Ministry for the Environment
Government of Gibraltar

Annual Report 2008

The Environment Matters

Annual Report 2008

Produced by the Department of the Environment in collaboration with the Environmental Agency

Foreword from the Minister for the Environment

I am once again pleased to present the annual report entitled "The Environment Matters", produced by the Department of the Environment and supported by data from the Environmental Agency.

It has been a year of achievement for Gibraltar. The production and publication of the Climate Change Programme is an important part of our efforts to combat global warming and reduce our carbon footprint and the Government is currently working towards full implementation of the Programme throughout the civil service and beyond. A local recycling scheme was established in May and now allows residents to dispose of their glass and cans in the appropriate bins, located in strategic points around Gibraltar. The expansion of the Department of the Environment clearly highlights our continued commitment to the environment and our desire to achieve development that is truly sustainable.

The Government will continue to focus on the long term management of our living environment to ensure the protection of our natural assets and the improvement in quality of life for all Gibraltarians.

I hope you will find this annual report educational and informative and that it will provide you with a useful insight into the current state of the local environment.

The Hon. E Britto OBE ED

Minister for the Environment & Tourism

Table of Contents

Executive Summary

Sustainable development and sound environmental management continue to underpin the work of the Department of the Environment and the Environmental Agency. This year has once again provided its challenges but by remaining focused on the long-term goals of the Environment Charter, it has been possible to realise many of its objectives for the promotion of a healthier living environment.

Gibraltar continues to make good progress in improving environmental quality in a number of areas. For example, the Government is helping to improve the biological and chemical quality of water by ensuring the effective implementation of the Water Framework Directive. Gibraltar also continues to meet the vast majority of the European Commission's air quality target values for monitored pollutants including benzene, sulphur dioxide and ozone. The limit value for nitrogen dioxide was once again exceeded, prompting the Government to begin the formal process of applying for a Time Extension Notification (TEN) from the European Commission in order to enable us to meet future air quality objectives. There was exceedence on the daily and annual limit values for particulate matter in the form of PM_{10}. Nickel was also found to be just above the target value. As a result of these episodes of exceedence, further monitoring and investigative work shall be carried out in order to better establish the sources of these pollutants and the best methods of abatement.

The launch of the local recycling programme was one of the highlights of 2008, with distinctly coloured recycling bins for glass and cans placed at key locations around the rock. This was accompanied by informational leaflets advising the public on when and how to use the disposal points. It is to be hoped that the recycling figures will increase over the coming years as recycling becomes an integral part of local life.

Climate change mitigation and adaptation have also been at the heart of the Government's efforts during this year. The Climate Change Programme was published in June 2008 containing a comprehensive package of policy measures designed to reduce Gibraltar's carbon footprint and steer it towards a low carbon, resource efficient economy.

Public awareness and education once again featured prominently in the Department's work as it hosted this year's World Environment Day events, with the theme "CO_2 – Kick the Habit!"

The coming year promises even more developments as the Government looks to publish its Environmental Action and Management Plan as well as an Energy Efficiency Action Plan. New

initiatives such as building energy certification, renewable energy studies and enhanced environmental education will also be launched in the near future.

The management of our environment will continue to present significant challenges over the coming years; Gibraltar will look to embrace those challenges as it works to realise its vision of a rich, diverse and healthy environment.

Chapter 1:

Improving Air Quality

Due to their potential impacts on human health, welfare and our natural environment, ambient concentrations of a wide range of air pollutants – including nitrogen oxides, sulphur dioxide, ozone, hydrocarbons and particulate matter – are continuously and automatically measured in Gibraltar.

The principle objectives of the air quality monitoring programme are:

- To analyse trends in pollutant concentrations
- To assess to what extent air quality standards, limit values and objectives are being met
- To provide the public with reliable and up to date information on local air pollution
- To fulfil statutory air quality reporting requirements

1.1 Background

This report provides an overview of Gibraltar's air quality measurements for the 2008 calendar year. It includes data from the automatic and non-automatic monitoring networks.

The Gibraltar Air Monitoring Programme consists of three automatic monitoring stations measuring a variety of pollutants and a passive monitoring network measuring nitrogen dioxide and six species of Volatile Organic Compounds by diffusion samplers. The equipment deployed on the existing network is set out in Table 1.1.

Table 1.1 The Gibraltar Air Monitoring Programme

Location	Pollutants Measured	Equipment Types
Electricity Offices Rosia Road	Sulphur dioxide	API M100E (Ultraviolet fluorescence)
	Oxides of nitrogen	API M200E (Chemiluminescence)
	Carbon monoxide	API M300E (Infrared Absorption)
	PM_{10} Gravimetry	R&P Partisol 2025
	$PM_{2.5}$ Gravimetry	R&P Partisol 2025
	PM_{10} Automatic	TEOM FDMS
	Poly Aromatic Hydrocarbons	DIGITEL High Volume Sampler
	Volatile Organic Compounds	Environment VOC71M Gas Chromatograph
	Wind speed & direction	Gill Windsonic
	Ambient temperature	Met One 592
Bleak House Near Europa Point	Oxides of nitrogen	API M200E (Chemiluminescence)
	Ozone	API M400E (Ultraviolet absorption)
	PM_{10} Gravimetry	R&P Partisol 2025
	Wind speed & direction	Gill Windsonic
	Ambient temperature	Met One 592
Witham's Road	Oxides of nitrogen	API M200E (Chemiluminescence)
	Wind speed & direction	Gill Windsonic
	Ambient temperature	Met One 592
Passive Network Various locations	Nitrogen Dioxide	Diffusion Samplers - Palmes Tubes at 27 sites
	Volatile Organic Compounds	Diffusion Samplers – Sorbent Tubes at 15 sites

The instrumentation deployed was selected to ensure robust measurements at the necessary level of accuracy and time resolution to meet the data quality objectives within the European Air Quality Directives and national legislation.

The monitoring equipment itself forms only one aspect of the overall Gibraltar Air Monitoring Programme. Appropriate maintenance and support, coupled to a well designed and managed

quality control regime, ensures that the raw monitoring data obtained are successfully processed, analysed and interpreted, in order to provide information and ensure compliance requirements under the Air Quality Framework and Air Quality Daughter Directives.

Gibraltar air pollutant measurements are underpinned by a rigorous quality assurance and control programme, central to which are cross-checked calibration standards that are traceable to and compared with internationally recognised metrology standards.

The non-automatic network consists of a diffusion tube programme for Nitrogen Dioxide and Benzene, Toluene and Xylenes (BTX) as well as three partisol filter (Gravimetric) units which are used to monitor particulate matter (PM_{10} & $PM_{2.5}$), Lead, Arsenic, Cadmium, Nickel and a DIGITEL High Volume Sampler monitoring Poly Aromatic Hydrocarbons (measured as Benzo(a)pyrene).

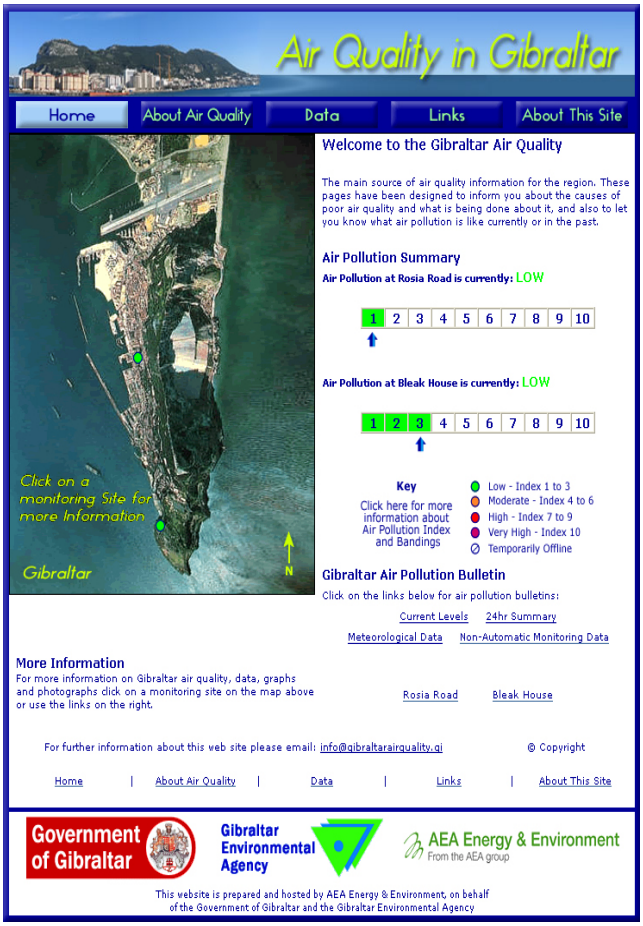


Figure 1.1 Air quality monitoring website

In addition to meeting the Gibraltar Governments monitoring obligations, the data itself is disseminated in near real-time on the **www.gibraltarairquality.gi** web site (Figure1.1). This web-based dissemination and reporting, forms an important tool for delivery of air quality data and descriptive statistics to a broad range of end users.

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 website has proved and continues to be popular, during 2008 it received 1,561,311 hits.

1.2 Gibraltar Air Quality Standards

Standards and objectives are set for air pollutant concentrations in ambient air, 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 quality is changing.

The Gibraltar ambient air quality standards, in place for the purpose of Local Air Quality Management, 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. 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 in Table 1.2.

Table 1.2 Current Gibraltar Air Quality Objectives

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	200µg/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	Daily maximum running 8 hr mean not to be exceeded more than 25 times per calendar year averaged over 3 years	1 January 2010
Particles[a] (PM10) (gravimetric)	50µg/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	350µg/m^3 Not to be exceeded more than 24 times per year	1 Hour Mean	1 January 2005
	125µg/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	20 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/m^3 – micrograms per cubic metre
mg/m^3 – milligrams per cubic metre
ng/m^3 – nanograms 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.

