

The Environment Matters



Annual Report 2006



Department of the Environment
Government of Gibraltar

Environmental Agency
Gibraltar





Minister's Forward

It gives me great pleasure to provide the forward for this first annual report, which is a joint effort of the Department of the Environment and the Environmental Agency. This report not only fulfils a manifesto commitment but more importantly provides a wealth of environmental information which I hope is of significant interest to the general public. The aim of the report is twofold: firstly to inform the public of issues that concerns their living environment, and secondly as a yardstick to measure future progress. To follow, we will publish the Gibraltar Climate Change Programme which will further the pursuit of our objectives.

A clean, healthy environment, rich in wildlife and natural diversity is the single greatest contributor to a better quality of life. The Environmental Agency together with the Department of the Environment works to sustainably manage and, where possible, enhance our living environment for the benefit of present and future generations. This includes tackling pollution incidents, reducing the impacts of industry on the environment, managing issues in relation to our waters and contaminated land, improving wildlife habitats and many more. Better regulation and increased investment has reduced the amount of pollution being discharged into our coastal waters. Changes in industry and in motor vehicle technology have helped improve air quality and more people are starting to learn about our collective environmental responsibilities through increased awareness.

The environment makes a key contribution to Gibraltar's prosperity. However, there are considerable pressures on our environment arising from the demand for new development, increasing demand for water and energy supplies, a growing consumer based society and the disposal of waste. Increasing population, the scale of economic activity, relatively low rainfall, and the impacts of climate change exacerbate these pressures. Sustainable resource consumption is fundamental to environmental management. For this to be achieved industry, organisations, households, consumer behaviour and lifestyles, must all become more sustainable. The incorporation of sustainability principles alongside high quality design gives the opportunity to develop more efficient homes. Such homes not only minimize environmental impacts, but can also prove to be cheaper to run. Energy efficient homes can generate a level of saving in energy use which is good for the homeowner and the environment.

The environment is making its way into the forefront of planning and management in Gibraltar. Sustainable development will only be achieved through delivering key environmental improvements that include the effective protection of the environment and the sensible use of natural resources. This will not only benefit the environment, but will provide a high quality of life for people in Gibraltar. As a result of the environment gaining such prominence on the world stage, great challenges lie ahead for us all if we are to preserve the planet for future generation. Increasingly we will be faced with greater challenges to reduce our carbon footprint in our attempt to combat global warming. Whilst Gibraltar is small, every step taken in this direction helps. Solutions to global problems start with local contributions. It is with this in mind, that I appeal to everyone to become more conscious of our individual and collective responsibilities in pursuance of a better world.

Acknowledgements

The Department of the Environment, together with the Environmental Agency would like to thank the following for their help in providing data for the compilation of this report:

- Staff at the Environmental Agency
- Staff at the Department of the Environment
- AquaGib Ltd
- Gibraltar Health Authority
- Gibraltar Ornithological and Natural History Society
- Heritage Division, Government of Gibraltar
- Environmental Waste Management Services
- Gibraltar Veterinary Clinic
- Gibraltar Port Authority
- Gibraltar Electricity Authority
- Department of Trade, Industry, Employment and Communications – Town Planning section
- Legislation Support Unit

Cover printed in 200 grs. couche matt and interior pages in 150 grs. couche matt ecologic paper.



Designed and printed by Roca Graphics Ltd.
Tuckey's Lane, Gibraltar. Tel. 59755

Contents

Ministers Forward	3
Acknowledgements	4
Contents	5
Introduction	6
Chapter 1 Air Quality	7
Chapter 2 Water Quality	15
Chapter 3 Waste Management	20
Chapter 4 Environmental Impact Assessment	26
Chapter 5 Food Hygiene	38
Chapter 6 Environmental Noise	30
Chapter 7 Public Awareness	32
Chapter 8 Other Issues	33
8.1 Climate Change in Gibraltar	33
8.2 Land Quality	34
8.3 Biodiversity	36
8.4 Environmental Legislation	38
8.5 Environment Charter	39
8.6 Renewables	39
Annex I Environment Charter	41
Annex II Air pollution monitoring programme report for 2005	43

Introduction

Sustainability is an integral part of human development. Strategic environmental planning is vital to improving quality of life. A better quality of life is intrinsically linked to a cleaner and healthier environment. The Government of Gibraltar recognises the need to establish a balance between the natural environment and development in our local setting. This Environment Report is part of an on-going initiative to increase public awareness in relation to key environmental issues. The role of the Department of the Environment and Environmental Agency is to manage our environment and identify where further work is needed to deliver environmental improvements. This is done primarily by:

- Analysing trends in environmental indicators to determine where the environment is under pressure, as well as highlighting areas where there is progress toward environmental objectives;
- Setting systems to ensure compliance with Local Legislation, Community Law and International Multilateral Agreements and Conventions;
- Identifying key issues where increased effort is needed to ensure that environmental health and quality of life continues to rise;
- Developing public awareness and participation in improving, enhancing and caring for our environment
- Identifying new and emerging environmental issues in Gibraltar; and providing information in the protection and management of the living environment.

The various aspects of the environment considered in this report are fundamental to the environment and the quality of life in Gibraltar. Gibraltar, like most modern societies strives to achieve economic development to ensure higher standards of living. However, a clean, healthy environment, rich in wildlife and natural diversity is the single greatest contributor to a better quality of life.

Quality of life is reflected through good health, social fulfilment, and access to services and recreation. This Environment Report will inform on the implementation and future review of local strategies and will enable the Government of Gibraltar, through the Department of the Environment and the Environmental Agency to assess its own performance toward maintaining and improving environmental health and quality of life in Gibraltar.

The Government's vision for a better environment focuses on improved planning through a holistic strategy, which promotes inter-ministerial programmes and channels for joint decision-making on matters that concern the environment. Stronger partnerships with local stakeholders, the business sectors, local agencies, professionals and the general public will ensure greater public awareness and collaboration between all concerned.

Chapter 1 - Air Quality

1.1 INTRODUCTION

This provisional report provides an overview of Gibraltar's air quality measurements for our automatic air pollution monitoring network and covers the calendar year of 2006. It does not include data from the non-automatic monitoring networks. This data will become available in May 2007. This report is based on provisional data and may be subject to further quality control. The 2005 Air Quality Report is presented in Annex I.

In 2005, Gibraltar air quality measurements were made available globally for the first time, via the World Wide Web. Information on current air pollutant concentrations, updated every hour, together with pollution inventories, and air chemistry is available via:

www.gibraltarairquality.gi

This provides wide and unrestricted accessibility to air quality data. The archive has been designed to be user-friendly, interactive and responsive. Users may download unlimited portions of the database in spreadsheet format or graphs. The website has proved and continues to be quite popular during 2006 it received 381,336 hits.

The primary objectives of this network are:

- To provide the public with rapid and reliable information on urban air quality.
- To monitor compliance with European Directives and local statutory instruments.
- To assist in developing new policies.

1.2 SITES AND INSTRUMENTATION

The automatic network forms part of a wider air quality monitoring programme operated on behalf of the Government of Gibraltar.

Instruments currently deployed in the monitoring network use the following measuring techniques:

Carbon Monoxide	Infrared Absorption
Sulphur Dioxide	Ultraviolet fluorescence
Nitrogen Dioxide	Chemiluminescence
Ozone	Ultraviolet absorption
Hydrocarbons	Gas chromatography

Non-automatic network consist of a diffusion tube network for Nitrogen Dioxide and Benzene, Toluene and Xylene (BTX). There are also three partisol filter (Gravimetric) units which are used to monitor particulate matter (PM10 & PM2.5), Lead, Arsenic, Cadmium, Nickel and Poly Aromatic Hydrocarbons (measured as Benzo(a)pyrene). The last four species were introduced in order to comply with Fourth Daughter Directive 2004/107/EC (DD4). Deposition samples for these same four species are also being monitored, via a deposition gauge which is sited at the Bleak House Station. The European Commission has yet to set standards for this type of data. The Website is currently being amended so that the public will be able to view the data collected so far for these last four species.

Gibraltar air pollutant measurements are based on a rigorous quality assurance and control programme, and utilise traceable and cross-checked calibration chains. Gas standards and procedures are regularly checked and compared with international scales.

Hydrocarbons hourly data are based on the chromatographic analysis of air samples collected over 30-minute periods each hour. All other data are derived from logger-scanned instantaneous readings taken every ten seconds. These logger measurements are used to derive fifteen-minute and hourly averages. Data are compiled over longer averaging periods as required.

1.3 MONITORING NETWORK

Two automatic air pollution monitoring stations were established and are classified as urban/roadside and suburban/rural. The urban/roadside station is sited at Rosia Road, close to a major road, Electricity power generating facilities and dock area. Suburban/rural station is sited at Bleak House.

The following are the various pollutants which are measured automatically and the results posted on the dedicated air pollution website:

- Carbon Monoxide (Rosia Road Site)
- Sulphur Dioxide (Rosia Road Site)
- Nitrogen Dioxide (Rosia Road Site and Bleak House Site)
- Ozone (Bleak House Site)
- Benzene (Rosia Road Site)
- Toluene (Rosia Road Site)
- mp Xylene (Rosia Road Site)
- o Xylene (Rosia Road Site)
- 1,3-Butadiene (Rosia Road Site)
- Ethyl Benzene (Rosia Road Site)

Non-automatically monitored pollutants are measured/analysed and the results are also posted on the website. The website is normally updated every three months as the analytical data becomes available. These pollutants are:

- Lead
- Particulate matter (PM10 & PM2.5)
- Arsenic
- Cadmium
- Nickel
- Poly Aromatic Hydrocarbons (measured as Benzo(a)pyrene)
- Nitrogen Dioxide (diffusion tube network)
- Benzene, Toluene and Xylene (BTX) (diffusion tube network)

The diffusion tube network will assist in identifying areas of high nitrogen dioxide and BTX concentrations for further examination. It will also determine the spatial variation of these pollutants within Gibraltar. A separate report will be made when the data from all our monitoring sources, automatic and non-automatic are available and have been ratified.

1.4 GIBRALTAR AIR QUALITY STANDARDS

Standards for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of each pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

Gibraltar standards are found in the Public Health (Air Quality Limit Values) Rules 2002 as amended by the Public Health (Air Quality Limit Values) (Amendment) Rules 2002 and the Public Health (Air Quality) (Ozone) Rules 2004 for the purpose of Local Air Quality Management. These Air Quality Rules have adopted into Gibraltar law the limit values required by EU Daughter Directives

on Air Quality. (European Council Directives 1996/62/EC, 1999/30/EC, 2000/69/EC and 2002/3/EC). Gibraltar is also complying with European Council Directive 2004/107/EC relating to Arsenic, Cadmium, Nickel and polycyclic aromatic hydrocarbons in ambient air which is in the process of being transposed.

A summary of the current Gibraltar Air Quality Objectives is provided Table 1.

Pollutant	Objective	Measured as	To be achieved by
Benzene	5 µg/m ³	Annual Mean	1 January 2010
Carbon monoxide	10.0 mg/m ³	Maximum daily running 8 Hour Mean	1 January 2005
Lead	0.5 µg/m ³	Annual Mean	1 January 2005
Nitrogen dioxide	200 µg/m ³ Not to be exceeded more than 18 times per year	1 Hour Mean	1 January 2010
	40 µg/m ³	Annual Mean	1 January 2010
Nitrogen Oxides**	(V) 30 µg/m ³	Annual Mean	19 July 2001
Ozone	120 µg/m ³	Running 8 hour Mean Daily maximum of running 8 hr mean not to be exceeded more than 10 times per year. 25 times per calendar year averaged over 3 years	1 January 2010
Particles ^a (PM10) (gravimetric)	50 µg/m ³ Not to be exceeded more than 33 times per year	24 Hour Mean	1 January 2005
	40 µg/m ³	Annual Mean	1 January 2005
Sulphur dioxide	350 µg/m ³ Not to be exceeded more than 24 times per year	1 Hour Mean	1 January 2005
	125 µg/m ³ Not to be exceeded more than 3 times per year	24 Hour Mean	1 January 2005
	(V) 20 µg/m ³	Annual Mean	19 July 2001
	(V) 20 µg/m ³	Winter Mean (01 October - 31 March)	19 July 2001
Arsenic	6 ng/m ³	Annual Mean	31 December 2012
Cadmium	5 ng/m ³	Annual Mean	31 December 2012
Nickel	10 ng/m ³	Annual Mean	31 December 2012
PAH (Benzo[a]pyrene***)	1 ng/m ³	Annual Mean	31 December 2012

Notes:

a. Measured using the European gravimetric transfer sampler or equivalent.

µg/m³ - micrograms per cubic metre

mg/m³ - milligrams per cubic metre

** Assuming NOx is taken as NO2

*** Benzo[a]pyrene is used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons in ambient air.

(V) These standards are adopted for the protection of vegetation and ecosystems. All of the remainder are for the protection of human health.

