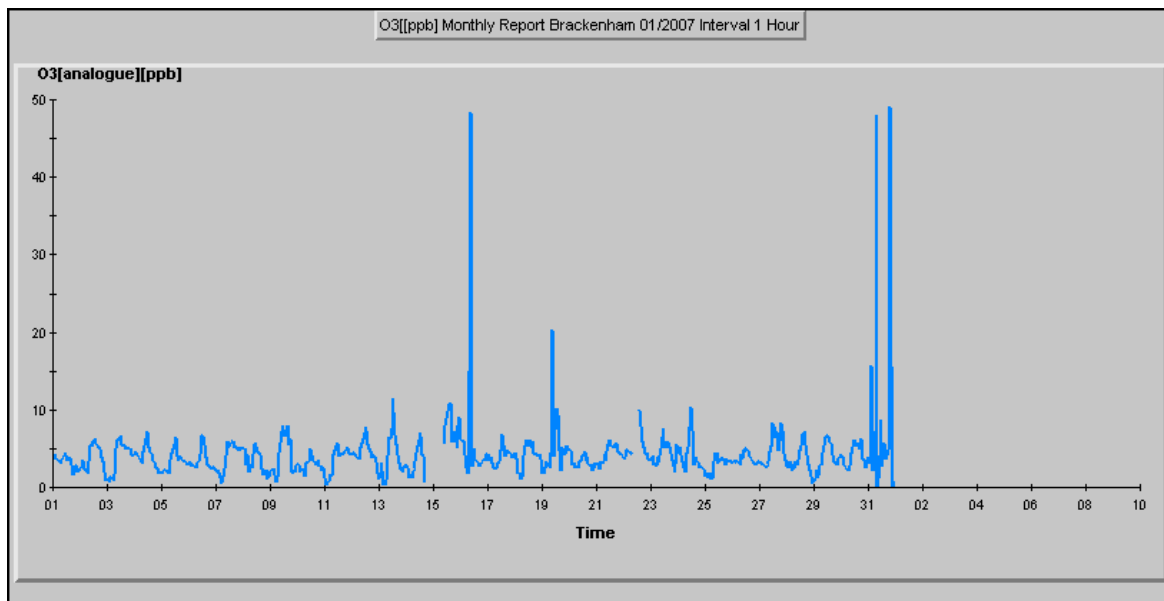
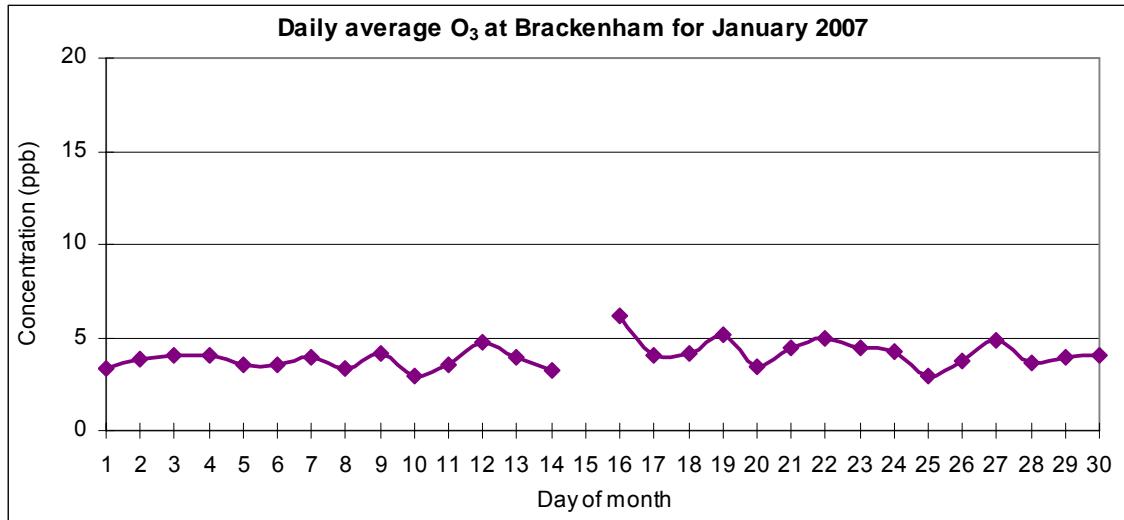


Figure 2: Daily average O<sub>3</sub> at Brackenhams during January 2007

## APPENDIX 9

### *Hawk Dispersion Model Parameters*

Meteorological Parameters:

<b>Dispersion Coefficients</b>	Urban
<b>Met Stations Used</b>	Arboretum
	Harbour West
	Scorpio
	Brackenham
<b>Roughness Length</b>	1.2

Model Parameters:

<b>Averaging Time</b>	10 minutes
<b>Resolution</b>	Medium
<b>Averaging Options</b>	Highest short term average
	Highest hourly average
	Highest daily average
	Annual average
<b>Maximum Concentration Calculation</b>	Don't calculate with every cycle
<b>Divergence Criterion</b>	0.1
<b>Wind directional change for full mass balance calculation</b>	5 degrees
<b>Wind directional change for full mass balance calculation</b>	0.1 m/s
<b>Interpolation Radius of Influence</b>	1000 m
<b>Barrier Limiting Height</b>	10
<b>Maximum Puff Separation Distance</b>	50 m
<b>Puff Diffusion Update Time Interval</b>	60 s
<b>Puff Advection Update Time Interval</b>	60 s
<b>Dosage Time Step Time Interval</b>	60 s

Source emissions as per 2004 emissions audit conducted by COEX.