1.3 AN OVERVIEW OF GIBRALTAR'S AUTOMATIC AIR POLLUTION MEASUREMENTS

The Data capture figures reflects data capture over the whole year, 1st January to 31st December 2008.

Rosia Road Station:

CO	NO_2	SO_2	Benzene
98.1%	91.5%	96.7%	92.1%

Bleak House Station

NO_2	O_3
89.1%	98.6%

Our aim is to obtain a minimum of 90% data capture in any one year. Any problems with the analysers have been promptly attended to, which has helped us to maintain the high level of data capture.

1.3.1 Carbon Monoxide

This pollutant is measured solely at the Rosia Road Station.

Carbon Monoxide (CO) is a colourless, odourless but 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 air quality objective for carbon monoxide is 10.0 mg/m^3 as the maximum daily running 8 Hour mean during a calendar year. The maximum running 8 Hour mean during 2008 was 2.4 mg/m^3; thus we are well below the maximum permissible under the air quality rules (and EU Directives) (TABLE 1.3). The level recorded this year is slightly higher than last year's, when a maximum running 8 Hour mean of 2.2 mg/m^3 was recorded. Carbon monoxide levels over the years 2005 -2008 show that we are well within the recommended level.

To summarise there was no exceedence of the carbon monoxide air quality objectives within our National rules or the European Limit Values.

Year	2005	2006	2007	2008
Maximum 8 hr mean (mg/m^3)	10.0	10.0	10.0	10.0
Carbon Monoxide Level (mg/m^3)	2.2	3.1	2.2	2.4

1.3.2 Nitrogen Dioxide

Nitrogen oxides (NO_x) is the collective term used to refer to two species of oxides of nitrogen, nitric oxide (NO) and nitrogen dioxide (NO_2). Nitric oxide (NO) is mainly derived from road transport emissions and other combustion processes such as the electricity supply industry. Nitric oxide (NO) is not considered to be harmful to health. However, once released to the atmosphere, Nitric oxide (NO) is usually very rapidly oxidised to nitrogen dioxide (NO_2).

This pollutant has been measured at the Rosia Road and Bleak House stations since the start of monitoring in 2005, however, the results from the passive monitoring network in Gibraltar had revealed high levels of nitrogen dioxide in the area to the east of Jumper's adjacent to the MOD and OESCO power generation facilities. The concentrations measured in and around this area are consistently above the EU Limit Value plus Margin of Tolerance for annual mean nitrogen dioxide.

The passive monitoring programme uses an indicative method and is not an EU compliant Reference Method, as the automatic samplers are.

The results from a dispersion modelling study had concluded that the power station emissions accounted for a significant proportion of the nitrogen dioxide concentrations measured in the area. Furthermore, the modelling provided some evidence that plume grounding may lead to the exceedence of the EU Limit Value for hourly mean concentrations. The existing passive monitoring network could not, of course, provide information on such short-term levels.

In light of these findings, a recommendation was made to install a fixed-point automatic monitoring facility for nitrogen dioxide. This would:

1) Better elucidate the impact of plume grounding on short term nitrogen dioxide concentrations in the Jumper's area affected by the power generation facility emissions and
2) Confirm the current situation using a more accurate measurement methodology than achieved through the current passive monitoring network in the area.
3) Have the added benefit of providing accurate measurement data to confirm the effectiveness of any abatement measures put in place on the OESCO facility as the result of IPPC
4) Highlight whether Limit Value exceedence remains an issue in the absence of abatement on the neighbouring MOD facility.

This recommendation was accepted by Government and consequently a further station was installed at Witham's Road. This station commenced monitoring in mid May 2008

There are two air quality objectives, for the protection of human health, set for nitrogen dioxide. A long term, annual mean objective, set to protect against long term exposure to elevated nitrogen dioxide concentrations and a short term, 1 hour objective, set to protect against short term elevated nitrogen dioxide concentrations.

The annual mean air quality objective for nitrogen dioxide is 40μg/m^3 to be achieved by 2010. The EU Directive also sets a temporary 'margin of tolerance' (MOT) in relation to this limit value which decreases annually until 2010, the date for attainment of the Limit Value. The MOT is intended to help identify those areas where current air quality is worst and acts as a trigger to encourage action to be taken to ensure that the limit value will be met, while also ensuring that exceedence of the limit values which is expected to disappear without additional measures, do not trigger the

requirement to produce plans and programmes. The annual mean's margin of tolerance in 2008 is 4μg/m^3. Thus the Annual Mean + MOT for 2008 is 44μg/m^3. The annual mean was measured at 45μg/m^3 (Rosia Road Station) and 26μg/m^3 (Bleak House Station). The nitrogen dioxide Annual Mean + MOT for 2008 was therefore exceeded in 2008 at the Rosia Road station. The annual mean was measured at 53μg/m^3 at the Witham's Rd station and although this also surpassed the annual mean plus MOT it should be noted that this station started monitoring in mid May 2008 and that the data is incomplete since it does not reflect one whole year's monitoring.

As a result of the exceedence the Government has notified the European Commission of its intention to submit an application for a Time Extension Notification (TEN) to the commission.

It is envisaged that a credible TEN application for NO_2 will not be too difficult to compile as the principle contributing source (the power station) is reasonably well understood and has been modelled previously and therefore requires little additional research. There is an existing policy measure in place to address this in terms of the new power station to be constructed in the south of Gibraltar.

The long term 1 hour air quality objective for nitrogen dioxide, to be achieved by 2010, is 200μg/m^3. This objective should not be exceeded more than 18 times per year. The maximum one hour means during 2008 at the Rosia Road and Bleak House sites were recorded at 134μg/m^3 and 120μg/m^3 respectively (TABLES 1.3 & 1.5). The Witham's Road station recorded a maximum one hour mean of 151μg/m^3 (TABLE 1.7) since May 2008. There was therefore no exceedence of the 1 hour air quality objective for nitrogen dioxide at any of the stations.

1.3.3 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.

There are two air quality objectives, for the protection of human health, set for sulphur dioxide: a daily mean objective and a 1 hour objective. The 1 hour objective sets a Limit Value of 350μg/m^3, which is not to be exceeded more than 24 times per year. The Daily objective sets a Limit Value of 125μg/m^3 which is not to be exceeded more than 3 times per year.

The maximum one hour mean during 2008 at the Rosia Road site was recorded at 128μg/m^3 (TABLE 1.3). There was no exceedence of the one hour mean Limit Value of 350μg/m^3 at the automatic

monitoring station. The maximum daily mean during 2008 at the Rosia Road site was recorded at 43µg/m^3 (TABLE 1.3). There was no exceedence of the Daily mean Limit Value of 125µg/m^3 at the automatic monitoring station.

There was therefore no exceedence of either of the two air quality objectives for Sulphur Dioxide in 2008.

1.3.4 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% by volume). There are no significant natural sources of benzene, so ambient exposure results primarily from the distribution and combustion of petrol. Of these, combustion by petrol vehicles is the single biggest source.

The air quality objective for benzene is 5µg/m^3, measured as an annual mean. This objective is to be achieved by 2010. The EU Directive also sets a temporary 'margin of tolerance' (MOT) in relation to this limit value which decreases annually until 2010, the date for attainment of the Limit Value. The MOT is intended to help identify those areas where current air quality is worst and acts as a trigger to encourage action to be taken to ensure that the limit value will be met, while also ensuring that exceedence of the limit value which is expected to disappear without additional measures do not trigger the requirement to produce plans and programmes. The annual mean's margin of tolerance in 2008 is 2µg/m^3 this means that the Annual Mean + MOT in 2008 is 7µg/m^3. In 2008 the annual mean was measured at 1.75µg/m^3 which is below the Benzene Annual Mean + MOT and the Limit Value itself.

There was no exceedence of the Benzene annual mean objective at the Rosia Road Station.

1.3.5 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 (NOx). The sources of VOCs are similar to those described for NOx 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 NOx 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 target value for ozone is expressed as a maximum daily 8 hour mean of 120µg/m^3.

This 2010 target value should not be exceeded more than 25 days per calendar year averaged over 3 years. This target value was exceeded on 7 days during 2008 (TABLE 1.6). The maximum hourly mean was recorded as 140µg/m^3, which is below the EU Information Threshold of 180µg/m^3 and the EU Alert Threshold of 240µg/m^3.

There was no exceedence of the Ozone objectives at the Bleak House Station.