1.5 ANNUAL DATA SUMMARY REPORTS

ROSIA ROAD 01 January to 31 December 2006

Table 2 (These data are provisional and may be subject to further quality control)

POLLUTANT	CO	NO ₂	SO ₂	BENZ
Number Very High	0	0	0	-
Number High	0	0	0	-
Number Moderate	0	0	0	-
Number Low	8530	8619	33526	-
Maximum 15-minute mean	9.5 mg m ⁻³	244 µg m ⁻³	247 µg m ⁻³	-
Maximum hourly mean	6.7 mg m ⁻³	195 µg m ⁻³	149 µg m ⁻³	61.20 µg m ⁻³
Maximum running 8-hour mean	3.1 mg m ⁻³	123 µg m ⁻³	74 µg m ⁻³	29.39 µg m ⁻³
Maximum running 24-hour mean	1.9 mg m ⁻³	88 µg m ⁻³	48 µg m ⁻³	13.82 µg m ⁻³
Maximum daily mean	1.7 mg m ⁻³	84 µg m ⁻³	38 µg m ⁻³	12.70 µg m ⁻³
Monthly average	0.6 mg m ⁻³	42 µg m ⁻³	14 µg m ⁻³	2.16 µg m ⁻³
Data capture	97.4 %	98.4 %	97.2 %	98.4 %

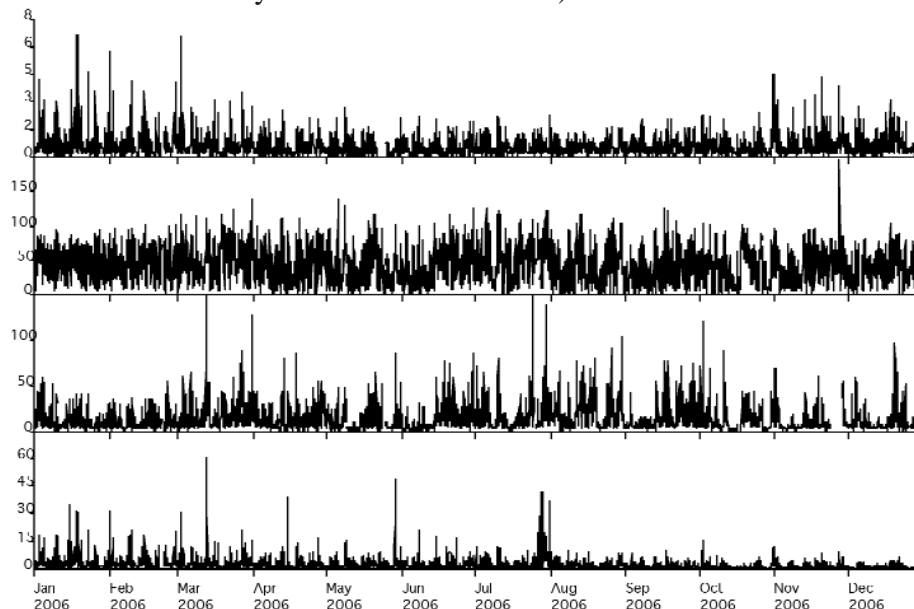
All mass units are at 20°C and 1013mb
 NO_x mass units are NO_x as NO₂

Table 3

Pollutant	Public Health (Air Quality Limit Values) Rules 2002, (Amendment) Rules 2003 and (Ozone) Rules 2004	Exceedences	Days
Carbon Monoxide	Running 8-hour mean > 10.0 mg m ⁻³	0	0
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0
Sulphur Dioxide	15-minute mean > 266 µg m ⁻³	0	0
Sulphur Dioxide	Hourly mean > 350 µg m ⁻³	0	0
Sulphur Dioxide	Daily mean > 125 µg m ⁻³	0	0
Benzene	Annual mean > 5 µg m ⁻³	0	-

GRAPH 1

(Hourly Mean Data for 01 January to 31 December 2006)



BLEAK HOUSE 01 January to 31 December 2006**Table 4** (These data are provisional and may be subject to further quality control)

POLLUTANT	NO ₂	O ₃
Number Very High	0	0
Number High	0	0
Number Moderate	0	1189
Number Low	8535	7509
Maximum 15-minute mean	380 µg m ⁻³	168 µg m ⁻³
Maximum hourly mean	132 µg m ⁻³	164 µg m ⁻³
Maximum running 8-hour mean	94 µg m ⁻³	159 µg m ⁻³
Maximum running 24-hour mean	73 µg m ⁻³	145 µg m ⁻³
Maximum daily mean	62 µg m ⁻³	140 µg m ⁻³
Monthly average	24 µg m ⁻³	62 µg m ⁻³
Data capture	97.4 %	98.8 %

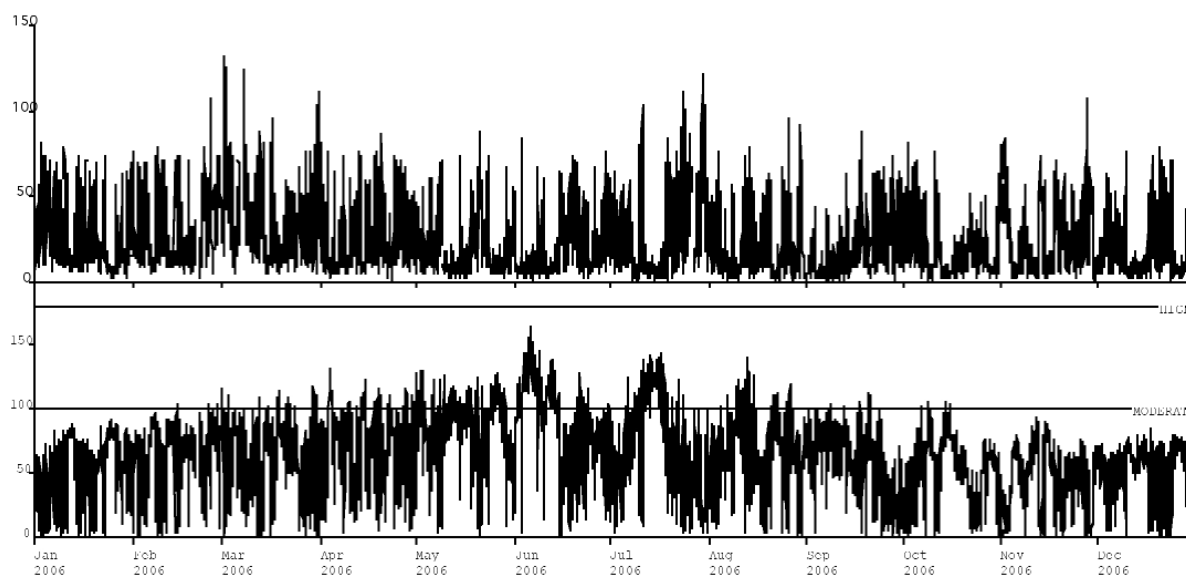
All mass units are at 20°C and 1013mb
 NO_x mass units are NO_x as NO₂

Table 3

Pollutant	Public Health (Air Quality Limit Values) Rules 2002, (Amendment) Rules 2003 and (Ozone) Rules 2004	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	0	0
Ozone	Running 8-hour mean > 120 µg m ⁻³	199	20

GRAPH 2

(Hourly Mean Data for 01 January to 31 December 2006)



1.6 AN OVERVIEW OF GIBRALTAR’S AIR POLLUTION MEASUREMENTS

The Data capture figures reflects data capture over the whole year, 1st January to 31st December 2006.

Rosia Road Station

CO	NO ₂	SO ₂	Benzene
97.4%	98.4%	97.2%	98.4%

Bleak House Station

NO ₂	O ₃
97.4%	98.8%

Our target is to at least get 90% data capture in any one year, this has been surpassed this year. Any problems with the analysers have been promptly attended to, this has helped us to keep the data capture as high as we have achieved.

Carbon Monoxide

This pollutant is measured solely at the Rosia Road Station.

Carbon Monoxide (CO) is a colourless, odourless poisonous gas produced by incomplete, or inefficient, combustion of fuel. It is predominantly produced by the road transportation sector, and in particular by petrol-engines.

This gas prevents the normal transport of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.

The standard for carbon monoxide is a maximum daily running 8 Hour Mean of 10.0 mg/m³. This is the second year this pollutant has been monitored. The annual daily running 8 Hour Mean was measured at 3.1 mg/m³; we are therefore well within the maximum standard. (TABLE 2) The level recorded this year is slightly above last year’s figure of 2.2 mg/m³. Since there is only two years data we cannot comment as to pattern or trends.

There were no exceedances of the air quality objectives within our National or European Standard.

Nitrogen Dioxide

This pollutant is measured at both the Rosia Road Station and Bleak House Station.

Nitrogen oxides (NO_x) is a collective term used to refer to two species of oxides of nitrogen, nitric oxide (NO) and nitrogen dioxide (NO₂). Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO₂), which is harmful to health.

Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure, to concentrations that are typically much higher than those normally found in the ambient air, may cause increased incidence of acute respiratory illness in children.

The air quality objective/standard for nitrogen dioxide is 40mg/m³ measured as an annual mean (2010) and a one hour mean of 200µg/m³, which is not to be exceeded more than 18 times per year.

The margin of tolerance permitted under our air quality legislation and the EC Directives for 2006 was an additional $8\text{mg}/\text{m}^3$ this means that the annual mean for 2006 is set at $48\text{mg}/\text{m}^3$ (long term objective for 2010 plus margin of tolerance). The annual mean was measured at $42\mu\text{g}/\text{m}^3$ (Rosia Road Station) and $23\mu\text{g}/\text{m}^3$ (Bleak House Station). There were no exceedances of the current annual mean (plus tolerances) or the one-hour mean of $200\mu\text{g}/\text{m}^3$ at either of the stations. (TABLE 2 & 4) The levels recorded this year are the same as last year in both stations.

The long term objective annual mean of $40\text{mg}/\text{m}^3$ has therefore been exceeded as recorded on the Rosia Road Station. Automatic monitoring of nitrogen dioxide was only started last year, it is therefore impossible to state if this is the norm or if it follows established trends as there is not sufficient historical data against which this year's recorded data can be compared.

Our major source of nitrogen dioxide is the power generating sector followed by road transportation and shipping. When the permitting scheme established under the Pollution Prevention and Control Ordinance comes into effect it is anticipated that there should be a noticeable drop in the nitrogen dioxide emissions. As new vehicles with improved environmental emissions replace the existing fleet there will also be a reduction in the amount of nitrogen dioxide produced locally.

Sulphur Dioxide

This pollutant is measured solely at the Rosia Road Station.

Sulphur dioxide (SO_2) is produced when a material, or fuel, containing sulphur is burned. Globally, much of the sulphur dioxide in the atmosphere comes from natural sources, but in Gibraltar the predominant source is power stations and shipping burning fuel oils.

Even moderate concentrations of sulphur dioxide may result in a fall in lung function in asthmatics. Tightness in the chest and coughing occur at high levels, and lung function of asthmatics may be impaired to the extent that medical help is required. Sulphur dioxide pollution is considered more harmful when particulate and other pollution concentrations are high.

The air quality objectives/standards for sulphur dioxide are a one hour mean of $350\mu\text{g}/\text{m}^3$, which is not to be exceeded more than 24 times per year and a twenty-four hour mean of $125\mu\text{g}/\text{m}^3$ which is not to be exceeded more than 3 times per year. The maximum hourly mean of $149\mu\text{g}/\text{m}^3$ and the maximum twenty-four hour mean of $38\mu\text{g}/\text{m}^3$ were recorded. (TABLE 2) These year's recorded levels are lower than those recorded last year of $213\mu\text{g}/\text{m}^3$ as the maximum hourly mean and $54\mu\text{g}/\text{m}^3$ as maximum twenty-four hour mean respectively.

There were no exceedances of the one-hour mean or the twenty-four hour mean at the Rosia Road Station.

Benzene

This pollutant is measured solely at the Rosia Road Station.

Benzene is a volatile organic compound which is a minor constituent of petrol (approximately 1% by volume). The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source.

Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.

The long term air quality objective/standard for benzene is $5\text{mg}/\text{m}^3$, measured as an annual mean.

This objective has to be met by 1st January 2010. The 2006 permitted annual mean including the margin of tolerance is 9mg/m³ (long term objective for 2010 plus margin of tolerance). The annual mean for this year was measured at 2.16µg/m³. (TABLE 2) This recorded annual mean is slightly lower than that recorded last year of 2.3µg/m³.

There was no exceedance of the long term objective annual mean at the Rosia Road Station.

Ozone

This pollutant is measured at Bleak House Station

Ozone (O₃) is not emitted directly from any man-made source in any significant quantities. In the lower atmosphere, O₃ is primarily formed by a complicated series of chemical reactions initiated by sunlight. These reactions can be summarised as the sunlight-initiated oxidation of volatile organic compounds (VOCs) in the presence of nitrogen oxides (NO_x). The sources of VOCs are similar to those described for NO_x above, but also include other activities such as solvent use, and petrol distribution and handling

The chemical reactions do not take place instantaneously, but can take hours or days, therefore ozone measured at a particular location may have arisen from VOC and NO_x emissions many hundreds or even thousands of miles away. Maximum concentrations, therefore, generally occur downwind of the source areas of the precursor pollutant emissions. Ozone irritates the airways of the lungs, increasing the symptoms of those suffering from asthma and lung diseases.

The air quality objective/standard for ozone is expressed as a maximum daily 8 hour mean of 120µg/m³. This 2010 target value should not be exceeded more than 25 days per calendar year averaged over 3 years. This long term target value was exceeded 199 times in total, but these exceedances occurred during 20 days in 2006. (TABLE 5) The maximum hourly mean was recorded as 164µg/m³, which is well below the information threshold of 180µg/m³ and the alert threshold of 240µg/m³. This year, though, the target value was exceeded 81 times more than last year's 118 figure, but this year the exceedances occurred during 20 days and not over 23 days as in the previous year.

1.7 CONCLUSION

This is the second year of automatic monitoring which has produced such robust and good quality data. Any reduction or increases to the 2005 recorded cannot be used to establish any reliable trends or patterns we would have to gather at least a few more years' data before we are able to do so.

The Provisional Data for the automatic air pollution monitoring network show that there were no exceedances of the various objectives contained in our national legislation or within the European Air Quality Directives or Daughter Directives.

Nitrogen dioxide once again failed to reach the long term objective of 40mg/m³ measured as an annual mean, which should be met by 2010. It was well within the annual mean as adjusted with the additional marginal tolerance, i.e. 48mg/m³. Regard must be had to the diffusion tube study as this will reveal whether there are other trouble areas and show up any hotspots.

Ozone has come close to the long term objectives as set down in our national legislation or within the European Air Quality Directives. As this pollutant is not produced locally but is brought to us by mass air movements we need to keep a close watch especially during the peak months of April to September.

Chapter 2 - Water Quality

2.1 BATHING WATER QUALITY

The European Commission, in the 1970's, decided that bathing water quality should be monitored and tested in order to protect bathers from health risks and to preserve the environment from pollution. This resulted in 1976 in one of the first pieces of European environmental legislation: the Council Directive 76/160/EEC on Bathing Water Quality. This was transposed into local legislation by the Public Health (Quality of Bathing Water) Rules 1992.

The 1976 Bathing Water Directive set binding standards for bathing waters throughout the European Union. The annual Bathing Water Report and Tourist Atlas can be viewed at http://www.europa.eu.int/water/water-bathing/report_2006.html

The 1976 Bathing Water Directive reflected the state of knowledge and experience of the early 1970s, both technically and socially. Since 1976, epidemiological knowledge has progressed and managerial methods have improved.

A new Bathing Water Directive (2006/7/EC) was adopted last 15th February 2006 and will replace the existing directive by 2014. It has still not been transposed in Gibraltar. Bathing sites will be classified into four categories: "excellent," "good," "sufficient" or "poor".



The new Directive lays down provisions for more sophisticated monitoring and classification of bathing water. Directive 2006/7/EC requires Member States to draw up a management plan for each site to minimise risks to bathers, based on an assessment of the sources of contamination that are likely to affect it

Information on a bathing site's quality classification, the results of water quality monitoring, the site's management plan and other relevant information are to be made readily available to the public, both through displays at the site and through the media and Internet.