1.4 ANNUAL AUTOMATIC DATA SUMMARY REPORTS

1.4.1 ROSIA ROAD 01 January to 31 December 2008

TABLE 1.3 (These data have been fully ratified)

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	8604	8037	33346	-
Maximum 15-minute mean	10.3 mg m^{-3}	210 µg m^{-3}	165 µg m^{-3}	-
Maximum hourly mean	5.5 mg m^{-3}	134 µg m^{-3}	128 µg m^{-3}	52.65 µg m^{-3}
Maximum running 8-hour mean	2.4 mg m^{-3}	103 µg m^{-3}	80 µg m^{-3}	25.36 µg m^{-3}
Maximum running 24-hour mean	1.4 mg m^{-3}	88 µg m^{-3}	49 µg m^{-3}	13.88 µg m^{-3}
Maximum daily mean	1.3 mg m^{-3}	81 µg m^{-3}	43 µg m^{-3}	12.31 µg m^{-3}
Average	0.5 mg m^{-3}	45 µg m^{-3}	11 µg m^{-3}	1.75 µg m^{-3}
Data capture	98.1 %	91.5 %	96.7 %	92.1 %

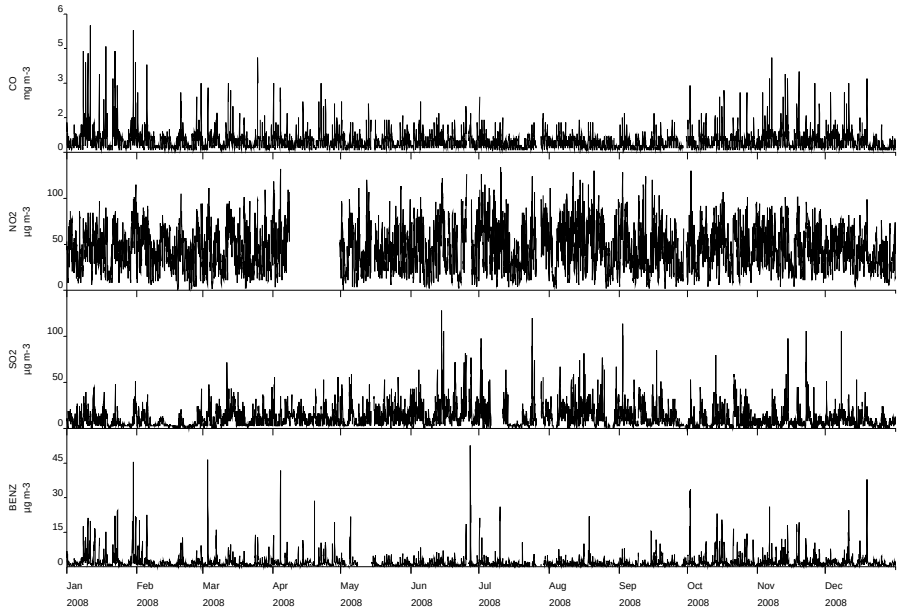
All mass units are at 20'C and 1013mb

TABLE 1.4

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

Sulphur Dioxide	Annual mean > 20 µg m^{-3}	0	-

GRAPH 1.1 (Hourly Mean Data for 01 January to 31 December 2008)



1.4.2 *BLEAK HOUSE*

01 January to 31 December 2008

TABLE 1.5 (These data have been fully ratified)

POLLUTANT	NO_2	O_3
Number Very High	0	0
Number High	0	0
Number Moderate	0	870
Number Low	7825	7836
Maximum 15-minute mean	189 µg m^{-3}	142 µg m^{-3}
Maximum hourly mean	120 µg m^{-3}	140 µg m^{-3}
Maximum running 8-hour mean	87 µg m^{-3}	134 µg m^{-3}
Maximum running 24-hour mean	60 µg m^{-3}	118 µg m^{-3}
Maximum daily mean	57 µg m^{-3}	118 µg m^{-3}
Average	26 µg m^{-3}	60 µg m^{-3}
Data capture	89.1 %	98.6 %

All mass units are at 20°C and 1013mb

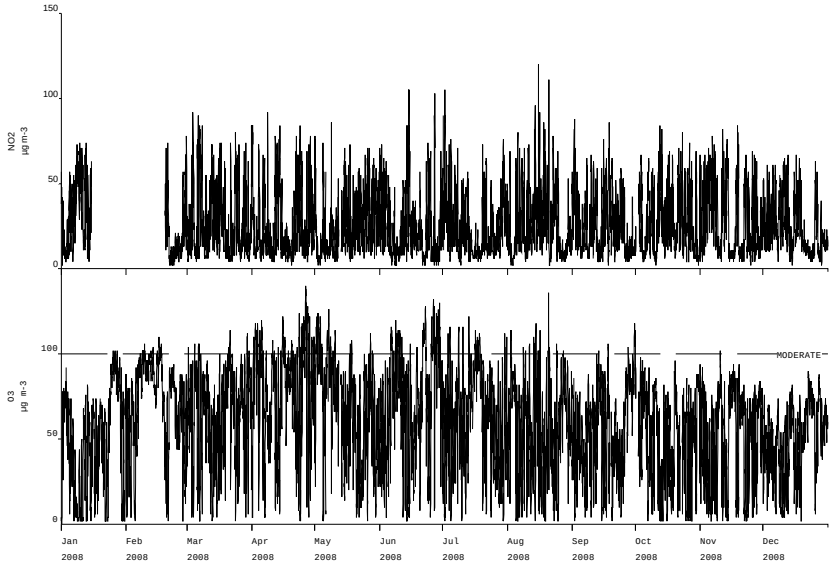
TABLE 1.6

Pollutant	Public Health (Air Quality Limit Values) Rules 2002,	Exceedences	Days

	(Amendment) Rules 2003 and (Ozone) Rules 2004		
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}	34	7

GRAPH 1.2 (Hourly Mean Data for 01 January to 31 December 2008)

1.4.3



WITHAM'S ROAD 15 May to 31 December 2008

TABLE 1.7 (These data have been fully ratified)

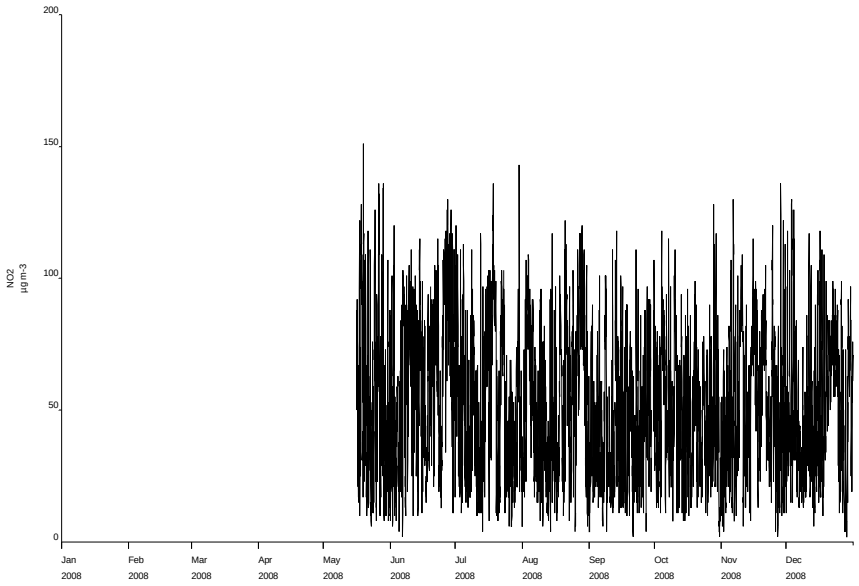
POLLUTANT	NO_2
Number Very High	0
Number High	0
Number Moderate	0
Number Low	5455
Maximum 15-minute mean	220 µg m^{-3}
Maximum hourly mean	151 µg m^{-3}
Maximum running 8-hour mean	121 µg m^{-3}
Maximum running 24-hour mean	104 µg m^{-3}
Maximum daily mean	102 µg m^{-3}
Average	53 µg m^{-3}
Data capture	62.1 %

All mass units are at 20°C and 1013mb

TABLE 1.8

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}	1	-
Nitrogen Dioxide	Hourly mean > 200 µg m^{-3}	0	0

GRAPH 1.3 (Hourly Mean Data for 15 May to 31 December 2008)



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

1.5.1 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).

The air quality objective for Lead is 0.5µg/m^3 measured as an annual mean to have been achieved by 2005. The 2008 annual mean was measured at 0.011µg/m^3. There was no exceedence of the Lead annual mean objective at the Rosia Road station.

1.5.2 Particulate Matter PM_{10}

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.

There are two air quality objectives set for Particulate matter (measured as the PM_{10} size fraction) a daily mean objective and an annual mean objective.

The annual mean air quality objective for PM_{10} is 40µg/m^3, and the Daily mean objective is set at 50 µg/m^3. The Daily Mean should not be exceeded on more than 35 days per year. These objectives were to be met by 2005. The 2007 annual mean was measured as 41µg/m^3 and the daily mean of 50 µg/m^3 was exceeded on 63 occasions.

Very high PM_{10} concentrations of 179ug/m^3 and 160ug/m^3 were measured on 11th October 2008 and 14th October 2008 respectively.

Table 1.9 PM_{10} Statistics for Rosia Road (Corrected to take into account African Dust Intrusions)

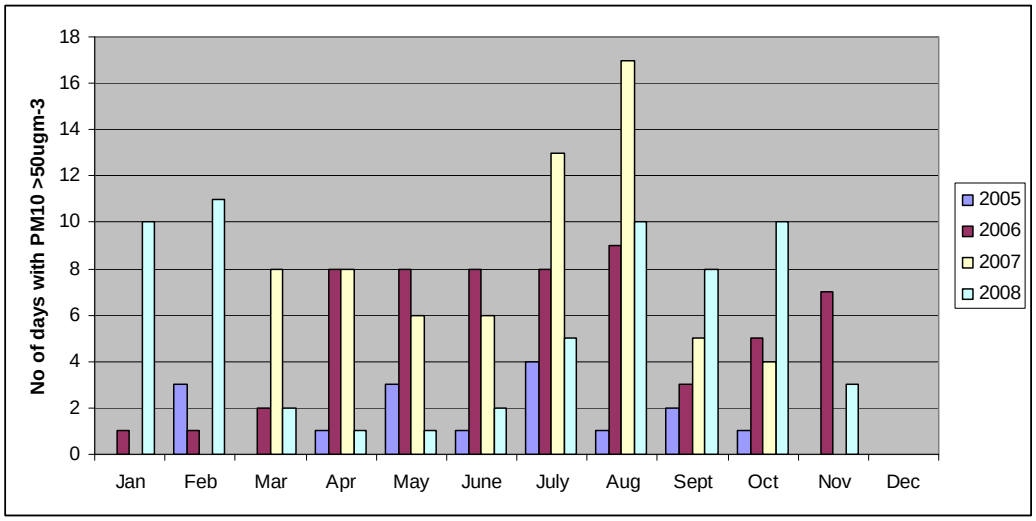
	2005	2006	2007	2008
Valid Days' Data	329	362	362	330
% Data Capture	90%	99%	99%	90%
Annual Mean PM_{10} (40ug/m^{-3})*	35.9	39.7	45.0	41
Max. 24-hour mean PM_{10}	81.6	91.9	249.8	179
Days > 50ug m-3 (35days)*	18	60	109	63[1]

[1] Correction for African Dust intrusion not effected
* Limit values – annual mean and maximum number of days daily limit value can be exceeded

2008 figures show that PM_{10} daily mean concentrations > 50ug/m^3 decreased with levels very similar to 2006.

Figure 1.2 shows number of days > 50ug/m^3 for PM_{10}, per month throughout the 4 years of the study. This indicates that there may be a seasonal pattern – initial indications suggesting more exceedences occurring during summer months.

Figure 1.2 Number of days per month with PM_{10} > 50 ug/m^3



Once again the daily PM_{10} limit value has been exceeded in 2008. There have been 63 days where the limit value has been exceeded, i.e. 28 days over and above the maximum of 35 days permitted.

The annual limit value of 40ug/m^3 was just exceeded in 2008. The recorded level for 2008 was 41ug/m^3.

1.5.3 Arsenic, Cadmium, Nickel and Poly Aromatic Hydrocarbons (measured as Benzo(a)pyrene)

Arsenic, Cadmium and Nickel are human genotoxic carcinogens. Evidence suggests that there is no identifiable threshold below which these substances do not pose a risk to human health. Impact on human health and the environment occurs via concentrations in ambient air and via deposition. The major sources of these metals in the Gibraltar region are likely to be Shipping and Power Generation. Target values are set with the aim of minimising harmful effects on human health, paying particular attention to sensitive populations, and the environment as a whole, of airborne arsenic, cadmium and nickel.

Polycyclic Aromatic Hydrocarbons are toxic organic micro pollutants (TOMPS) that cause a wide range of health effects.

Target values are set with the aim of minimising harmful effects on human health, paying particular attention to sensitive populations, and the environment as a whole, of airborne Polycyclic Aromatic Hydrocarbons. Benzo[a]pyrene is used as a marker for the carcinogenic risk of polycyclic aromatic hydrocarbons in ambient air.

TABLE 1.9 Pollutants regulated by 4th Daughter Directive

Pollutants regulated by 4th Daughter Directive			
Pollutant	**Parameter**	**Target Value**	**Recorded Average**
Arsenic	Annual average	6ngm^{-3}	1.28ngm^{-3}
Cadmium	Annual average	5ngm^{-3}	0.2ngm^{-3}
Nickel	Annual average	20 ngm^{-3}	20.4ngm^{-3}
BAP	Annual average	1ngm^{-3}	0.07ngm^{-3}

The annual averages recorded reveal that arsenic, cadmium and poly aromatic hydrocarbons are well below their corresponding target value. The annual average recorded for Nickel shows that it is just above the target value, the highest recorded monthly concentration was 56.17ngm^{3} in period 2nd December to 30th December 2008. This high level of nickel will require further investigation in order to enable us to meet the target value at the end of 2012. Arsenic, cadmium and poly aromatic hydrocarbons continue to be below their corresponding lower assessment levels.

1.6 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, power generation plants, 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, Witham's Road and Bleak House. 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 (+/-25%).

1.6.1 Hydrocarbon Diffusion Network

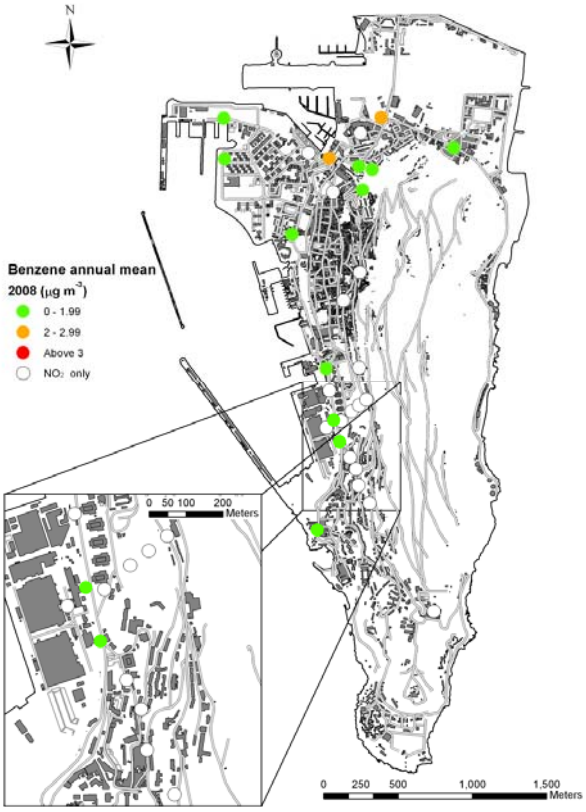


Figure 1.3 Hydrocarbon diffusion network

- No sites had annual mean benzene concentrations greater than the EC Limit Value or Gibraltar AQ Objective of 5 μg m-3 in 2007.
- The highest levels of BTEX hydrocarbons were measured at Winston Churchill Way (Sundial Roundabout)and Glacis Road , both busy roads.
- The highest annual mean benzene concentration was 2.2μg/m^3 measured at Glacis Road followed by 2μg/m^3 measured by the Sundial roundabout.

At all other sites the annual mean benzene concentration was 1.7μg/m^3 or less. All sites met the Gibraltar Air Quality Objective (and EC Limit Value) of 5μg/m^3 for annual mean benzene concentration, which is to be achieved by 2010.

1.6.2 Nitrogen Dioxide Network

Annual mean NO_2 concentrations for 2008 range from 37 μg/m^3 to 61 μg/m^3 at kerbside sites, 37 μg/m^3 to 53 μg/m^3 at roadside sites and 25 μg/m^3 to 39 μg/m^3 at background sites.

The highest annual mean concentrations (61 μg/m^3) were measured at Jumper's (on Rosia Road) followed by Witham's Road at 59 μg/m^3. As can be seen below, other sites geographically close to these also exhibited elevated concentrations of NO_2.

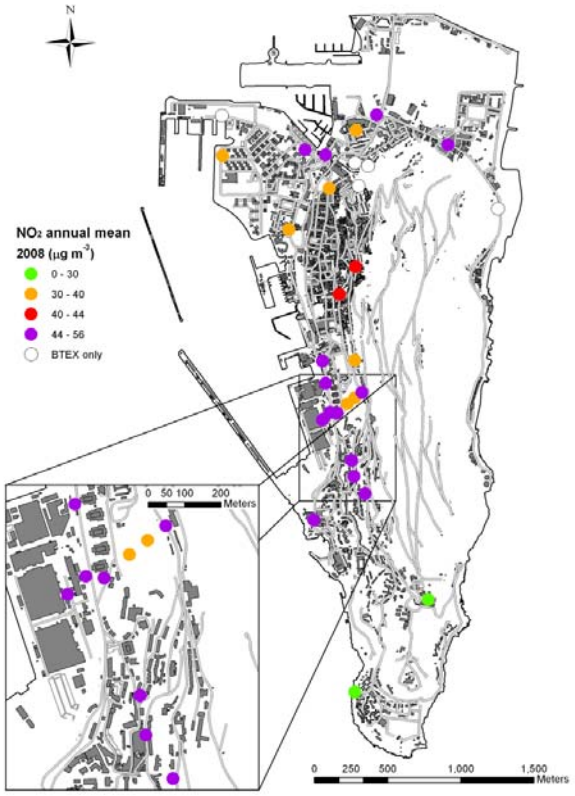


Figure 1.4 NO_2 Annual Average concentrations for 2008 (sites that do not measure NO_2 shown by white circles

Background levels of around 37-39 $\mu g/m^3$ (Main St and Harbour Views) were measured at background sites in the northern built-up area, while concentrations in the less built-up southern part of Gibraltar were considerably lower (25-26 $\mu g/m^3$ at Lathbury Industrial Park and Bleak House). The background levels near Rosia Road (Alameda Gardens) were measured at 37$\mu g/m^3$.

Annual mean NO_2 concentrations at sixteen sites located in built-up areas were greater than, or equal to, the EC Directive Limit Value plus margin of tolerance for 2008 (44$\mu g/m^3$).

1.7 CONCLUSIONS & RECOMMENDATIONS

The Ratified Data for the automatic air pollution monitoring network shows that there was no exceedence of the carbon monoxide, sulphur dioxide, ozone and benzene objectives contained in our national legislation or within the European Air Quality Directives or Daughter Directives. Nitrogen dioxide exceeded the annual mean objective of 40$\mu g/m^3$ which should be met by 2010. The annual mean's Margin of Tolerance (MOT) in 2008 was 4$\mu g/m^3$. This means that the annual mean plus MOT was 44$\mu g/m^3$. The annual mean at Rosia Road automatic monitoring station was 45$\mu g/m^3$.The annual mean plus MOT for 2008 was therefore exceeded at this monitoring station. The annual mean at Witham's Road monitoring station was 53$\mu g/m^3$. Although this figure exceeded the annual mean plus MOT it should be noted that this station has only seven months monitoring data (monitoring commenced in May 2008). The Government of Gibraltar has commissioned the Environmental Agency, who in turn have contracted AEA Energy & Environment to prepare a Time Extension Notification (TEN) to the EU Commission in respect of our Nitrogen Dioxide exceedence of the limit value plus MOT in 2008. Data provided by the Nitrogen Dioxide diffusion tube network in the south district, especially around the Jumper's area, and the new monitoring station at Witham's Road, indicate that elevated Nitrogen Dioxide levels are as a result of emissions from the OESCO power station and the Inter Services Generating Station. Modelling carried out in the past confirmed that these elevated levels are attributable to these power stations. It is expected that the closure of these stations in the near future will result in lower Nitrogen Dioxide levels, in compliance with the Directive. The closure of these two stations and the building of a modern and cleaner power station will form the basis of our TEN application.