The classification of water quality at a bathing site will be determined on the basis of a three-year trend instead of a single year's result as at present. This means that the classification will be less susceptible to bad weather or one-off incidents. Where water quality is consistently good over a three-year period the frequency of sampling may be reduced.

Gibraltar has six bathing areas, Camp Bay, Catalan Bay, Eastern Beach, Little Bay, Sandy Bay and Western Beach. These areas are monitored on a fortnightly basis during 15th April to 30th October each year.

The Gibraltar beaches have always met the Mandatory Values and at least three of them have met the more stringent Guide Values consistently each year. Since 2003 all six sites have met the Guide Values. Below is a table of the results for the period 1997 – 2005.



GIBRALTAR

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
1. Camp Bay	●	●	●	●	●	●	●	●	●	●
2. Catalan Bay	●	●	●	●	●	●	●	●	●	●
3. Eastern Beach	●	●	●	●	●	●	●	●	●	●
4. Little Bay	●	●	●	●	●	●	●	●	●	●
5. Sandy Bay	●	●	●	●	●	●	●	●	●	●
6. Western Beach	●	●	●	●	●	●	●	●	●	●

- Meets Guide Values set by National legislation and EEC Directive 76/160/EEC.
- Meets Mandatory Values set by National legislation and EEC Directive 76/160/EEC.

2.2 POTABLE WATER QUALITY 2005

The supply and quality of potable water in Gibraltar are controlled by the Public Health (Potable Water) Regulations 1994, the Public Health (Potable Water) Rules 1994, Public Health Ordinance (Amendment) Ordinance 2001 and Public Health (Potable Water) Rules 1994 (Amendment) Rules 2001.

The limit values and maximum advisable concentrations (MAC) for potable water is contained in the Schedules to the Public Health (Potable Water) Rules 1994 as amended by Public Health (Potable Water) Rules 1994 (Amendment) Rules 2001.

Water quality is checked under a two tier sampling and analysis programme:

- (i) The water undertakers have their own “in house” programme and additionally submit samples of each batch of water produced to the Public Analyst at the Public Health and Clinical Pathology Laboratories. The analysis results are then interpreted by the Environmental Agency and the batch under consideration is only released for general supply if found fit.
- (ii) The Environmental Agency also carries out its own independent monitoring programme, sampling the water supplies as they reach the consumers. This programme is designed to meet the sampling criteria outlined in Directive 80/778/EEC as substituted by Directive 98/83/EC and our national legislation.

In 2006, AquaGib Ltd supplied a total of 1,241,397 cubic metres of potable water. The potable water consisted of 93.4% desalinated water and 6.6% well water. This compares to 1,214,477 cubic metres of potable water supplied in 2005 which consisted of 96% desalinated water and 4% well water

The Public Health (Potable Water) Rules 1994 and the European Directive 98/83/EC require that both “Check” and “Audit” Monitoring is carried out on the potable water supplied to the community.

The purpose of the “Check” Monitoring is:

- to provide information on the organoleptic and microbiological quality of the water supplied for human consumption,
- to test the effectiveness of the drinking water treatment and;
- to determine whether or not the water complies with the relevant parametric values laid down by the Rules and the Directive.

The following parameters are included in the “Check” Monitoring list:

- Ammonium
- Colour
- Conductivity
- Escherichia coli (E.Coli)
- pH
- Odour
- Taste
- Coliform bacteria
- Turbidity.

The purpose of “Audit” monitoring is to determine whether or not the water complies with the relevant parametric values laid down by the Rules and the Directive.

The Rules and Directive require that a minimum of 16 “Check” and 3 “Audit” samples be undertaken in a given year. The Environmental Agency alone has taken and had analysed a total of 123 “Check” and 3 “Audit” samples in 2006 and 90 “Check” and 4 “Audit” samples in 2005. These figures do not include the numerous samples also taken by AquaGib Ltd itself during the corresponding period.

The following summary details the number of quality control samples taken by Environmental Agency all samples were below the maximum advisable concentration for each determinant.

Summary of overall quality 2005/6

PARAMETERS	2005			2006		
	No. samples	<MAC*	>MAC*	No. samples	<MAC*	>MAC*
Escherichia coli	90	90	0	126	126	0
Enterococci	4	4	0	3	3	0
Acrylamide	4	4	0	3	3	0
Alkalinites	4	4	0	3	3	0
Aluminium	4	4	0	3	3	0
Ammonium	90	90	0	126	126	0
Antimony	4	4	0	3	3	0
Arsenic	4	4	0	3	3	0
Barium	4	4	0	3	3	0
Benzene	4	4	0	3	3	0
Benzo(a) pyrene	4	4	0	3	3	0
Boron	4	4	0	3	3	0
Bromate	4	4	0	3	3	0
Cadmium	4	4	0	3	3	0
Calcium	4	4	0	3	3	0
Chloride	90	90	0	126	126	0
Chromium	4	4	0	3	3	0
Coliform Bacteria	4	4	0	3	3	0
Colour	90	90	0	126	126	0
Conductivity	90	90	0	126	126	0
Copper	4	4	0	3	3	0
Cynide	4	4	0	3	3	0
1,2- dichlorethene	4	4	0	3	3	0
Epichlorohydrin	4	4	0	3	3	0
Flouride	4	4	0	3	3	0
Hydrogen ion concentrate	90	90	0	126	126	0
Iron	4	4	0	3	3	0
Lead	4	4	0	3	3	0
Magnesium	4	4	0	3	3	0
Manganese	4	4	0	3	3	0
Mercury	4	4	0	3	3	0
Nickel	4	4	0	3	3	0
Nitrate	4	4	0	3	3	0
Nitrite	4	4	0	3	3	0
Pesticides } Pesticides – Total }	4	4	0	3	3	0
Phosphorous	4	4	0	3	3	0
Polycyclic aromatic hydrocarbons	4	4	0	3	3	0
Potassium	4	4	0	3	3	0
Odour	90	90	0	126	126	0
Oxidisability	4	4	0	3	3	0
Residual Chlorine	90	90	0	126	126	0
Selenium	4	4	0	3	3	0
Silver	4	4	0	3	3	0
Sodium	4	4	0	3	3	0
Sulphate	4	4	0	3	3	0
Taste	90	90	0	126	126	0
Tetrachloroethene and trichloroethene	4	4	0	3	3	0
Total organic Carbon	4	4	0	3	3	0
Total hardness	90	90	0	126	126	0
Turbidity	90	90	0	126	126	0
Zinc	4	4	0	3	3	0

2.3 The Water Framework Directive (2000/60/EC)

The overriding aim behind the Water Framework Directive is to ensure that all our water bodies, both coastal and groundwater, achieve or maintain “Good Status”. With this aim in mind, Government appointed consultants to carry out an initial characterisation study and produce a report on their findings. This report provides a summary of Gibraltar's water bodies as required under the Directive. The report included an analysis of the characteristics of the Gibraltar River Basin District along with a review of the impact of human activity on the status of surface waters and groundwater. Data collected during this reporting process has subsequently been used by the Water Framework Directive Working Group (WFDWG) to develop a monitoring network for Gibraltar. Consultants have also been contracted to facilitate the scheme. The WFDWG itself is made up of a panel of local professionals, scientists and Government officials. It was specifically established to provide ongoing technical and scientific advice to Government on the development and implementation of the Water Framework Directive

Coastal waters were designated as covering an area of three nautical miles from the Gibraltar coastline. Within this region, two areas have been provisionally designated as Heavily Modified Water Bodies (HMWB); the main harbour and waters north of the harbour area.

The coastal water body crosses two ecoregions - the North East Atlantic and Mediterranean ecoregions. Based on the substantial research that has been carried out in this regard, we are able to confidently state that our coastal waters should be characterised as Mediterranean.

So as to provide an effective and efficient account of coastal water quality, a total of four monitoring stations are being set up around Gibraltar. Surveillance monitoring will be carried out for a period of one year starting in winter 2007. Monitoring results will then be used to design the operational monitoring network as required under the directive. A wide range of parameters will be investigated including physio-chemical, chemical, hydromorphological and biological parameters. A screening exercise will also take place to determine which priority substances or other significantly discharged substances should be monitored. Details of the precise chemical parameters that will be monitored should be available after the preliminary screening takes place.

Groundwaters are also covered under the monitoring network. Two groundwater bodies have been defined within the Gibraltar River Basin District. These include the Northern groundwater body (Isthmus sands) and the Southern groundwater body (aquifer within limestone bedrock). A total of eight groundwater-monitoring stations have been identified; five stations within the Northern body and three within the Southern body. The frequency of monitoring will vary for each groundwater body. Groundwater monitoring will also start in spring 2007 and will address both chemical and level (quantitative) monitoring requirements.

Overall, the proposed monitoring network will cover the monitoring requirements of the WFD whilst also addressing protected areas and perhaps investigative monitoring if any abnormal results are discovered.

Chapter 3 - Waste Management

The strategy for waste management within Gibraltar has concentrated on the preference to handle and manage waste locally. Historically, this has been realised through the operation of a municipal solid waste incinerator. However, following the closure of the facility in 2000, waste treatment and disposal occurs across the border in Spain. Wastes generated within Gibraltar are collected by a combination of public and private companies, for subsequent transportation across the border by road haulage vehicles. In the case of municipal (domestic and commercial) wastes, collection is carried out partly by Gibraltar Industrial Cleaners and partly under contract by Master Services (Gib) Ltd.



Waste is deposited for collection in a number of forms, including bagged waste, wheelie bins, euro bins and the miscellaneous loose deposit of an array of items. Collection vehicles generally take the form of proprietary rear end loaders that are typical across Europe, but there are also some smaller open-back collection vehicles whose crew are variety of different waste items e. The payloads of the collection vehicles range from

around 4-4_ tonnes capacity up to a maximum 7-7_ tonnes capacity. There are seven routes that cover the whole of Gibraltar and collection of refuse is undertaken daily, 6 days a week.

The main sources of hazardous/industrial wastes within Gibraltar originate from the following sources, with the following being the figures from each for 2005 and 2006:

Shipping	10,765 tpa
Clinical	182 tpa
MoD	552 tpa
Misc. Other	166 tpa
Total Industrial Waste	11,665 tpa

(tpa - tonnes per annum)

In the case of industrial wastes, movements occur on an as-and-when-needed basis, with some such materials being stored locally until sufficient quantities of such waste have been collected to warrant the economic transfrontier movement for subsequent treatment and disposal. In the absence of any heavy industry within Gibraltar, sources of hazardous industrial wastes are limited to shipping, the Ministry of Defence (MOD), light industry and clinical/medical sources. A limited amount of hazardous material is also produced from municipal sources or via construction and demolition activities. These are however, treated as industrial hazardous wastes requiring specialist collection and disposal. The predominant types of hazardous waste that arise from these sources are waste oils, clinical/medical waste grits and asbestos or asbestos containing products.

3.1 WASTE OIL

The predominant hazardous waste material within Gibraltar is waste oil, comprising a mixture of waste oils from visiting ships, MOD sources, service stations and other light industry. These materials currently undergo preliminary treatment and water separation at a Slop Oil Reception and Treatment (SLOP) facility at 12 North Mole Road, before being transferred to the UK for further treatment and regeneration or disposal.

3.2 CLINICAL WASTE

The second most predominant hazardous waste material is clinical waste produced by the hospitals (St Bernard's Hospital and the Royal Naval Hospital) and a number of medical, nursing, dental and veterinary practices. All clinical waste is currently collected and temporarily stored for no more than a couple of days, awaiting transportation to the Ecoclinic SL treatment facility in Granada, Spain. There are normally between two to three deliveries per week to this facility, although numbers vary on a monthly basis. The average size of each delivery, effected by road transport using dedicated sealed vehicles, was calculated at an average of:

Number of 60 litre barrels	Year
30960	2004
33200	2005
37800	2006

Construction of a new clinical waste incinerator in Gibraltar is currently taking place at the ex Governor's Cottage Camp site, at Europa Advance Road. This new facility is expected to be operational by late 2007.

3.3 GRIT

Grit is also produced locally, resulting from ship repair and conversion work undertaken by Cammell Laird (Gibraltar) at the Naval Yard. The accumulation of this material that had previously been stockpiled on site, was removed during the course of last year and transported by road haulage to a landfill site in Spain. It is expected that with the adoption of new working practices at the Cammell Laird yard, such accumulations should not arise in the future. These new working practices centre around Cammell Laird's intention to concentrate on luxury yacht repair and refurbishment. This shift in focus will include changing from the traditional sand blasting technique to hydro blasting as well as a change from spray painting to brush painting.

3.4 ASBESTOS

The prevention and reduction of pollution by asbestos discharges into the natural environment is governed by Part XIV of the Factories Act 1956. This includes the handling, transportation and disposal of waste containing asbestos. In Gibraltar there are currently 3 companies licensed to collect and transport asbestos waste under Part VA of the Public Health Act. One of these is further authorised under the Transfrontier Shipment of Waste Regulations to export asbestos waste to an authorised disposal plant in Spain. A total of 455 tonnes of asbestos waste was exported in 2006, most of it comprising of asbestos-cement although other asbestos products such as insulation board laggings, brake pads, rope, gaskets, etc were also exported. Currently in 2007, Government has extracted 48.5 tonnes of asbestos waste (sealed in bags) stockpiled in 'Dead Man's Cave', Europa Point.

3.5 OTHER HAZARDOUS

Other hazardous wastes (including MOD wastes) are generally collected and disposed of by any one of a number of private waste contractors. Such materials are delivered for treatment and/or disposal to suitably licensed facilities in Spain. The frequency and quantity of such other types of hazardous waste arisings is largely dependent on the nature and occurrence of such arisings.

3.6 CONSTRUCTION AND DEMOLITION WASTE

Wherever possible, clean construction and demolition wastes are utilised within Gibraltar for land reclamation purposes; otherwise the wastes are categorised, collected and disposed of as municipal or hazardous industrial waste, as appropriate. Gibraltar is currently producing an average of some 15,000 to 22,500 tonnes of construction and demolition waste per year.

3.7 RUBBER TYRES

Gibraltar produces an average of 59 tonnes of waste tyres per year. This includes tyres for all construction and industrial vehicles. The current location for the deposition of rubber tyres is the refuse holding facility at Europa Advance Road. Tyres may be disposed of at this site, at no cost. During the course of 2006, the accumulation that had build up over a number of years has been completely removed and presently we are dealing with the volumes presently being produced, which are removed periodically as and when numbers warrant this.