The annual mean for Nickel during 2008was 20.4$\mu g/m^3$ .This was slightly above the target value of 20$\mu g/m^3$ which has to be achieved by 31st December 2012. It is suspected that the elevated levels

are attributable to heavy industry in neighbouring Spain and shipping sources. Further studies are required to firmly establish the true origins of these elevated levels of Nickel.

Particulate matter(PM_{10}) daily mean in 2008 has again breached our national and European Limit Value although the number of exceedence episodes was down from 2007. There were 63 exceedences in 2008 of the daily mean of 50$\mu g/m^3$ (Maximum number of exceedences permitted in one year is 35). Established methodology to identify the proportion of PM_{10} exceedences resulting from natural transboundary PM_{10} (ie Saharan dust) will now be used to quantify how many of the PM_{10} Daily Mean Limit Value exceedences in Gibraltar were due to the influence of these natural events. Work is currently in progress preparing a TEN application in respect of PM_{10} exceedences in Gibraltar. This work entails additional research which will look at the contribution to PM_{10} levels from sea salt, shipping generally, re-suspended dust, building works and traffic amongst other things.

The Government, as part of the network monitoring upgrades commissioned, a second Particulate Matter(PM_{10}) monitoring unit during 2008. a TEOM FDMS near real-time analyser was installed at the Rosia Road Station. This instrument provides a better understanding of diurnal patterns of PM_{10} and adds further information to the source apportionment process. The instrument also further improves on the Gibraltar Air Monitoring Programme by providing near real-time alerts to the public via the Air Quality web

The NO_2 non- automated monitoring network continued to show elevated levels of Nitrogen Dioxide above the Limit Value +MOT for 2008 in the South District, especially in the vicinity of the two power stations. There were also high levels associated with traffic in Glacis Road and the Sundial roundabout. Levels recorded at Watergardens, Devil's Tower Road, Prince Edwards Road and Lime Kiln Road were also above the EC Directive Limit Value (and the Gibraltar Air Quality Objective) of 40$\mu g/m^3$.

Chapter 2:

The Natural Environment

The natural environment encompasses all naturally occurring living and non-living things. It includes air, water, vegetation, land and soil and natural phenomena that occur therein. It contrasts with the built environment which comprises areas that are strongly influenced by humans. Understanding of the natural environment and how it underpins our wellbeing and prosperity is growing all the time, however, the natural world is a complex thing and there is a great deal about it that is still unknown or not fully understood. By monitoring and collecting evidence on the state of the natural environment, the Department is better able to inform policies and decisions which might affect it.

2.1 WATER QUALITY

2.1.1 Bathing Water Quality

The 1976 Bathing Water Directive, which was transposed into local legislation by the Public Health (Quality of Bathing Water) Rules 1992, sets binding standards for bathing waters throughout the European Union. The annual Bathing Water Report and Tourist Atlas can be viewed at http://ec.europa.eu/water/water-bathing/index_en.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 on the 15th February 2006 and will replace the existing directive by 2014. This has been transposed into local legislation by the Environment (Quality of Bathing Water) Regulations 2009. Bathing sites will be classified into four categories: "excellent," "good," "sufficient" or "poor".

The new Regulations lay down provisions for more sophisticated monitoring and classification of bathing water. They also include a requirement 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 is to be made readily available to the public, both through displays at the site and through the media and internet. The water quality results can be viewed at www.environmental-agency.gi/beach.php

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 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 1999 – 2008.

Table 2.1 Bathing Water Quality Results

	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
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

2.1.2 Potable Water Quality

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 Act (Amendment) Act 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" water quality control programme. Samples are taken at the outlet of the production plant, batch storage reservoirs, service reservoirs and at the customer taps. 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 2008, a total of 1,327,265 cubic metres of potable water was supplied. The potable water consisted of 94% desalinated water and 6% 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 latest results for "Check" and "Audit" monitoring carried out on the potable water supplied to the community can be found on www.environmental-agency.gi/potable-water.php

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 161 "Check" and 6 "Audit" samples in 2008. This figure does not include the numerous samples also taken by AquaGib Ltd itself.

The summary on the following page details the number of Check and Audit samples taken in Gibraltar. All samples complied with the standards.

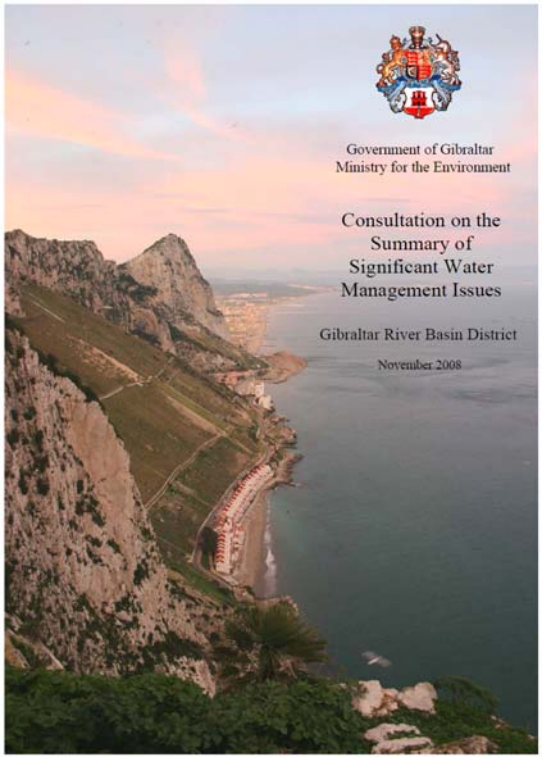
Table 2.2 Summary of information on drinking water quality 2008

Parameters (1)	Numbers of analyses	Numbers of analyses not complying	% of analyses complying
Microbiological Parameters			
Escherichia coli (E.coli)	151	0	100
Enterococci	0	0	100
Chemical Parameters			
Aluminium	5	0	100
Antimony	8	0	100
Arsenic	10	0	100
Benzene	9	0	100
Benso(a)pyrene	4	0	100
Boron	9	0	100
Bromate	9	0	100
Cadmium	9	0	100
Chromium	8	0	100
Colour[3]	161	0	100
Copper	8	0	100
Cyanide	8	0	100
1,2-dichloroethane	5	0	100
Fluoride	9	0	100
Iron	9	0	100
Lead	9	0	100
Manganese	9	0	100
Mercury	9	0	100
Nickel	9	0	100
Nitrate	9	0	100
Nitrite in distribution at the tap	9	0	100
Nitrate/nitrite formula[4]	9	0	100
Odours[3]	157	0	100
Pesticides-individual[2]	0	0	100
Pesticides – Total	19	0	100
Polycyclic Aromatic Hydrocarbons	6	0	100
Selenium	9	0	100
Sodium	9	0	100
Taste[3]	156	0	100
Tetrachloroethene and Trichloroethene	10	0	100
Trihalomethanes - Total	8	0	100

Indicator Parameters			
Ammonium	160	0	100
Chloride	160	0	100
Clostridium perfringens	0	0	100
Conductivity	160	0	100
Hydrogen Ion Concentration	156	0	100
Sulphate	5	0	100
Colony count 22_oC_3	151	0	100

2.1.3 The Water Framework Directive

The Department recently completed the *Summary of Significant Water Management Issues Report* in line with our requirements under the Water Framework Directive (2000/60/EC). In essence, the report identifies and elaborates on the issues that are currently affecting our coastal and groundwater bodies. For each of the most important water-related issues, the report sets out background information showing the extent of each issue and, the way that they can cause water problems, including possible measures that can be taken. The potential impacts of the identified coastal and groundwater pressures were evaluated using available data and expert judgement. The following is a list of identified significant water management issues that affect coastal and ground waters in Gibraltar:



- Point source discharges (e.g. Sewage outfalls and industrial discharges)
- Physical modifications (Reclamation, urban development)
- Diffuse pollution (including shipping)
- Abstraction
- Transboundary impacts
- Climate change

The *Summary of Significant Water Management Issues Report* is available online from the Gibraltar Government website. The report is being used to inform the *Gibraltar River Basin Management Plan* and this will include a comprehensive overview of the current work being done locally in the field of coastal and groundwater sampling. Water quality status classifications will also be included in this report which needs to be sent to the Commission along with a proposed programme of measures implemented to safeguard local water quality.

2.2 BIODIVERSITY

Photo credits: L.Linares

A contract was entered into with WildLife (Gibraltar) Ltd to carry out clearing of paths in the Upper Rock. It carried out numerous tasks including the clearing of Martin's Path. This initiative proved to be a success since it provided the general public with renewed access along the paths. In the process, open areas were created for flowering plants that had become smothered by the developing maquis vegetation characteristic of the Upper Rock Nature Reserve. Similar work was also carried out in Mediterranean Steps, Inglis Way Path and Douglas Path (GONHS, 2008).

A summary of habitat management and conservation issues was provided by Wildlife (Gibraltar) Ltd in their report titled '*Report on the Conservation of Terrestrial Flora & Fauna in Gibraltar 2008*'. The report gives provides a description of the existing state of terrestrial species and habitats some of which are protected under the EU Habitats Directive including the Upper Rock Nature Reserve, Windmill Hill Flats, the Great Sand Slopes and Talus. Species covered by the report include birds, mammals including bats, plants and invertebrates.

A separate report on EU protected marine species was also produced by the Gibraltar Museum titled *'Marine Surveillance – Diving and Intertidal Survey'*. This report brings together the results of a one-year long period of surveys, appraisal and interpretation of results stemming from population studies of four marine species that can be found in Gibraltar waters and are listed by the EU as being in danger of extinction. These four species are *Patella ferruginea, Pinna nobilis, Lithophaga lithophaga* and *Centrostephanus longispinus.* The study establishes initial baselines as to the status of the four species being monitored and proposals for future action.

2.3 LAND & SOIL/GREEN AREAS

The Department of the Environment is also tasked with the monitoring of the contracts which the Government holds with a number of providers, including for the management of our planted areas. During 2008, the following areas underwent beautification and additional trees were planted:

- Morrisson's roundabout refurbished and addition of lighting – 9 succulent trees were introduced
- Europort roundabout refurbished and addition of lighting
- Chatham Couterguard and Orange Bastion Link Road – 28 trees
- Orange Bastion, Line Wall Road – 3 trees
- Planters beside Youth Club, Line Wall Road
- Frontier fence strip
- Saluting Battery has been revamped and 40 tree sapplings introduced
- Palm tree at Cathedral was replanted
- Bishop Fitzgerald car park, new trees introduced – 2 saplings
- Westview promenade – 45 saplings – unfortunately everything was destroyed by storm in October 2008
- GASA areas – 3 trees
- North Mole planters, bedding plants introduced – 3 semi mature trees
- Varyl Begg Estate – 21 semi mature trees
- Trafalgar Cemetery, new trees introduced – 18 semi mature trees
- Alameda Estate, new trees planted and Palm tree from the Frontier Guardroom & 6 sapplings

- Planter re-instated outside Market toilets – 1 semi mature tree
- Camp Bay – 12 mature trees transferred from North Mole Road
- College of Further Education – 4 saplings
- Convent Garden – 4 saplings
- Supreme Court – 6 saplings
- Cathedral Square – 3 semi mature trees
- Piazella – 3 semi mature trees
- Casemates Square – 2 semi mature trees
- Corral Road – 4 semi mature trees
- Waterport promenade – 8 trees
- Jumpers flower bed – 2 saplings
- Rosia Road FHQ – 3 semi mature trees
- Harbour Views Road adjacent to Hospital – 9 trees transferred from Main Street South

A total of 239 trees were planted in 2008.

Chapter 3:

Waste & Recycling

The management of waste continues to be a primary factor in the Government's commitment to achieve the objectives of sustainable development. Gibraltar continues to aim to manage its waste locally, in so far as is reasonably possible. The clinical waste incinerator and the proposed refurbishment of the energy from waste plant form part of this strategy. The introduction of recycling points at various locations around Gibraltar was a highlight during 2008 and signals the start of a more comprehensive waste recycling programme for Gibraltar.

This chapter will provide statistical information on Gibraltar's waste arisings as well details of the waste management policies currently being implemented.

3.1 INDUSTRIAL WASTE ARISINGS

Due to the lack of heavy industry in Gibraltar, the main sources of industrial waste are 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.

Industrial waste materials are stored locally until sufficient quantities have been amassed to warrant the economic transfrontier shipment of this waste. This predominantly consists of waste oils, asbestos and asbestos containing products. A more detailed breakdown of the hazardous wastes produced in Gibraltar is given in Table 3.1.

Table 3.1 Breakdown of Hazardous Wastes produced in Gibraltar (Tonnes)

WASTE TOTALS	2008
ASBESTOS	192.74
BILGE OILS (M3)	5.63
BITUMEN	187.30
CLINICAL WASTE	45.56
ELECTRONIC EQUIPMENT	13.6
FLOURESCENT TUBES	1.08
GRIT	1520.37
HALOGENATED ORGANIC SOLVENTS	1.58
NON-HALOGENATED SOLVENTS	44.67
OIL & GREASE CONTAINING WASTE	57.14
OIL FILTERS	6.48
PAINT CHIPPINGS	12.46
SOILD SALTS & SOLUTIONS	3.07
WASTE CONTAINING OIL	44.06
WASTE OIL (M3)	0.58
WASTE PAINT & VARNISH	83.32
TOTAL(TPA)	2451.75

3.2 MUNICIPAL WASTE

Municipal waste in Gibraltar is collected by two different bodies, namely Gibraltar Industrial Cleaners and Master Service (Gib) Ltd. In 2008 the total amount of municipal waste collected and sent to Spain was 30,116.04 tonnes. This includes mattresses and bulky household items. Removing these from the total sum leaves 17,041 tonnes of household waste, which equates to approximately 570 kg of waste per person per annum. This figure still includes commercial waste from businesses,

bars and restaurants, which goes some way towards explaining why it is significantly higher than the average figure for a developed European country (approximately 400kg per person per annum).

Table 3.2 Breakdown of Municipal Waste Arisings

Type of Waste	Amount of Waste (tonnes)
Bulky items	13,058.4
Mattresses	16.3
Other municipal waste	17,041.3
Total	30,116.04

3.3 RECYCLING

3.3.1 Glass & Cans

As of Monday 19th May, distinctly coloured recycling bins could be found at various strategic locations around the Rock.

The green bins are for glass bottles, drinking glasses, tumblers and jars only. Metal lids and metal bottle tops should be deposited separately in the yellow bins. The yellow bins are only for the depositing of aluminium and steel drink cans, steel food tins, household aerosols and clean aluminium foil (as well as metal bottle tops and metal lids from glass bottles and jars). No other types of refuse should be deposited in these bins and the public is asked to give items a quick clean before depositing.

The public was notified of the placement of the bins via the local media and leaflets with information on how to use the bins were published and distributed widely around the rock.

Despite this however, recycling figures for 2008 were disappointingly low. During the first 6 months of the recycling programme 25,250kg of glass and 5,020kg of cans were collected. These figures represent approximately 5% of the glass and 1% of the cans produced as waste.

3.3.2 Other waste materials

The recycling of other waste materials continues. Recyclable material from our municipal waste is manually and automatically separated and processed at the Los Barrios landfill site, Sur Europa. Further sorting and recycling of items is carried out locally; wood and metal items are sorted out at the previous incinerator site at Michael Dobinson Way. A separate Civic Amenities Site is operated by Gibraltar Community Projects and located at Buena Vista. At this site people can dispose of their

bulky timber items, white goods and other electrical items, mattresses, building debris and metal scrap.

Buena Vista	Michael Dobinson Way
• Bulky timber items • White goods & other electrical items • Matresses • Building Debris • Metal Scrap	• Wood & metal items • White goods & electrical equipment

3.4 CLINICAL WASTE INCINERATOR

The Clinical Waste Incinerator came into operation during Easter 2008. It provides the collection, transport & destruction services to all local Clinical and Medical Waste Producers (hospitals, clinics, laboratories, surgeries, dental and veterinary clinics). The collected wastes are incinerated at the facilities situated at Governor's Cottage at Europa Advance Road.

1,228,060 litres of clinical waste were incinerated locally in 2008. A further 643,290 litres were exported to Spain. 58 Clinical Waste Sharps boxes were also incinerated during this year.

Chapter 4:

Tackling Climate Change

Climate change is a reality which is now formally accepted by all the world's major governments. All countries must reconcile themselves to committed action to help curb these changes as a matter of urgency. As part of this process all our policies, economic models and initiatives must be both climate-proof and climate-friendly.

The Government of Gibraltar is committed to tackling the issue of climate change and has had the UK ratification of the Kyoto Protocol extended to Gibraltar. As part of its obligations under this commitment the Government, in consultation with scientific experts, has created a comprehensive package of policies geared towards decreasing our carbon footprint and increasing energy efficiency and conservation.

4.1 KYOTO COMMITMENTS

The United Nations Framework Convention on Climate Change (UNFCCC) was entered into force in 1994 and sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change. It recognises that the climate system is a shared resource whose stability can be affected by industrial and other emissions of carbon dioxide and other greenhouse gases.

The Kyoto Protocol is an international agreement linked to the UNFCCC which sets binding targets for 37 industrialised countries and the European community for reducing greenhouse gas (GHG) emissions. These amount to an average of five per cent against 1990 levels over the five-year period 2008-2012.

The ultimate objective of the UNFCCC is to achieve "stabilisation of greenhouse gases in the atmosphere at a level that would prevent dangerous (human induced) interference with the climate system" (Article 2).

Gibraltar is already committed to reduce greenhouse gas emissions via a number of measures. These include:

(a) Thermal efficiency of new buildings to be reviewed under proposed new Building Regulations.
(b) An ongoing modernisation programme of all our fresh water distribution system (leakage reduction).
(c) Encouragement of waste reduction and recycling.
(d) Improvements to bus transport system. School children can travel free to and from school thus reducing dependence of parents having to drive children to school on private vehicles.

There are also a number of EC Directives which require measures to be implemented to ensure the reduction of greenhouse gas emissions. These measures vary in extremity, applicability to our local setting and practical deliverability according to the Directive in question. These include the Biofuels Directive 2003/30/EC, Renewables Directive 2001/77/EC, Emissions Ceiling Directive 2001/80/EC, Greenhouse Gas Emissions Trading Directive (2003/87/EC), and amending Directive establishing a scheme for Greenhouse Gas Allowance Trading 2004/101, Energy End Use efficiency and Energy Services Directive 2006/32/EC, Habitats Directive 92/43/EEC, Substances that deplete the ozone layer Regulations 2037/2000, 3093/94, Integrated Pollution Prevention and Control 96/61/EC and the Landfill of Waste Directive 1999/31/EC.