3.8 RECYCLING

The Government is committed to the ideology of recycling non-combustible materials. At present all our municipal waste is sent to Sur Europa, a landfill site in Los Barrios, Spain. In 2003, Sur Europa opened a new 'Environmental Park', which now accommodates all of Gibraltar's municipal waste (representing some 13% of the 190,000 tonnes per annum facility capacity). The environmental park employs an array of manual and automated separation and sorting processes to recover paper, plastics and metals from the incoming waste stream, with the organic fraction being composted in a covered shed to provide a 'saleable' compost product. The residual waste is removed by separate conveyor to a baling plant, before being disposed of to a newly developed landfill adjacent to the facility.

In addition wood and metals items, principally resulting from commercial wastes, are sorted out locally at the site of the previous incinerator at Michael Dobinson Way. Furthermore, Government provides a separate Civic Amenity Site, presently at Buena Vista, and which is operated by personnel from Gibraltar Community Projects. At this facility, householders are able to dispose of their bulky timber items, white goods, electrical goods, mattresses, building debris and metal scrap. Large volumes of such items are accepted at the Government's alternative site, being the site of the old incinerator at Michael Dobinson Way, a site that is also being used for the storage of white goods and electrical goods awaiting the identification of appropriate decommissioning plants for these items.

The following items of local waste are currently being sent abroad for recycling:

- Waste oil - Partially recycled/regenerated at North Mole Sullage Plant (SLOP Oil Reception & Treatment Ltd SORT)
- Metals - Sent as sorted scrap to Spain to join recycling a stream
- Batteries –
 - (i) Car batteries collected by scrap metal dealers and sent to Spain where they join a recycling stream
 - (ii) Small recyclable batteries (those containing nickel and cadmium) collected by Environmental Agency from fixed collection points for future recycling abroad
- Cardboard - Limited amount sent to Spain to join a recycling stream
- Refrigerators - Taken to Spain to join recycling streams for both refrigerant gases and metals
- Wooden pallets - Generally returned to suppliers for re-use

A concession for the recycling of glass and cans has been awarded to the Government's current appointed waste contractor Master Services. Plant and equipment will shortly be acquired for this purpose and systems will be set up to allow for the distribution of bins and subsequent collection of these, as well as for the sorting and subsequent exportation of such items.

3.9 WASTE ARISING

Waste data collated by the Government on the historic municipal waste arisings for Gibraltar, is illustrated in Figure 3.2. These waste arisings exhibit a series of step changes over time. In addition, prior to 2000, the figures include both domestic and bulky items. However, from 2000 onwards domestic refuse and bulky items were separated and the figures relate to domestic refuse only. Records of industrial waste arisings are held by the Environmental Agency as part of its maintenance of the transfrontier shipment database - covering a range of hazardous industrial waste types dating back to 1996. Details of these are set out in Table 3.1.

Current waste arisings (as at the end of 2005) are summarised as follows (tonnes per annum):

Municipal	23,650 tpa
Industrial	11,665 tpa
Construction & Demolition	30,000 tpa

(tpa - tonnes per annum)

The current municipal waste arisings within Gibraltar are estimated to be 17,650 tpa, based on a civilian population of 28,779. This equates to around 610kg of gross municipal waste arisings per capita per year. Although higher than may normally be expected within a developed European country (typically around 400kg per capita per annum), these arisings are considered reasonable when considered in the context of Gibraltar's geographical constraints.

The ultimate goal of Gibraltar's waste management strategy is to become as self-sufficient as possible in terms of waste collection, treatment and disposal. Appreciating the difficulty of this, considering our geographical limitations, the strategy should still aim to optimise waste treatment within Gibraltar and minimise our reliance on external facilities, principally in Spain, for residual waste disposal. In order to minimise such reliance on others, a strategy is being developed that encourages the key principles of waste management within the bounds of economic possibility. In the order of priority and effectiveness, these principles are listed as follows:

- Reduction of waste at source;
- Recycling and re-use of specific wastes;
- Treatment to reduce volume of wastes - e.g. incineration
- Treatment and use of residues to reduce disposal volumes (e.g. incinerator ash to road-base,); and
- Careful consideration of location for final disposal of residues.

An important point to remember is that all waste management option processes, no matter how efficient, will continue to require some disposal to landfill. As such, any options should be considered against the need to reduce reliance on landfill as much as possible, an issue that is beginning to figure more prominently due to the requirements of the European Landfill Directive, whose aim objectives are:

“To prevent or reduce as far as possible negative effects on the environment, in particular the pollution of surface water, groundwater, soil and air, and the global environment, including the greenhouse effect, as well as any resulting risk to human health, from the land filling of waste, during the whole life-cycle of the landfill”.

The Landfill Directive sets demanding targets to reduce the amount of biodegradable municipal waste. Strategies are therefore presently being devised that will enable Gibraltar to fully comply with such obligations, the first of which takes effect in 2010 by when we would have been required to reduce our biodegradable municipal waste landfilled to 75% of that produced in 1995.

Figure 3.2: Municipal Waste Arisings in Gibraltar by Year - 1993 to 2005

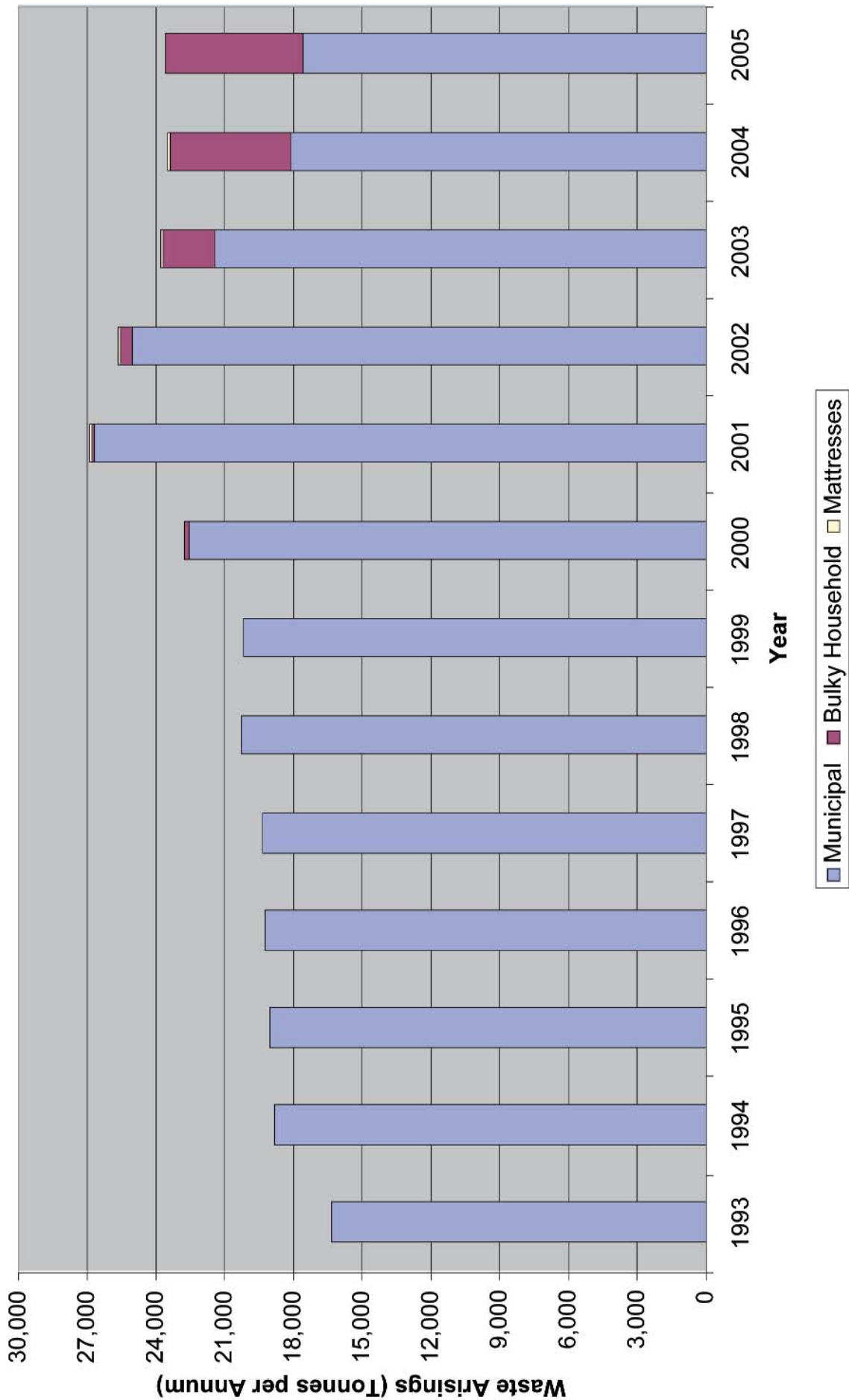


Table 3.1: Industrial Waste Arisings in Gibraltar - 1996 to 2005

Waste Type	2000	2001	2002	2003	2004	2005
Acid Solutions				1.89	1.40	
Alkaline Solutions			32.64	12.84	0.18	
Asbestos		105.35	200.04	74.95	189.47	151.04
Bituminous Products						13.10
Clinical Waste	128.91	173.29	170.28	94.09	190.07	178.00
Electronic Equipment					3.94	0.29
Glues				0.18		
Grit						10,746
Halogenated Solvents		0.41	0.43			0.50
Hexamine						
Incinerator Ash	112.54					
Lead Batteries		0.93	3.49	9.58	11.24	5.78
Medicines			1.81	0.20		3.94
Mercury			0.02			
Misc. Chemical Elements			3.04	0.26		
Non Halogenated Solvents			1.60	5.69		4.27
Oil-contaminated Soil/Sludge					26.62	4.80
Oily Sludge					11.31	
Paint chippings		2.13	18.21	3.60	1.54	19.36
Petrol			0.86			
Photographic Liquids		0.03	0.40		1.39	1.42
Salts				0.11		
Sand & Soil Hydrocarbons					13.40	4.80
Sand with Metals				277.41	18.54	531.62
Waste Oil	20.07	362.34	4,607	2,138	522.86	
X-Ray Plates				5.00	1.55	
TOTAL (TPA)	262	644	5,040	2,624	1,024	11,655

Chapter 4 - Environmental Impact Assessment

Environmental Impact Assessments (EIA) is a necessary tool for the assessment of potential effects to the environment arising from development. It is a public process through which the likely significant effects of a project proposal on the environment are identified, assessed and then considered by the competent authority in the decision making process. The law and the practice of EIA have evolved tremendously since the ratification of the first EIA Directive in 1985 (Directive 85/337/EEC). The amending Directive was published in 1997 (Directive 97/11/EC) and is now a general code of practice adopted in all EU Member States, (Figure 4.1).



Article 2 of the Directive requires Member States to adopt “all measures necessary to ensure that, before consent is given, projects likely to have significant effects on the environment by virtue, inter alia, of their nature, size or location are made subject to a requirement for development consent and an assessment with regard to their effects”. These requirements have been transposed into local law by virtue of the Town

Planning (Environmental Impact Assessment) Regulations 2000. The EC Directive and the Town Planning Act provides categories of (list 1 and list 2) projects, which require an EIA.

An Environmental Statement (ES) prepared by the developer should identify and classify all environmental effects. It is then up to the relevant bodies to certify what are considered to be significant effects and are at liberty to add any additional factors for consideration, should they so decide.

EIA's have four key principles:

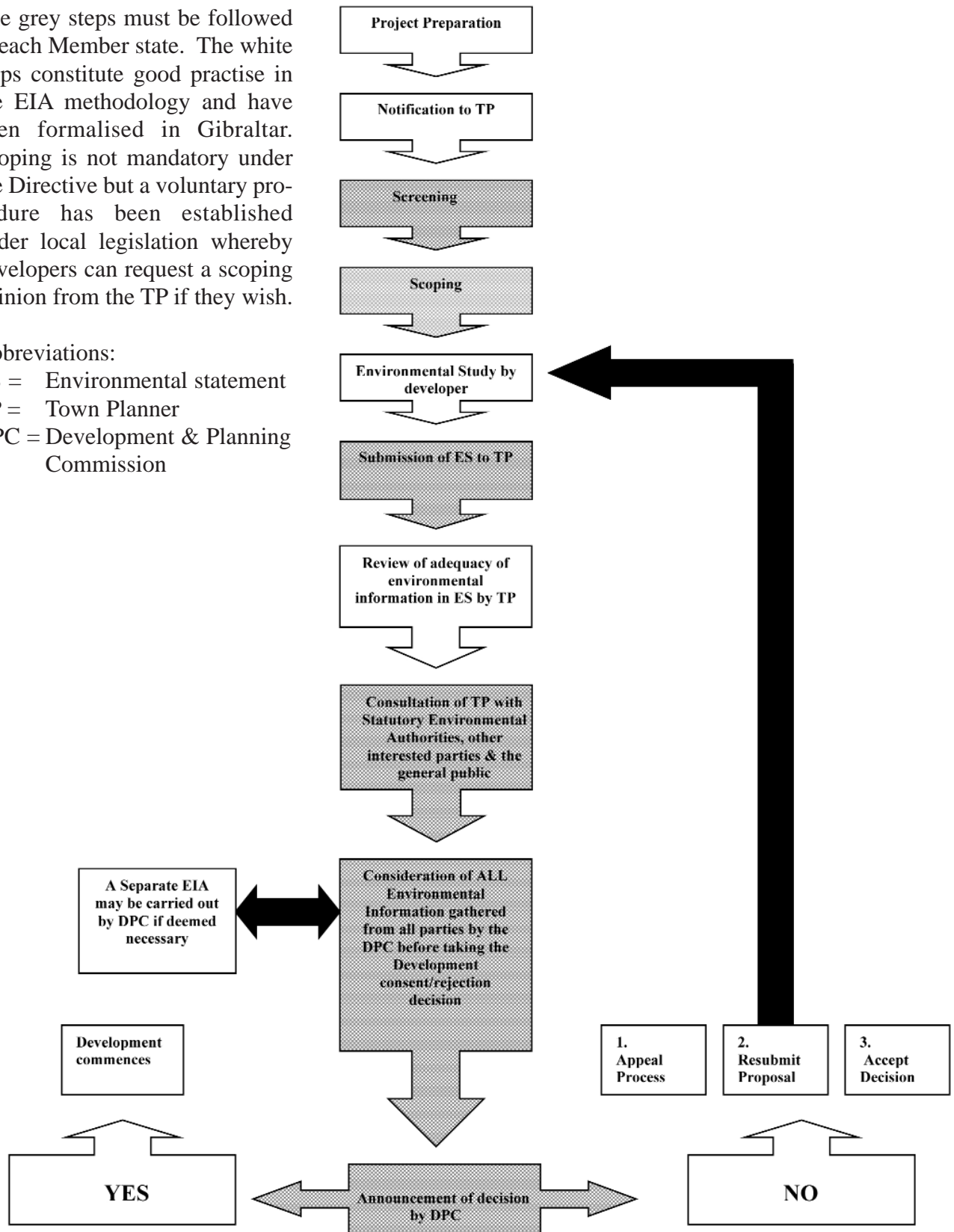
1. Procedural – it establishes a systematic procedure which allows the incorporation of environmental considerations into decision making
2. Informational – the procedure outlined above enables the information about the environment to be passed onto the decision making body, the Development & Planning commission (DPC) in Gibraltar, and the public, in a clearly defined way
3. Preventive – it should happen at the earliest possible opportunity in the decision making process and well before a consent is made
4. Iterative – the information it provides feeds back into the EIA process and the design process of the activity concerned

Figure 4.1 The EIA Process in Gibraltar

The grey steps must be followed in each Member state. The white steps constitute good practise in the EIA methodology and have been formalised in Gibraltar. Scoping is not mandatory under the Directive but a voluntary procedure has been established under local legislation whereby developers can request a scoping opinion from the TP if they wish.

Abbreviations:

- ES = Environmental statement
- TP = Town Planner
- DPC = Development & Planning Commission



Chapter 5 - Food Hygiene

5.1 FOOD POISONING

Food poisoning and food borne infections are generic terms applied to illnesses acquired through the consumption of contaminated food or water. The most common food borne infections in Gibraltar are Salmonella and Campylobacter.

The downward trend in the number of cases of laboratory confirmed notifiable infection reported in recent years persists. “Although the total number of notifications at 184 is slightly higher when compared with 172 last year, this is still much lower than previous years, being 265 (2001), 242 (2000) and 233 (1999)” (GHA Annual Report, 2005).

Table 5.1.1 Reported cases of food poisoning

Infection	2005	2004	2003	2002	2001	2000	1999	1998
Campylobacter	32	24	51	98	92	73	69	42
Salmonella	90	129	74	103	58	85	38	28

When food poisoning is reported to the Environmental Agency, the Environmental Health Officer conducts an investigation to trace the source of infection. This normally entails visiting households, interviewing affected persons and offering precautionary advice to prevent the spread of infection.



Any food establishment which may be associated with an outbreak is inspected immediately and samples of any suspected food are taken for analysis.

A thorough investigation is carried out in the establishment into the handling, preparation and cooking of any suspected food in order to establish any malpractices. Health screening of food handlers is undertaken if required.

Checking for signs of pest infestation in a kitchen.

5.2 FOOD SAFETY SAMPLING PROGRAMME

Foods that normally give rise to bacterial food poisoning are those in which food poisoning bacteria can easily multiply and live. These foods are known as high-risk foods and include cooked meat, poultry and meals prepared with meat and poultry. Some dairy products fall under the category as well.

These foods are sampled in order to ensure that they are free from food poisoning bacteria. Any food found to contain these bacteria are condemned and a thorough investigation is carried out to ascertain the cause of the contamination. Other foods are sampled to ensure that they comply with statutory compositional standards. A total of 150 samples were taken during 2005 and 162 samples were taken in 2006 for bacterial and chemical analysis.



Cooked meat and dairy produce – High Risk foods

5.3 IMPORTED FOOD



Environmental Health Officer checking the temperature of food

All food consumed locally is imported from countries worldwide. Food was traditionally imported by shipping but today the majority of our food imports enter Gibraltar via the land frontier with Spain. The Environmental Agency operates an inspection post at the frontier. An Environmental Health Officer and an assistant staff this post. Their role is to inspect all food entering Gibraltar via land, sea and air and to ensure that it complies our Imported Food Regulations. The inspection is supplemented by a routine and random sampling programme.

5.4 REGISTRATION AND INSPECTION OF FOOD PREMISES

There are 415 food premises in Gibraltar. These consist of restaurants, takeaways, supermarkets, delicatessens, bakeries, groceries and confectionery outlets. There are no foods manufacturing factories.

Food premises in which high-risk foods are handled have to be registered with the Government prior to trading. Registration is granted subject to the premises complying fully with our Food Hygiene Regulations.

All food premises are subjected to periodic inspections by Environmental Health Officers to ensure that they comply with our Food Hygiene Regulations (Table 5.4.1). The frequency of inspection is dependant on the type of food sold from the premises. Premises which sell high risk foods such as takeaways, restaurants, delicatessens etc are subjected to more frequent inspections than those that sell other types of foods.



Inspections of retail outlets to ensure compliance with Food hygiene Regulations

Table 5.4.1 Number of inspections

Year	Number of inspections
2001	1036
2002	1028
2003	971
2004	1161
2005	967
2006	885

During the course of inspections Environmental Health Officers provide advice on food hygiene related issues to Managers and food handlers employed at these premises.

Chapter 6 - Environmental Noise



Noise is all around us and has its own particular effects on the quality of our environment and health. Noise pollution is on the increase due to our current lifestyles. Vehicles, motorcycles, aircraft, hi-fi systems, air conditioning units, construction, power generators etc all make a contribution to environmental noise.

The Directive on Environmental Noise has arisen through the concern and subsequent realisation that environmental noise, caused by the sources listed above is one of the major environmental problems, which affects human health throughout Europe. The target of the directive is to develop a method that aims to avoid, prevent (if not limit) the negative and potentially harmful effects caused by exposure to environmental noise. The noise management strategy supported and advocated by the Directive focuses on the development of criteria for maximum safe noise exposure, the policing of designated noise control zones and the endorsement of noise assessment and control through environmental health programmes. The main way in which the Directive aims to decrease unacceptable levels of environmental noise is through the use of noise mapping and subsequent action and mitigation plans. Locally, environmental noise from different sources is an issue of concern. An assessment of our “major roads” as defined by the Directive is underway. Traffic counters are being distributed amongst our major roads for set periods of time. Once the extent of our major roads is established, Government can then begin to plan any necessary mitigation and action, aimed at decreasing any excessive environmental noise down to more acceptable levels.

The Environmental Agency is the competent authority for noise pollution, its powers to deal with noise problems stem from the Public Health Act. The provisions within the existing Public Health Ordinance are not sufficient to properly cope with the environmental noise problems of today. Government through the Department of the Environment and the Environmental Agency are currently engaged in a review of the existing noise legislation with a view to allow for the better control of noise, for example, from construction and demolition sites, audible intruder alarms, motorcycles, places of entertainment and noise from domestic premises.

The Directive does not apply to noise that is caused by the exposed person himself, noise from domestic activities, noise created by neighbours or noise at work places. The review of the local Noise Act will however, marry a whole array of local noise sources such as noise from domestic sources and will subsequently introduce methods for the control, management and policing of noise. In addition to this, noise consultants appointed by Government have assessed the noise pollution emanating from the OESCO power station with a view to advising Government on possible mitigation measures for this site. The measures outlined will reduce the possible adverse effects from environmental noise exposure and aim to sustainably manage environmental noise in Gibraltar. One of the most common sources of noise arises from cars and motorcycles. Two issues arise from such vehicles, one is the noise emanating from vehicles with modified or damaged exhaust systems, and the second is the level of music that originates from cars after hours. This not only causes noise pollution, but also is illegal.

Noise surveys are carried out for noise complaints from premises, usually as a result of a complaint to the Agency, and an Abatement Notice may



be served if a statutory nuisance is deemed to exist. This may require the person or premises causing the excessive noise to either stop producing the noise or carry out sound insulation or other works to reduce the noise transmitted. The majority of the cases are resolved by informal action after the intervention of the attending environmental health officer. Similarly the Royal Gibraltar Police (RGP) investigates complaints of noise pollution and prosecute offenders who exceed the legal noise limits after hours.

The Environmental Agency received a total of 29 noise complaints in 2005. These were broken down as follows:

Nature of Complaint	Number of reports
Noisy Establishments	10
Industrial noise	2
Shipping noise	1
Construction	10
Noisy Neighbours	3
Dogs	1
Miscellaneous	2

The complaints recorded in 2006 were as follows:

Nature of Complaint	Number of reports
Construction Noise	23
Noisy neighbours	5
Noisy establishments	4
Industrial noise	6
Barking dogs	4
Miscellaneous	6

The number of complaints received by the Royal Gibraltar Police between 1st April 2005 to 31st March 2006 is:

Nature of Complaint	Number of reports
Making loud noise after hours	1
Playing loud music from cars	93
Playing music after hours	6

Chapter 7 - Public Awareness

An issue of great importance is that of environmental education and awareness. The key to tackling environmental issues is through the creation and increased spread of awareness of the impacts of unsustainable codes of practice as well as awareness in relation to existing environmental legislation and management facilities available. The government is currently developing two programmes, one being environmental education in schools and the other in the public and private business sectors of the community.

Environmental Education in schools expands upon the aims of education by providing a context outside the classroom in which pupils can discover new ideas and learn new skills. It is a way of involving pupils in the first hand exploration of their environment, as well as providing an understanding of the needs of others. This is appreciated through the realisation that humans are intrinsically linked to our environment and are dependant on it for our survival. The environmental responsibility and duty of care, which we all share towards our environment, is a fundamental message to be learnt. Active learning and spending time outdoors puts people in personal contact with their environment – contact leads to improved aesthetic and moral development. This then achieves a greater understanding and involvement in environmental issues from an early age in a pupil's development, which is of the utmost importance if current and future generations are to preserve and retain our unique environment. Environmental awareness is high among our young population as was evident on World Environment Day this year (http://www.gibraltar.gov.gi/gov_depts/environment/department_of_environment.htm). The morning seminar focused on spreading environmental awareness as interpreted through the eyes of our younger population and one message was made very clear, Gibraltar's children are very much aware of their environment and they care deeply for it! Nine schools (seven infant schools and two middle schools) performed original, witty and exciting plays and songs portraying very important environmental messages.

The Green Business Program that Government is developing is a voluntary program that encourages businesses to take proactive action that is not only good for the business but also for the environment. Our goal is to achieve a healthier and cleaner environment by helping businesses integrate environmental responsibility into their operations in a manner that is sustainable as well as profitable. Green businesses operate in ways that solve, rather than cause, both environmental and social problems. These businesses adopt principles, policies, and practices that improve the quality of life for their customers, their employees, communities, and the environment. As mentioned previously, any business, from any sector, whether it be commerce, finance, retail or industry can become a green business.

Small and large businesses will be given examples and tips on a range of green issues from the green management of the day to day running of the office to green philosophies within the company. The main aim is to encourage businesses to look into and assess their environmental performance. This will hopefully then create a knock-on effect where a competitive market for green products and green codes of practice within industry and commerce is created.

Chapter 8 - Other Issues

8.1 CLIMATE CHANGE IN GIBRALTAR

The climate change debate is fast becoming the main issue of environmental concern. Is global warming occurring and are we responsible for it? The earth naturally undergoes cycles of warming and cooling. The climate is regulated and driven by a continuous flow of energy from the sun. It



has now been established amongst leading international scientists that climate change is occurring, the debate still lies however, as to whether it is part of the earth's natural cycles, if humans are accelerating and enhancing the effects of these cycles, or whether it is mainly human induced.

The predicted effects of climate change in the Western Mediterranean are expected to consist of a rise in temperatures, lower levels of rainfall and a change in the intensity and distribution of the rainfall leading to a subsequent increase in floods. The effects of climate change in this region are expected to create a greater degree of unpredictability of extreme weather events, ranging from wetter winters, drier and hotter summers and heat waves. Episodes such as drought are not expected to affect the human population in Gibraltar to a very large degree, as our potable drinking water source is largely desalination. This however, may not be the case for the floral and fauna populations on the Rock. These communities are likely to suffer from decreased rainfall.

Lower river flows in summer and subsequent decreased discharge of freshwater into the Bay will affect the sea temperature, salinity, CO₂, nitrate and phosphate concentrations within the marine environment. This will in turn have a knock on effect on marine flora and fauna as well as the supporting terrestrial populations. Furthermore, higher temperatures will dry soils and increase salinization and generate a higher incidence of wind blown soil erosion. Gibraltar is on a main migratory path for birds. Increasing drought in the Mediterranean would lengthen migratory journeys and increase stress to migrants (GONHS, 2005).



The Department of the Environment is looking into the effects of climate change both locally and in the region, with a future view to creating a climate change programme for Gibraltar. The possible effects listed above are based on general climate scenarios and may not pan out as predicted. However, awareness of possible effects allows for precautionary planning, i.e. plan for circumstances in which they could arise.

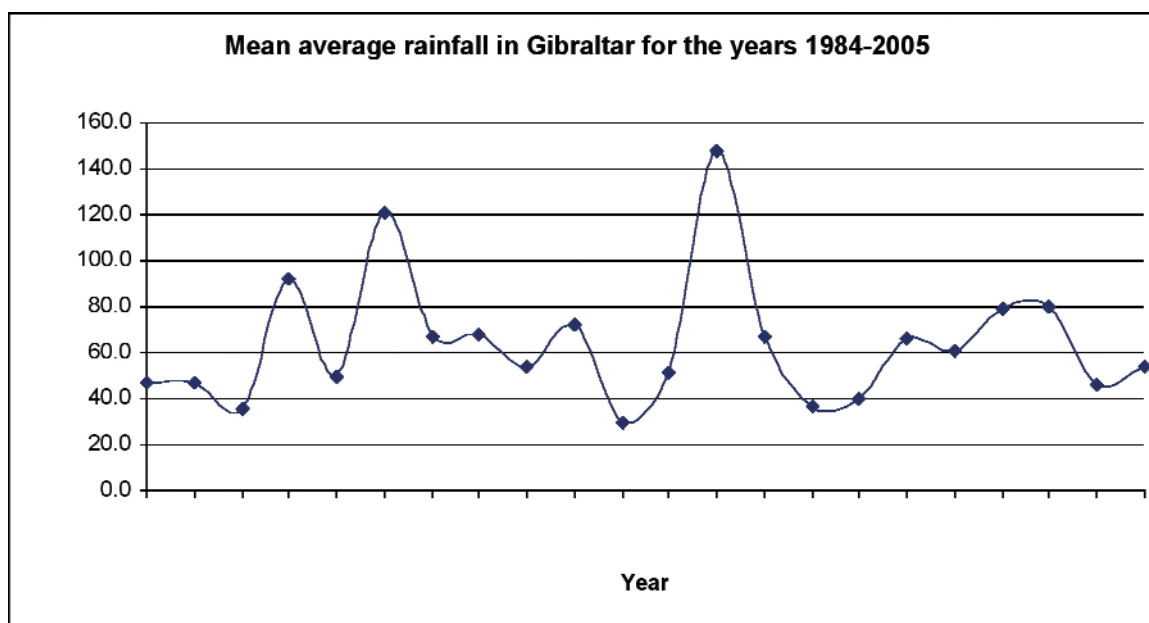
One important point to take note of is that it is as yet difficult to ascertain whether there is any evidence of the effects of climate change in Gibraltar. Whilst it may seem that the last few summers



have been hotter than in the past, records show that in 1996 Gibraltar experienced particularly strong storms, as shown by the photos in this chapter. Gibraltar has experienced years when summers have been much hotter than those currently being experienced, and similarly winters have been wetter or drier than experienced recently. The data in Figure 8.1.1 illustrates this point. The lowest rainfall counts were in 1986, 1994, 1998 and 1999. The highest rainfall counts were recorded in 1987, 1989 and 1996. This twenty-year record for

rainfall shows the large variability, which can happen between years, the reason for this is believed to be due to the variation of movement of weather systems. Going further back into our records will invariably show possible longer-term trends having been established.