4.2 CLIMATE CHANGE PROGRAMME

The Gibraltar Climate Change Programme (GCCP) builds upon the foundations laid out in the Environment Charter and is a reflection of the Government's commitment to reduce Gibraltar's overall greenhouse gas emissions and to conserve energy. The programme is based on a number of broad principles such as the adoption of a balanced partnership approach, a focus on cost effective and flexible policy options and taking a longer term view of the issue of climate change.

The policies included in the GCCP are the following:

4.2.1 Land Use Policy

This focuses on the preservation of our green areas as well as looking to create new green areas, particularly within dense urban developments. Where the inclusion of a green area is not possible due to space restrictions, stand alone trees will be planted. Trees and green areas will be retained and preserved wherever possible. The Upper Rock, which contains the largest concentrations of trees, has been designated as a Site of Community Importance (SCI) under the EU Habitats Directive. The Development & Planning Commission (DPC) has implemented a policy whereby they require two trees to be planted whenever one had to be cut down.

4.2.2 Soil Protection Policy

This policy is aimed at the prevention of soil degradation processes (both natural and human-induced) which undermine its ability to perform essential environmental functions. Such measures include the mitigation of the effects of those degradation processes and the restoration and remediation of degraded soils. In addition, any developments which would involve the removal of significant amounts of soil will be discouraged. Where the removal of soil is absolutely necessary, every effort will be made to find a beneficial use for removed soil (e.g. landscaping).

4.2.3 Energy Conservation Policy

Energy efficiency is the fastest and most cost effective way of achieving significant emissions reductions. The Government is developing an Energy Efficiency Action Plan which identifies key priorities for action such as making products, buildings, and power generation and distribution more energy efficient; improving the fuel efficiency of vehicles and raising awareness of energy efficiency throughout all sectors of society.

The Government will also look into the possibility of setting up renewable energy projects in Gibraltar. A recent feasibility study concluded that energy from wind, waste and tidal currents were the most technically viable options for Gibraltar.

4.2.4 Traffic & Transport Management Policy

The aim is to reduce the growing emissions from private vehicles by encouraging more sustainable modes of transport. One of the primary ways in which this is to be achieved is via an improvement in the current public transport service, increasing the hours of service and assessing the existing routes to identify any gaps in service.

The creation of a park & ride service will also help to reduce congestion on our roads as it will encourage visitors to leave their cars in the new purpose built car park and make use of the shuttle bus service into town.

Ultimately the goal is to implement a series of policy measures as opposed to one single policy in order to achieve the greatest impact. The Government is presently working on a traffic & transport management plan.

4.2.5 Promotion of environmental education & awareness

Generating awareness and instilling a sense of responsibility towards the planet are key goals of the Climate Change Programme, given that it is ultimately down to each and every individual to make the daily choices which will affect Gibraltar's overall carbon emissions. The ongoing environmental education programme in schools and a revival of the Green Business programme will be the primary ways in which the Department seeks to foster this heightened awareness.

Chapter 5:

Hazard Management

Emergency planning and hazard management focus on dealing with and avoiding risks. These disciplines involve preparing for disaster before it occurs as well as supporting and rebuilding systems after natural or human-caused disasters have occurred. Effective emergency management relies on the thorough integration of emergency plans at all levels of government and non-government involvement.

This year Gibraltar had to invoke its hazard management systems as severe storms caused the grounding of the *Fedra* off the eastern coast of Gibraltar and destroyed large sections of our infrastructure.

5.1 NEW FLAME INCIDENT

The Panamanian bulk carrier cargo ship *M/V New Flame* collided with an oil tanker off Europa Point on the 12th August 2007. It became partially submerged in the Strait of Gibraltar and eventually broke in two in December 2007 following numerous unsuccessful recovery efforts. The stern section sank following storms in February 2008. The vessel now lies on the seabed with most of the wreckage lying between 10 and 20 metres in depth.

A total of 780 cubic metres of fuel oil was removed from the vessel by 14th September 2007. Following pollution abatement measures, the cargo was removed using a 100 tonne grab. 39,400 tonnes (approximately 94%) were removed by Titan Salvage. Portions of the wreck still remain on the sea bed, however, and efforts are now concentrated on deciding on how to proceed.

The area in which the vessel is located is within the Southern Waters of Gibraltar, a Designated Site of Community Importance under the EU Habitats Directive. Potential future actions are therefore being examined in the light of this Directive and the assessment focuses primarily on the ecological values of the habitat. Other aspects of the site are also considered and include human uses such as marine activities, commercial and recreational fisheries, research, diving, tourism and other potential human uses. Factors to be considered when determining the best course of action include:

- Direct ecological effects of salvage and removal
- Potential toxicity
- Indirect disturbance such as turbidity
- Long-term implications of possible vessel movement

- Interactions of the wreck removal with a variety of human uses such as maritime activities, fishing, diving and research
- Archaeological and geological considerations
- Carbon footprint and
- Air quality

The primary consideration at all times will be the conservation of the integrity of the site, in terms of its habitats and species.

5.2 Fedra/Storms

Extreme gale force weather pounded Gibraltar on the 10th October 2008, destroying structures on land and pushing a crippled cargo ship, the *Fedra*, onto the cliffs at Europa Point. The 36,000-tonne ship was empty at the time of the casualty and was carrying fuel for its own consumption. The severity of the storm, which reached gale force 11 at numerous points in the Straits, highlighted the potential impacts that could be witnessed in Gibraltar if the intensity and frequency of storms are affected by changes in our climate.

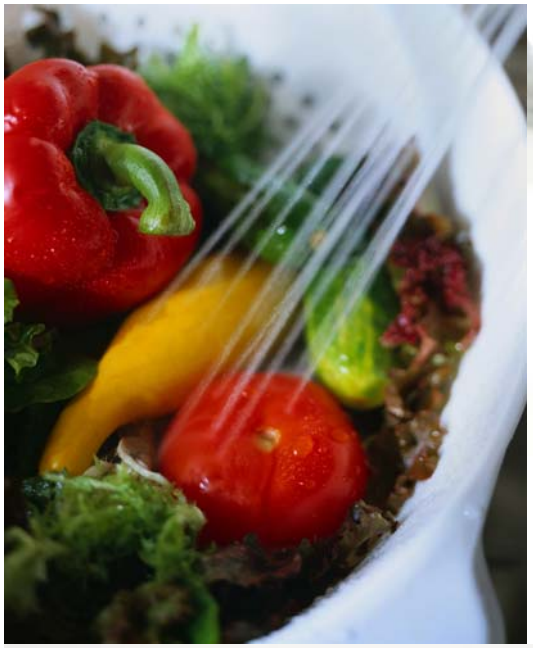
The grounding of the *Fedra* resulted in a minor oil spill which was observed once the storm had dissipated. Numerous beaches were affected by the spill although no major ecological impacts were encountered due to the relatively small quantities of fuel leaked.

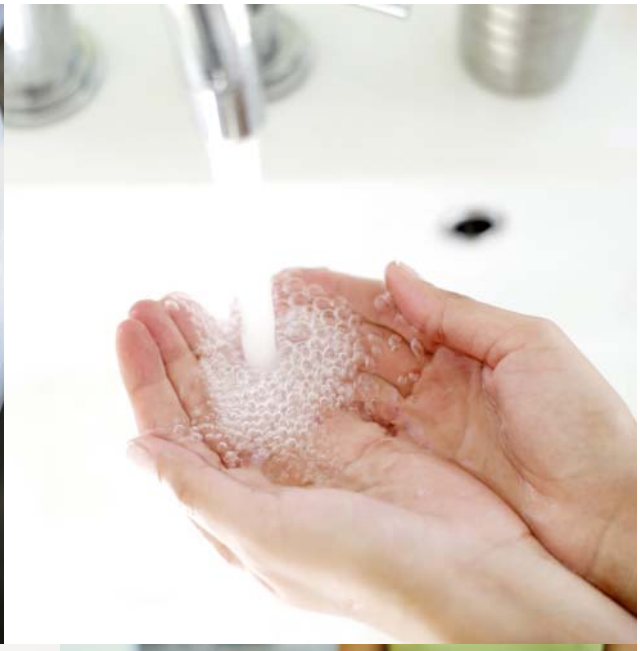
Marine surveillance is ongoing and to date, no residual impacts have been observed.

Chapter 6:

Food Hygiene

Food safety is the absence of any risk of harm arising from the consumption of food. Generally speaking food safety describes the practice of managing food in such a way that the food is highly unlikely to cause any harmful effects to consumers. Food hygiene is the practical process that ensures that the food you make, serve or sell is perfectly safe to eat.





6.1 FOOD POISONING

Contamination is the term that describes food in which there is a presence of something that is harmful or objectionable. Generally speaking if you eat contaminated food there is a strong likelihood that you will suffer from food poisoning. Food may become contaminated with physical objects, chemicals or harmful bacteria. The most common type of food poisoning in Gibraltar is caused by bacteria and it is referred to as bacterial food poisoning. The most common types of bacterial food poisoning in Gibraltar are caused by bacteria of the Salmonella and Campylobacter groups.

As part of their everyday duties Environmental Health Officers investigate food poisoning cases once they are reported to the Environmental Agency. The Environmental Health Officer conducts a thorough investigation to trace the source of infection. This normally entails visiting households, interviewing affected persons and offering precautionary advice to prevent the spread of further infection. Any food establishment associated with an outbreak is inspected immediately and a thorough investigation is carried out into the handling, storage, preparation and cooking of any suspect food to identify any malpractices which may have led to contamination. Food samples and health screening of food handlers may be carried out if deemed necessary.

6.2 FOOD 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 those that have high protein contents such as cooked meats, meat and poultry products and meals prepared with meat and poultry. These foods are known as “high risk foods” and are sampled frequently by the Environmental Health Officer’s of the Environmental Agency to ensure that they are free from food poisoning bacteria.