Figure 8.1.1 Rainfall in Gibraltar between 1984-2005



The Department of the Environment is presently drawing up a climate change programme. The aim of the programme is to deliver a series of packages in the form of government policies that will lead to enhanced environmental awareness throughout our community and which will hopefully start to promote and encourage effective changes in our daily lives. The Gibraltar Climate Change Programme is to be reviewed and if necessary updated not later than every 10 years, if deemed necessary by the representatives of the local Climate Change Forum. This forum acts as a technical advisory group (TAG) to the Government and consists of local professionals, scientists and Government officials alike. A TAG is a team that provides ongoing technical, scientific and managerial advice on policy development and implementation. It is essentially independent advisory forums whose recommendations are not obligatory but nevertheless carry substantial weight with decision-makers. It maintains transparency in its processes and establishes and maintains an open working relationship with Government.

8.2 LAND QUALITY

The extreme density of the population of Gibraltar exerts considerable pressure on land use, making land use planning an issue of the utmost importance. The population of c.29, 000 is concentrated on an area of 6.4 km². In an attempt to protect the land quality in Gibraltar, Government's intent in relation to development proposals is that the affect on the environment of development proposals shall be a prime consideration in determining applications. Similarly, Government's intent in relation to development on potentially contaminated or contaminated land is that Planning permission for development on contaminated land will normally be granted provided that it can be demonstrated that measures can be taken to satisfactorily overcome any danger to life, health or property. Instances of development on potentially contaminated land have arisen locally and Government deals with such issues on a case by case basis. Historical land use in Gibraltar has been such that, as with all EU countries, varying degrees of contaminated land exist. The Department of the Environment, together with the Environmental Agency monitor such cases closely to ensure that any contaminated (or potentially contaminated) material is removed and disposed of in an environmentally acceptable manner. If deemed necessary soil

samples will be taken to assess the degree and extent of contamination of a site. The Government is drafting legislation that focuses on land quality management and enforces the polluter pays principle in respect to the contamination or pollution of land.

In addition to the above, further ways in which the Government works to ensure that Gibraltar's land area is of the highest quality and ensures the long-term preservation of such areas include:

- The revising of the Development Plan for Gibraltar, shortly to be released
- The issuing of Tree Preservation Orders
- Adoption of a policy for the Planting of trees.
- The undertaking of a survey of all planted green areas throughout Gibraltar so as to ensure better management and preservation of all such areas.
- The declaration of a significant portion of Gibraltar land mass and territorial waters as Special Areas of Conservation under the Habitats Directive.

Soil plays an important role in controlling and mediating pressures on the environment, and as such, must be considered for the protection of water, air and human health. Government's intent on the preservation of soil, is that where relevant, applicants for planning permission will be expected to make provision for the beneficial re-use of soil removed from the site. Soil preservation is related to the issue of open spaces within urban environments. There are areas of open space of various sizes, forms and character throughout Gibraltar that are considered important for their contribution to the built environment. There will be a presumption against the loss of open spaces that are considered important in terms of their:

- contribution to the character and appearance of the built or natural environment; and/or
- recreational or amenity value; and/or
- ecological value

The aim is that this will include an assessment of all open spaces, which will need to be undertaken that will consider such factors as nature conservation value, recreational and amenity value and landscape value in determining the relative importance of these areas.

The land area of Gibraltar has increased by 389,031 m² since the 1980's. (Table 8.2.1) Gibraltar now has a total land area of 6.4 km². In this total land area, there are significant areas of ecological value. Twenty nine percent of Gibraltar's land area has been designated as a nature reserve and thirty one percent has been designated at EU and Local level as a terrestrial Special Area of Conservation (SAC). This is a proportion of land that few, if any, country can boast (Figure 8.3.1).

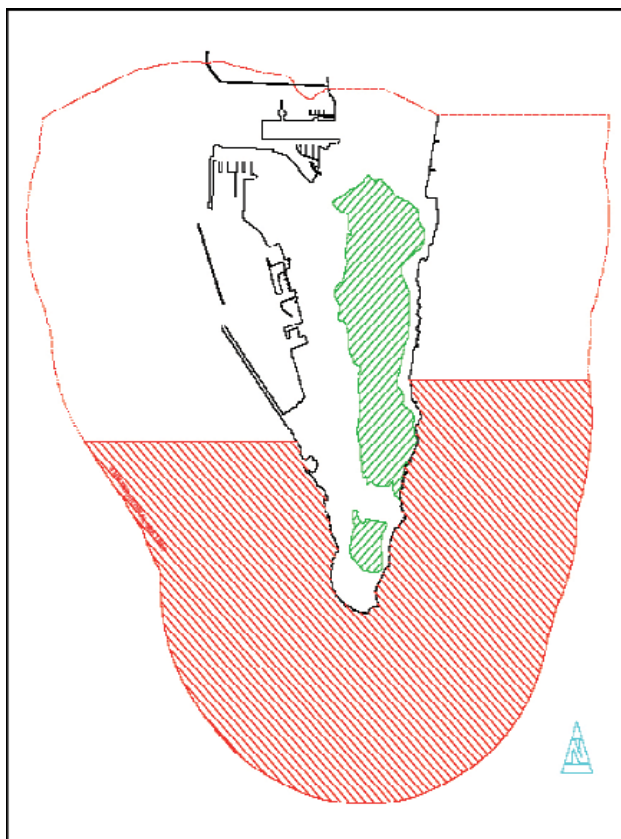
TABLE 8.2.1 Land reclamation since 1980.

Reclamation area	Year	Total SQ M	Grand total
V.I.E Distiller	1981	9000	
V.I.E Distiller	1984	5400	14400
V.I.E Distiller	1988	6770	21170
Container Berth	1982	5550	26720
Waterport Coach Park	1987	8720	35440
Marina Bay	1987	14800	50240
Viaduct	1986	2400	52640
Eastern Beach	1989	6840	59480
Reclamation Area 1	1989	196271	255751
Reclamation Area 2 & 3	1989	60210	315961
Reclamation Area 4	1989	9750	325751
Eastern Beach	2005	63280	389031

Government’s intent for sites of ecological importance is that Planning permission for development that would adversely affect identified sites of ecological value will not normally be granted.

8.3 BIODIVERSITY

Biodiversity is the range of species, habitats and ecological systems that make up the living earth. It



has a local, regional and global importance and is of infinite value to humanity. Healthy ecosystems are essential for water, land and air quality, climate generation, and the cycling of nutrients and natural waste products. Biodiversity is also significant to recreational and cultural activities.

The main threats to biodiversity in Gibraltar include:

- Development pressure
- Habitat fragmentation and loss
- Water management and drainage
- Spread of non-native species
- Human interference

Biodiversity management is an important part of Gibraltar’s responsibilities in the conservation of natural ecosystems across Europe. The EU Habitats Directive (92/43/EEC) was designed to provide long-term protection for a network of the most important wildlife sites across the European Union.

FIGURE 8.3.1 Candidate Special Areas of Conservation

Figure 8.3.1 shows an outline map of Gibraltar with the designated SAC sites. A site is identified as a special area of conservation by reason of any of its flora, fauna, geological or physiographical features (plants, animals, and natural features relating to the Earth’s structure). Government’s objectives in relation to nature and wildlife in Gibraltar are:

- To protect and where necessary restore the structure and functioning of natural ecosystems
- Stop the loss of biodiversity in our terrestrial and marine habitats
- Protect soils against erosion and pollution

In order to achieve these aims, the following objectives have been set out:

- The preparation of a biodiversity action plan
- The adoption of a Tree planting policy
- The encouragement of regional participation for the protection of common natural resources
- The preparation of an action and management plan for the Upper Rock Nature Reserve (Produced for Government by the Gibraltar Ornithological and Natural History Society).

Gibraltar is very rich in biodiversity. The following species numbers have been recorded so far:

Species Group	Number of recordings
Birds	310
Beetles	135
Butterflies and moths	410
Fish	174
Mammals	24
(Barbary Macaques)	240
Reptiles and Amphibians	30
Platyhelminthes	1
Echiuroidea	1
Mollusca	87
Crustacea	45
Echinodermata	3
Tunicata	4
Bryozoa	4
Annelida	9
Porifera	2
Protoctista	23
Flora	632

Source: <http://www.gib.gi/gonhs/>

As part of Government's commitment to increase and preserve local biodiversity stocks, several programmes are being planned. One initiative is the reintroduction of native flora and fauna. Both flora and fauna, which were once indigenous to Gibraltar (within the current climatic cycle) but are believed to have been affected by anthropogenic activity, will be considered for reintroduction. However, a series of factors and criteria will need to be considered and met before the success of the programme on ecological grounds is deemed to be practically possible. Another programme is the eradication or control of anthropogenically introduced invasive and pest species. In the case of fauna, the most effective way of dealing with such species is by prohibiting their introduction as well as culling programmes. Species of flora and fauna have been lost in Gibraltar as a result of human activity as well as through natural succession by more dominant, invasive and pest species. Part of conservation management includes the control of population numbers within established habitats. The main culling programmes in Gibraltar include stray dogs and cats, seagulls and pigeons.

Animals Culled in 2005 and 2006

	2005	2006
Cats	64	90
Dogs	18	60
Seagulls	4762	4800
Apes	-	16
Pigeons	9	1889

Some trees in Gibraltar are protected under a Tree Preservation Order. This is issued on a tree-by-tree basis, whenever deemed necessary. This Order ensures the preservation and protection of a par-

ticular tree. Proposals are currently being considered for amending of the Town Planning Ordinance so that consent would need to be sought prior to the cutting down or removal of any trees in Gibraltar.

8.4 ENVIRONMENTAL LEGISLATION

The EU has a very prominent view on the environment, incorporating it into the heart of the decision making process. The extensive diversity in environmental legislation, which is incorporated into Gibraltar law, includes subjects such as drinking and bathing water quality, greenhouse gas emissions, control of wastes, solvent use, radiation emergency preparedness, air quality, pollution prevention and control etc. The origin of these topics in Gibraltar law largely stem from our obligation to transpose applicable EU Directives. There are close to one hundred pieces of legislation transposed or in the process of being transposed into local law, all aimed at increasing levels of environmental protection.

The Public Health Act dates back to 1950. The Act, whilst originally dealing with issues of environmental concern, principally focused on health issues and on ensuring that sanitary living conditions were maintained. Since then, what started as a trickle of environmental directives has, since the mid 1980's, become a steady flow of more stringent, focused and demanding directives, all aimed at improving every aspect of our environment.

One issue of concern for Gibraltar, resulting from our small size and limited resources, is our ability to comply with every aspect of every Directive, as they apply to us. When such provisions are applied to a territory of the size of Gibraltar, the resulting technical requirements can often present very complex issues for us to contend with. Implementation costs can also be greatly distorted when compared on a per capita basis to much larger communities. This said, Government aims to ensure that all reasonable, practical and as far as possible, necessary steps are taken to achieve compliance with all relevant EU environmental Directives.

When the EU introduces a new environmental directive, a process is set in motion locally to consider how this affects us, how best to go about its transposition into local law, and what systems exist or need to be put in place to ensure our compliance, including the putting into effect of monitoring, management and policing arrangements. This process involves consultation, as appropriate, between various government departments and on numerous occasions, also non-governmental organisations with whom we work closely. The entities most commonly involved include the Legislation Support Unit (LSU), the Department of the Environment, the Environmental Agency and, on occasion, the Gibraltar Ornithological and Natural History society and its associated bodies.

Depending on the type of legislation being contemplated, it is either the Department of the Environment, or the Environmental Agency that normally plays a pivotal role in the process of transposing environmental directives into local law, being the entities most suited to advise, lead and manage on such issues, each within their specific area of expertise. Advice is offered to the Government's Legislation Support Unit on technical matters, difficulties in implementation or enforcement, required resources, effects on existing or future installations or processes, benefits and on the possible resulting financial implications.

The Legislation Support Unit (LSU) is responsible for drafting legislation for the Government of Gibraltar. Legislation is drafted on the basis of information from other departments that are seeking to implement the policies of the government. In addition to this, the LSU also drafts legislation to secure compliance with Gibraltar's international obligations. Of these international obligations, the European Union provides the most work, with the transposition of Directives in particular, being the most voluminous.

8.5 ENVIRONMENT CHARTER

The Environment, as an integral part of sustainable development, is vital for Gibraltar's prosperity. In recognition of this, the Government's Environment Charter for Gibraltar was signed May 2006. This Charter carries a set of commitments that Government will strive to achieve and maintain. The guiding principles form the core and foundation necessary for achieving sustainable development within Gibraltar. It will form the footprint by which environmental management and policies will be developed and administered. The Government considers it essential that each of us draw inspiration from these guiding principles in our everyday activities, both as individuals and as businesses.

To enable Gibraltar to continue to build on these principles, its forward-planning policies will remain firmly linked to conservation and environmental management. Government's aim is to encourage the community to work towards striking the right balance in our local setting.

The Environment Charter is to be followed by an Environmental Action and Management Plan. This plan, driven by the principles of sustainable development, ultimately affects our community as a whole and is therefore addressed to all of us, reinforcing the message that we all have a part to play in protecting our environment.

8.6 RENEWABLES

The Government of Gibraltar (GOG) is committed to the ideology of generating Gibraltar's electricity from renewable energy sources. It has therefore engaged consultants to investigate the feasibility of providing some of Gibraltar's energy demands from renewable energy sources. EU legislation is increasingly geared towards the supply of energy within the community from renewable energy sources. Gibraltar is unique in its environmental and socio-economic setting, and this will undoubtedly affect the extent of and our ability to comply with such legislation.

Annex I Environment Charter

Government of Gibraltar



Environment Charter Guiding Principles

For the Government and people of Gibraltar

1. To recognise that all people need a healthy living environment for their well-being and livelihood and that all can help to conserve and sustain it.
2. To use our natural resources sensibly, with regard to the needs of present and future generations.
3. To identify environmental opportunities, costs and risks in all policies and strategies.
4. To seek expert advice and consult with relevant parties on decisions affecting the environment.
5. To aim for solutions which benefit both the environment and development.
6. To contribute towards the protection and improvement of the global environment.
7. To safeguard and restore native species, habitats and landscape features, and control or eradicate invasive species.
8. To encourage activities and technologies that benefit the living environment.
9. To control pollution, with the polluter paying for prevention and remedies.
10. To study and celebrate our environmental heritage as a treasure to share with our children.

A handwritten signature in blue ink, appearing to read 'JJ Netto'.

The Hon JJ Netto
Minister for the Environment

A handwritten signature in blue ink, appearing to read 'PR Caruana'.

The Hon PR Caruana QC
Chief Minister

30th May 2006

**AIR POLLUTION MONITORING
PROGRAMME REPORT
FOR 2005
(RATIFIED DATA)**



Environmental Agency
June 2006

1. INTRODUCTION

This report covers the calendar year of 2005 and is the first summary report for Gibraltar's air pollution monitoring network since this programme started in February 2005.

Although it does not contain detailed statistics it is intended to provide an overview of Gibraltar's air quality measurements.

In 2005, Gibraltar air quality measurements were made available globally for the first time, via Internet World Wide Web. Information on current air pollutant concentrations, updated every hour, together with pollution inventories, and air chemistry is available via:

www.gibraltarairquality.gi

This provides wide and unrestricted accessibility to air quality data. The archive has been designed to be user-friendly, interactive and responsive. Users may down-load unlimited portions of the database in spreadsheet format or graphs.

The primary objectives of this network are:

- To provide the public with rapid and reliable information on urban air quality.
- To monitor compliance with European Directives and local statutory instruments.
- To assist in developing new policies.

2. SITES AND INSTRUMENTATION

The air pollution monitoring network consists of:

1. An automatic network;
2. A non-automatic diffusion tube network; and
3. Two gravimetric filter units to monitor particulate matter and lead.

Instruments currently deployed in the automatic monitoring network use the following measuring techniques:

Carbon Monoxide
Sulphur Dioxide
Nitrogen Dioxide
Ozone
Hydrocarbons

Infrared Absorption
Ultraviolet fluorescence
Chemiluminescence
Ultraviolet absorption
Gas chromatography



Figure.1 Typical analyser

The non-automatic network consists of a diffusion tube network for Nitrogen Dioxide and Benzene, Toluene and Xylene (BTX).

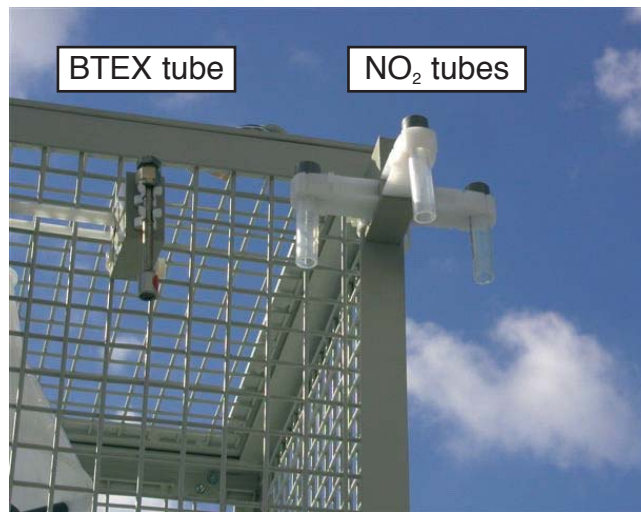


Figure 2 - Nitrogen Dioxide (right) and BTEX (left) Diffusion Tubes co-located alongside Rosia Road Monitoring station.

There are also two partisol filter (Gravimetric) units which are used to monitor particulate matter (PM₁₀ & PM_{2.5}) and Lead.



Gibraltar air pollutant measurements are based on a rigorous quality assurance and control programme, and utilise traceable and cross-checked calibration chains. Gas standards and procedures are regularly checked and compared with international scales. Hydrocarbons hourly data are based on the chromatographic analysis of air samples collected over 30-minute periods each hour. All other data are derived from logger-scanned instantaneous readings taken every ten seconds. These logger measurements are used to derive fifteen-minute and hourly averages. Data is compiled over longer averaging periods as required.

3. MONITORING NETWORK

Two automatic air pollution monitoring stations were established and are classified as urban/roadside and suburban/rural. The urban/roadside station is sited at Rosia Road, close to a major road, electricity power generating facilities and dock and Bay area. Suburban/rural station is sited at Bleak House.

The following are the various pollutants which are measured automatically and the results posted on the dedicated air pollution website:

- Carbon Monoxide (Rosia Road Site)
- Sulphur Dioxide (Rosia Road Site)
- Nitrogen Dioxide (Rosia Road Site and Bleak House Site)
- Ozone (Bleak House Site)
- Benzene (Rosia Road Site)
- Toluene (Rosia Road Site)
- mp Xylene (Rosia Road Site)
- o Xylene (Rosia Road Site)
- 1,3-Butadiene (Rosia Road Site)
- Ethyl Benzene (Rosia Road Site)

Non-automatically monitored pollutants are measured/analysed and the results are also posted on the website. The website is normally updated every three months as the analytical data becomes available. These pollutants are:

- Lead
- Particulate matter (PM₁₀ & PM_{2.5})
- Nitrogen Dioxide (diffusion tube network)
- Benzene, Toluene and Xylene (BTX) (diffusion tube network)

The diffusion tube network will assist in identifying areas of high nitrogen dioxide and BTX concentrations for further examination. It will also determine the spatial variation of these pollutants within Gibraltar. The diffusion networks are discussed in section 8.

4. GIBRALTAR AIR QUALITY STANDARDS

Standards for air pollution are concentrations over a given time period that are considered to be acceptable in the light of what is known about the effects of each pollutant on health and on the environment. They can also be used as a benchmark to see if air pollution is getting better or worse.

The Gibraltar standards are found in the:

1. Public Health (Air Quality Limit Values) Rules 2002 as amended by the Public Health (Air Quality Limit Values) (Amendment) Rules 2003; and
2. Public Health (Air Quality) (Ozone) Rules 2004.

These Air Quality Rules have adopted into Gibraltar law the limit values required by EU Daughter Directives on Air Quality. (European Council Directives 1996/62/EC, 1999/30/EC, 2000/69/EC and 2002/3/EC).

A summary of the current Gibraltar Air Quality Objectives is as follows:

Pollutant	Objective	Measured as	To be achieved by
Benzene	5 µg/m ³	Annual Mean	1 January 2010
Carbon monoxide	10.0 mg/m ³	Maximum daily running 8 Hour Mean	1 January 2005
Lead	0.5 µg/m ³	Annual Mean	1 January 2005
Nitrogen dioxide	200 µg/m ³ Not to be exceeded more than 18 times per year	1 Hour Mean	1 January 2010
	40 µg/m ³	Annual Mean	1 January 2010
Nitrogen Oxides**	(V) 30 µg/m ³	Annual Mean	19 July 2001
Ozone	120 µg/m ³	Running 8 hour Mean Daily maximum of running 8 hr mean not to be exceeded more than 10 times per year. 25 times per calendar year averaged over 3 years	1 January 2010
Particles ^a (PM10) (gravimetric)	50 µg/m ³ Not to be exceeded more than 35 times per year	24 Hour Mean	1 January 2005
	40 µg/m ³	Annual Mean	1 January 2005
Sulphur dioxide	350 µg/m ³ Not to be exceeded more than 24 times per year	1 Hour Mean	1 January 2005
	125 µg/m ³ Not to be exceeded more than 3 times per year	24 Hour Mean	1 January 2005
	(V) 20 µg/m ³	Annual Mean	19 July 2001
	(V) 20 µg/m ³	Winter Mean (01 October - 31 March)	19 July 2001

Notes:

a. Measured using the European gravimetric transfer sampler or equivalent.
µg/m³ - micrograms per cubic metre
mg/m³ - milligrams per cubic metre

** Assuming NO_x is taken as NO₂
(V) These standards are adopted for the protection of vegetation and ecosystems. All of the remainder are for the protection of human health.

5. ANNUAL DATA SUMMARY REPORTS

ROSIA ROAD 01 January to 31 December 2005

TABLE 2 (These data are provisional and may be subject to further quality control)

POLLUTANT	CO	NO ₂	SO ₂	BENZ
Number Very High	0	0	0	-
Number High	0	0	0	-
Number Moderate	0	0	0	-
Number Low	7829	7224	30627	-
Maximum 15-minute mean	8.9 mg m ⁻³	844 µg m ⁻³	255 µg m ⁻³	-
Maximum hourly mean	6.6 mg m ⁻³	206 µg m ⁻³	213 µg m ⁻³	66.33 µg m ⁻³
Maximum running 8-hour mean	2.7 mg m ⁻³	150 µg m ⁻³	94 µg m ⁻³	25.54 µg m ⁻³
Maximum running 24-hour mean	1.5 mg m ⁻³	112 µg m ⁻³	58 µg m ⁻³	11.12 µg m ⁻³
Maximum daily mean	1.5 mg m ⁻³	110 µg m ⁻³	54 µg m ⁻³	10.94 µg m ⁻³
Annual mean	0.5 mg m ⁻³	42 µg m ⁻³	16 µg m ⁻³	2.30 µg m ⁻³
Data capture	89.4 %	82.5 %	88.9 %	88.4 %

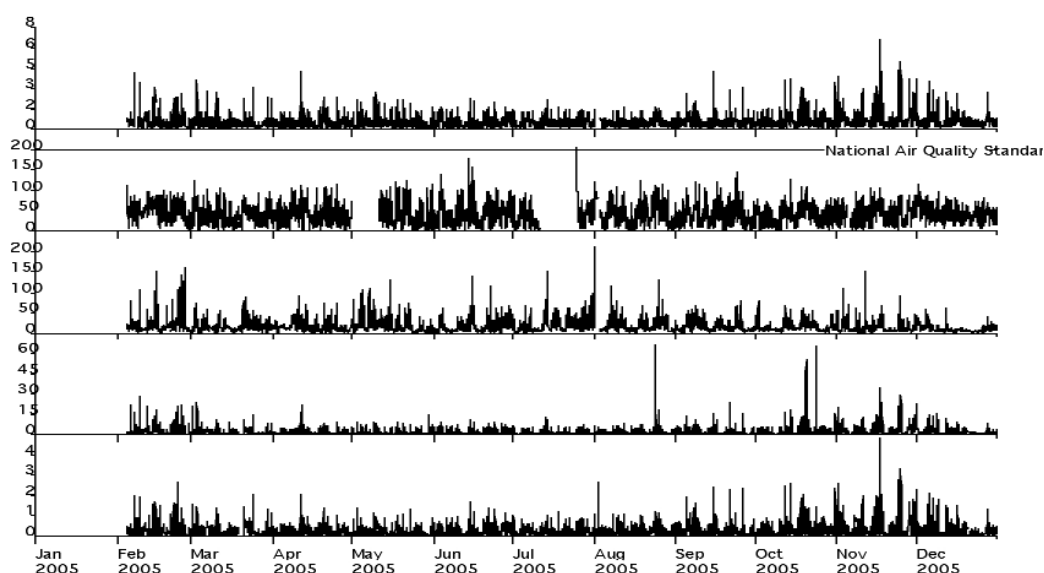
All mass units are at 20°C and 1013mb
NO_x mass units are NO_x as NO₂

Table 3

Pollutant	Public Health (Air Quality Limit Values) Rules 2002, (Amendment) Rules 2003 and (Ozone) Rules 2004	Exceedences	Days
Carbon Monoxide	Running 8-hour mean > 10.0 mg m ⁻³	0	0
Nitrogen Dioxide	Annual mean > 40 µg m ⁻³	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m ⁻³	1	1
Sulphur Dioxide	Hourly mean > 350 µg m ⁻³	0	0
Sulphur Dioxide	Daily mean > 125 µg m ⁻³	0	0
Benzene	Annual mean > 5 µg m ⁻³	0	-

GRAPH 1

(Hourly Mean Data for 01 January to 31 December 2005)



BLEAK HOUSE 01 January to 31 December 2005

TABLE 4 (These data are provisional and may be subject to further quality control)

POLLUTANT	NO ₂	O ₃
Number Very High	0	0
Number High	0	0
Number Moderate	0	1524
Number Low	7432	6352
Maximum 15-minute mean	199 µg m-3	160 µg m-3
Maximum hourly mean	155 µg m-3	154 µg m-3
Maximum running 8-hour mean	92 µg m-3	140 µg m-3
Maximum running 24-hour mean	65 µg m-3	125 µg m-3
Maximum daily mean	57 µg m-3	121 µg m-3
Annual mean	23 µg m-3	67 µg m-3
Data capture	84.8 %	89.4 %