Although priority is given to the sampling of the aforementioned foods, other foods are sampled to ensure that they comply with compositional standards set down in food

additives legislation. A total of 390 samples of food were obtained and submitted for analysis in 2008.

6.3 IMPORTED FOOD

The vast majority of food consumed locally is imported from countries worldwide via the land frontier with Spain. The Environmental Agency operates an inspection post at the border with Spain and all food imported is subject to inspections as necessary. A small amount of food is imported by shipping and this is also inspected by members of the Environmental Agency. The inspection service is supplemented by a routine and random sampling programme.

6.4 REGISTRATION AND INPSECTION OF FOOD PREMISES

There are 427 food premises in Gibraltar. These premises consist of restaurants, supermarkets, delicatessen, bakeries, groceries and confectionery outlets. There are no manufacturing factories. In 2008, a number of large new restaurants opened in a new development on Gibraltar's western sea front. The Environmental Agency has been working closely with both the developers and proprietors of these premises offering advice in their design and layout.

The Food and Drugs Act 1964 requires certain premises in which high risk foods are handled to be registered by the Government. Registration is granted subject to the premises being fully compliant with our Food Hygiene Regulations.

All food premises are inspected by Environmental Health Officers to ensure that they comply with the Food Hygiene Regulations. The frequency of inspection is dependant on the risk categorisation of the premises. Premises in which high risk foods are sold are subjected to a more stringent inspection frequency than other premises. The inspection of premises is carried out to identify risks arising from –

- The activities carried out and the effectiveness of the food business own assessment and control of those risks
- Any contravention of the Food Hygiene Regulations and to seek to have them corrected.

Inspecting Officers discuss with the proprietor or representative all matters relating to hygiene systems and procedures.

6.5 FOOD HYGIENE TRAINING

Environmental Health Officers of the Agency deliver Food Safety training for persons employed in the catering, food retail, healthcare and service industries.

Every year several people in Gibraltar still suffer from the effects of food poisoning bacteria, with symptoms such as diarrhoea, nausea, vomiting and stomach cramps. Many of these people will have eaten food which has been contaminated by poor food hygiene practices during preparation, storage or cooking.

The importance of good food hygiene practices and procedures should not be underestimated. Employers have a legal obligation to comply with the Food Hygiene Regulations.

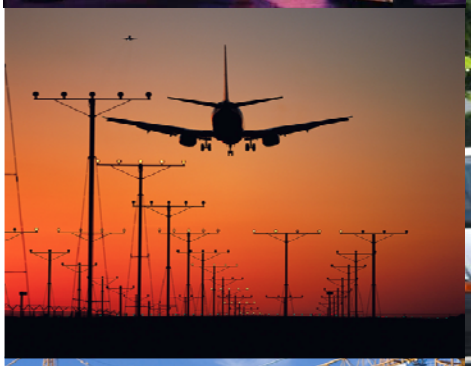
Training courses are accredited by the Chartered Institute of Environmental Health (CIEH) and all trainers are approved by the CIEH. Courses have been re-designed to be more relevant to specific business environments and are suitable for anyone working where food is prepared, handled or cooked.

Chapter 7:

Noise Pollution

Noise pollution, or environmental noise, can be defined as displeasing human, animal, or machine created sound that disrupts the activity or balance of human or animal life. The EU's Green paper on noise policy estimates that approximately 20% of the population suffer from unacceptable noise levels that cause sleep disturbance, annoyance and unacceptable health effects.

In Gibraltar, the main source of environmental noise is traffic, however, people also suffer from the effects of neighbourhood noise from construction activity or music from bars and pubs. This chapter deals with the issue of noise and how the Government is addressing it.



7.1 EUROPEAN UNION POLICY ON NOISE

Until the mid nineties the noise policy in Europe concentrated in the regulation of noise emitted from sources such as road traffic, aircraft and equipment used outdoors. It was recognized that these measures did not result in significant noise reductions and European Noise Policy was revised prominently focusing on noise exposure. Thus the European Commission Green Paper from 1996 defines as the basic aim of future noise policy that "no person should be exposed to noise levels which endanger health and quality of life". This Green Paper paved the way for the European Noise Directive.

The Directive therefore advocates and supports a noise management strategy that focuses on the development of criteria for maximum noise exposure, the policing of designated noise control zones and the endorsement of assessments to manage noise from certain sources. 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 Directive is applicable to major airports, railways, agglomerations over 250,000 persons and major roads in excess of over 6,000,000 vehicles passages per annum. Locally the Directive is only applicable to two of Gibraltar's major roads, namely, Winston Churchill Avenue and Queensway. Actions required by this legislation are the determination of exposure to environmental noise by mapping and the adoption of Noise Action Plans.

The Minister with responsibility for the Environment has constituted a Noise Action Core Steering Group to advise him on all issues concerning Environmental Noise and for adopting noise guidelines and recommending actions under this Plan.

The Noise Action Plan has been completed by the Environmental Agency and together with the noise mapping has been the subject of a public consultation exercise during December 2008 as required by the Directive. This is still available for public viewing in the archives of the Environmental Agency website at www.environmental-agency.gi.

7.2 NOISE COMPLAINTS

We are all affected at one time or another by neighbourhood noise. It could be noise coming from some activity in your neighbour's home, businesses, vehicles, machinery in the street or construction activities. It is always sensible to talk to the person or company responsible for the noise and explain that you are being affected before making a formal complaint. You may find that in most cases they are not aware that they are disturbing you. If however your informal approach to the person or

company producing the noise does not work you can complain officially to the Environmental Agency, the Royal Gibraltar Police or, if the noise emanates from a designated leisure area, the Chief Secretary of the Gibraltar Government. The powers to act against different sources of neighbourhood noise are divided between these three authorities. The Royal Gibraltar Police, for example, deals with noise arising from motorcycles, music from vehicles, and licensed premises. The Environmental Agency deals mainly with noise arising from industrial and mechanical sources such as air-conditioning, refrigeration plant, construction sites and in certain circumstances loud music. The Chief Secretary of the Government of Gibraltar deals with noise arising from entertainment premises licensed in designated leisure areas. You can complain by contacting the aforementioned departments. If you are not sure to which of these authorities you have to complain any of the three will assist you as to whom you have to direct your complaint.

7.2.1 What Action Can Be Taken?

The three authorities have powers to deal with noise under their jurisdiction in different manners, for example, the Royal Gibraltar Police have powers to report offenders, the Government's Chief Secretary has powers to impose conditions on licenses and the Environmental Agency has power to serve abatement notices, outside of leisure areas, to abate noise which is considered to be a nuisance.

Table 7.1 NOISE COMPLAINTS RECEIVED BY THE ENVIRONMENTAL AGENCY IN 2008

Nature of Complaint	Number of reports
Noisy establishments	**9**
Industrial noise	**8**
Shipping noise	**4**
Construction noise	**16**
Noisy neighbours	**10**
Dogs	**2**
Miscellaneous	**7**
Alarms	**2**

Total: 58

Chapter 8:

Increasing Public Awareness

Improved public awareness and education continue to be at the heart of Government's attempts to promote a healthier and more sustainable environment. Environmental education helps people to appreciate the intrinsic link between humans and our environment and in this way generates a sense of responsibility towards our planet.

The main event in the awareness raising programme was once again World Environment Day where local schools were able to demonstrate their knowledge of environmental issues through song and dance whilst local businesses, NGOs and government departments displayed their environmental goods and services at the Trade Fair.

8.1 ENVIRONMENTAL EDUCATION & PUBLIC AWARENESS

Education, including formal education and public awareness, is critical for promoting sustainable development and improving people's capacity to address environmental issues. While basic education provides the underpinning for any environmental education, the latter needs to be incorporated as an essential part of learning. Formal and non-formal education is critical for the achievement of environmental and ethical awareness.

In recognition of this fact, the Department of the Environment continues to work in close collaboration with the Department of Education and schools to deliver relevant environmental messages to children. This year's environmental programme focused on the theme of energy, both its production and consumption, and drove home the message that we all need to find ways to become more efficient and reduce our energy consumption.

A well educated public is a vital tool in the fight against climate change and environmental damage. The Government of Gibraltar continues to invest in public awareness initiatives such as the publication of this annual report, the publication and dissemination of newsletters and focused information campaigns. The aim is to provide the whole community with the opportunity to acquire the awareness, knowledge, skills and commitment needed to protect and improve our environment. It is hoped that this increased awareness will in turn create new environmentally-friendly behavioural patterns and also promote effective public participation in environmental and development decision making processes.

8.2 WORLD ENVIRONMENT DAY 2008

World Environment Day, commemorated each year on 5 June, is one of the principal vehicles through which the United Nations Environment Programme (UNEP) stimulates worldwide awareness of the environment and enhances political attention and action.

The World Environment Day slogan for 2008 was *Kick the Habit! Towards a Low Carbon Economy***.** Recognising that climate change is becoming the defining issue of our era, UNEP is asking countries, companies and communities to focus on greenhouse gas emissions and how to reduce them. The World Environment Day events around the globe highlighted resources and initiatives that promote low carbon economies and life-styles, such as improved energy efficiency, alternative energy sources, forest conservation and eco-friendly consumption.

The main international celebrations of World Environment Day 2008 were held in New Zealand.

In Gibraltar, the event was hosted at the Tercentenary Hall in order to allow parents to attend the event and spread the message more widely.

Children from local schools delivered their environmental messages via energetic and enthusiastic song and dance performances, clearly demonstrating the high level of awareness that exists among young people in Gibraltar.

At the same time as the school performances, the now traditional trade fair was being hosted in the foyer of the Tercentenary Hall. Local businesses, government departments and non-governmental organisations used this opportunity to display their environmental goods and services to the general public.