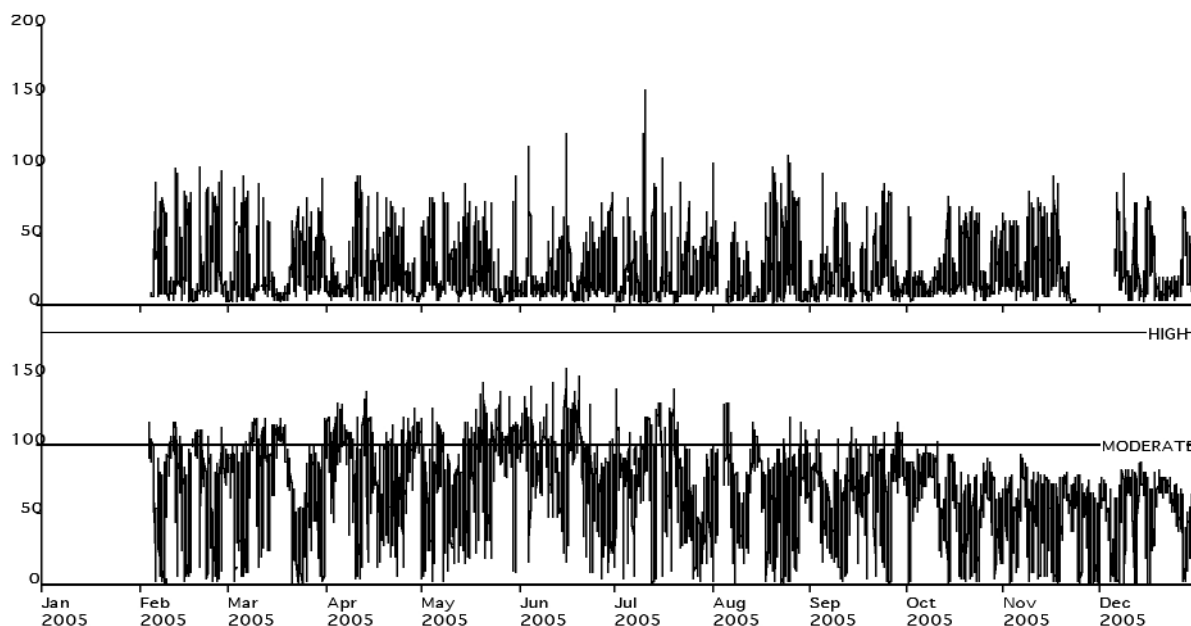
All mass units are at 20°C and 1013mb
 NO_x mass units are NO_x as NO₂

Table 3

Pollutant	Public Health (Air Quality Limit Values) Rules 2002, (Amendment) Rules 2003 and (Ozone) Rules 2004	Exceedences	Days
Nitrogen Dioxide	Annual mean > 40 µg m-3	0	-
Nitrogen Dioxide	Hourly mean > 200 µg m-3	0	0
Ozone	Running 8-hour mean > 120 µg m-3	118	23

GRAPH 2

(Hourly Mean Data for 01 January to 31 December 2005)



6. AN OVERVIEW OF GIBRALTAR'S AUTOMATIC AIR POLLUTION MEASUREMENTS

When examining the above annual automatic data summary it is important to note that the annual means relate to the actual period monitoring i.e. from 2nd February (Start Date) to 31st December 2005. The Data capture figures, in the automatic data summary above, reflect data capture over the whole year, 1st January to 31st December 2005.

The Data Capture averages for the period 2nd February to 31st December 2005 are:

Rosia Road Station

CO	NO ₂	SO ₂	Benzene
97.5%	90%	96.9%	96.4%

Bleak House Station

NO ₂	O ₃
92.5%	97.5%

We anticipate that we will easily attain our target of at least 90% data capture next year.

6.1 Carbon Monoxide

This pollutant is measured solely at the Rosia Road Station.

Carbon Monoxide (CO) is a colourless, odourless poisonous gas produced by incomplete, or inefficient, combustion of fuel. It is predominantly produced by road transportation sector, and particularly by petrol-engines.

This gas prevents the normal transport of oxygen by the blood. This can lead to a significant reduction in the supply of oxygen to the heart, particularly in people suffering from heart disease.

The standard for carbon monoxide is a maximum daily running 8 Hour Mean of 10.0 mg/m³. This is the first year this pollutant has been monitored. The annual daily running 8 Hour Mean was measured at 2.2 mg/m³ we are therefore well within the maximum standard. (TABLE 2) and there were no exceedances of the air quality objectives within our National or European Standard.

6.2 Nitrogen Dioxide

This pollutant is measured at both the Rosia Road Station and Bleak House Station.

Nitrogen oxides (NO_x) is a collective term used to refer to two species of oxides of nitrogen, nitric oxide (NO) and nitrogen dioxide (NO₂). Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. NO is not considered to be harmful to health. However, once released to the atmosphere, NO is usually very rapidly oxidised to nitrogen dioxide (NO₂), which can be harmful to health.

Nitrogen dioxide can irritate the lungs and lower resistance to respiratory infections such as influenza. Continued or frequent exposure, to concentrations that are typically much higher than those normally found in the ambient air, may cause increased incidence of acute respiratory illness in children.

The air quality objective/standard for nitrogen dioxide is 40mg/m³ measured as an annual mean (2010) and a one hour mean of 200µg/m³, which is not to be exceeded more than 18 times per year. The margin of tolerance for 2005 was an additional 10mg/m³ so that the annual mean for 2005 is set at 50mg/m³. The annual mean was measured at 42µg/m³ (Rosia Road Station) and 23µg/m³ (Bleak

House Station). There were therefore no exceedances of the current annual mean (plus tolerances) or the one hour mean of $200\mu\text{g}/\text{m}^3$ at either of the stations. (TABLE 2 & 4)

The long term objective annual mean of $40\text{mg}/\text{m}^3$ has however been exceeded as recorded on the Rosia Road Station. Automatic monitoring of nitrogen dioxide was only started this year it therefore impossible to state if this is the norm or if it follows established trends as there is no historical data against which this year's recorded data can be compared with.

Our major source of nitrogen dioxide is the power generating sector followed by road transportation. When the permitting scheme established under the Pollution Prevention and Control Ordinance comes into effect in late 2007 it is anticipated that there should be a noticeable drop in the nitrogen dioxide emissions.

6.3 Sulphur Dioxide

This pollutant is measured solely at the Rosia Road Station.

Sulphur dioxide (SO_2) is produced when a material, or fuel, containing sulphur is burned. Globally, much of the sulphur dioxide in the atmosphere comes from natural sources, but in Gibraltar the predominant source is power stations and shipping burning fuel oils.

Moderate concentrations of sulphur dioxide may result in a fall in lung function in asthmatics. Tightness in the chest and coughing occur at high levels, and lung function of asthmatics may be impaired to the extent that medical help is required. Sulphur dioxide pollution is considered more harmful when particulate and other pollution concentrations are high.

The air quality objectives/standards for sulphur dioxide are a one hour mean of $350\mu\text{g}/\text{m}^3$, which is not to be exceeded more than 24 times per year and a twenty-four hour mean of $125\mu\text{g}/\text{m}^3$ which is not to be exceeded more than 3 times per year. The maximum hourly mean of $61\mu\text{g}/\text{m}^3$ and the maximum twenty-four hour mean of $27\mu\text{g}/\text{m}^3$ were recorded. (TABLE 2)

We are therefore well below the stated standards and there were no exceedances of the one hour mean or the twenty-four hour mean at the Rosia Road Station.

6.4 Benzene

This pollutant is measured solely at the Rosia Road Station.

Benzene is a volatile organic compound which is a minor constituent of petrol (Approximately 1%). The main sources of benzene in the atmosphere in Europe are the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source.

Possible chronic health effects include cancer, central nervous system disorders, liver and kidney damage, reproductive disorders, and birth defects.

The long term air quality objective/standard for benzene is $5\text{mg}/\text{m}^3$ measured as an annual mean. This objective has to be met by 1st January 2010. The 2005 annual mean including the margin of tolerance is an additional $10\text{mg}/\text{m}^3$. The annual mean was measured at $2.3\mu\text{g}/\text{m}^3$. (TABLE 2)

There were consequently no exceedances of the annual mean at the Rosia Road Station.

6.5 Ozone

This pollutant is measured at Bleak House Station

Ozone (O_3) is not emitted directly from any man-made source in any significant quantities. In the lower atmosphere, O_3 is primarily formed by a complicated series of chemical reactions initiated by sunlight. These reactions can be summarised as the sunlight-initiated oxidation of volatile organic compounds (VOCs) in the presence of nitrogen oxides (NO_x). The sources of VOCs are similar to those described for NO_x above, but also include other activities such as solvent use, and petrol distribution and handling

The chemical reactions do not take place instantaneously, but can take hours or days, therefore ozone measured at a particular location may have arisen from VOC and NO_x emissions many hundreds or even thousands of miles away. Maximum concentrations, therefore, generally occur downwind of the source areas of the precursor pollutant emissions. Ozone irritates the airways of the lungs, increasing the symptoms of those suffering from asthma and lung diseases.

The air quality objective/standard for ozone is expressed as a maximum daily 8 hour mean of $120\mu\text{g}/\text{m}^3$. This 2010 target value should not to be exceeded more than 25 days per calendar year averaged over 3 years. This standard was exceeded on 118 times in total, but these exceedances occurred during 23 days in 2005. (TABLE 5)

The maximum hourly mean was recorded as $154\mu\text{g}/\text{m}^3$, which is well below the information threshold of $180\mu\text{g}/\text{m}^3$ and the alert threshold of $240\mu\text{g}/\text{m}^3$.

7. AN OVERVIEW OF GIBRALTAR'S NON-AUTOMATIC AIR POLLUTION MEASUREMENTS

As with the annual automatic data summary it is important to note that the annual means relate to the actual period monitoring i.e. from 2nd February (Start Date) to 31st December 2005. The Data Capture averages over the period 2nd February to 31st December 2005 are:

Rosia Road Station

Pb	PM ₁₀
100%	99%

7.1 Lead

The majority of Lead (Pb) emissions arise from vehicles fuelled with leaded petrol. Industry, in particular secondary non-ferrous metal smelters, may contribute to emissions of lead in industrial areas, though none exist within Gibraltar. This source can become increasingly significant due to the reduction in the lead content of leaded petrol and the increasing use of unleaded petrol (leading to significant reductions in urban lead levels).

Even small amounts of lead can be harmful, especially to infants and young children. In addition, lead taken in by the mother can interfere with the health of the unborn child. Exposure has also been linked to impaired mental function, visual-motor performance and neurological damage in children, and memory and attention span.

The air quality objective/standard for lead is $0.5\text{mg}/\text{m}^3$ measured as an annual mean. This objective has to be met by 1st January 2005. Our annual mean was measured at $0.22\mu\text{g}/\text{m}^3$ and there was no exceedance of the annual mean at the Rosia Road Station.

7.2 Particulate Matter PM_{10} & $PM_{2.5}$

Fine particles are composed of a wide range of materials arising from a variety of sources including:

- combustion sources (mainly road traffic);
- secondary particles, mainly sulphate and nitrate formed by chemical reactions in the atmosphere, and often transported from far across Europe;
- coarse particles, suspended soils and dusts (e.g. from the Sahara), sea salt, biological particles and particles from construction work.

Particles are measured in a number of different size fractions according to their mean aerodynamic diameter. Most monitoring is currently focussed on PM_{10} , but the finer fractions such as $PM_{2.5}$ and PM_1 are becoming of increasing interest in terms of health effects. Fine particles can be carried deep into the lungs where they can cause inflammation and a worsening of the condition of people with heart and lung diseases. In addition, they may carry surface-absorbed carcinogenic compounds into the lungs.

The long term air quality objectives/standard for PM_{10} is $40\text{mg}/\text{m}^3$ measured as an annual mean. There is also a 24 hour mean of $50\ \mu\text{g}/\text{m}^3$ which must not be exceeded more than 35 times per year. These objectives have to be met by 1st January 2005. Our annual mean was measured as $36\ \mu\text{g}/\text{m}^3$ and the 24 hour mean of $50\ \mu\text{g}/\text{m}^3$ was exceeded on 16 occasions.

8. DIFFUSION TUBE NETWORKS

Diffusion tube samplers are used to measure nitrogen dioxide (NO_2) and hydrocarbons across Gibraltar. Monitoring sites were selected to include areas likely to be affected by specific emission sources (such as heavy traffic, petrol stations, or vents from fuel storage), as well as general background locations.

NO_2 and hydrocarbon (BTEX) diffusion tubes are exposed for 4-week periods and are bias adjusted using data from co-location studies carried out at Rosia Road. The precision of NO_2 and BTEX tubes was very good and the accuracy was within the expected range for an indicative method such as diffusive samplers ($\pm 25\%$).

Annual mean NO_2 concentrations at three kerbside sites in built-up areas were greater than the EC Directive Limit Value plus margin of tolerance for 2005 of $50\ \mu\text{g}\ \text{m}^{-3}$. These sites were at Jumper's, South Barracks Road and Glacis Road.

Annual mean NO_2 concentrations at a further five sites (Devil's Tower Road, Red Sands, Water Gardens, Rosia Road and Prince Edward's Road) were above the Gibraltar Air Quality Objective (and EC) long term (2010) Limit Value of $40\ \mu\text{g}\ \text{m}^{-3}$.

Annual mean NO_2 concentrations at other urban and residential background sites were all well below the Limit Value $40\ \mu\text{g}\ \text{m}^{-3}$ in 2005.

Kerbside and roadside NO_2 concentrations in Gibraltar's built-up areas were comparable with roadside concentrations in large UK towns and cities. Background concentrations were typically higher than those measured at comparable sites in the UK.

The highest annual mean benzene concentration was $3.8\ \mu\text{g}\ \text{m}^{-3}$. This was measured at Glacis Road, where the tube was located near a petrol station. At all other sites the annual mean benzene concentration was $3.0\ \mu\text{g}\ \text{m}^{-3}$ or less. All sites met the Gibraltar Air Quality Objective (and EC Limit Value) of $5\ \mu\text{g}\ \text{m}^{-3}$ for annual mean benzene concentration, which is to be achieved by 2010.

9. MONITORING CONCLUSIONS

This is the first year of automatic monitoring which has produced such robust and good quality data so it is not possible to examine any trends or patterns.

There were no exceedances in this year's automatic monitoring of the various objectives contained in our national legislation or within the European Air Quality Directives or Daughter Directives.

Nitrogen dioxide as measured automatically failed to reach the long term objective of $40\text{mg}/\text{m}^3$ measured as an annual mean, which should be met by 2010. It was well within the present annual mean as adjusted with the additional marginal tolerance, i.e. $50\text{mg}/\text{m}^3$. The diffusion tube study has revealed a few hotspots of which Jumper's and South Barracks Road merit closer investigation. It is therefore recommended that the NO_2 Diffusion Network be extended in these areas.

Ozone has come close to the long term objectives as set down in our national legislation or within the European Air Quality Directives. As this pollutant is not produced locally but is brought to us by mass air movements we need to keep a close watch especially during the peak months of April to September.



Department of the Environment
Government of Gibraltar

Environmental Agency
Gibraltar

