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1 Introduction

1.1 Background

AEA Energy & Environment, on behalf of the States of Jersey Public Health Services, has undertaken a further programme of air quality monitoring on the island of Jersey in 2007. This is the eleventh in a series of extensive annual monitoring programmes that began in 1997, and has since provided a long-term dataset of pollutant concentrations.

The pollutants measured were nitrogen dioxide (NO_2), and a range of hydrocarbon species (benzene, toluene, ethyl benzene and three xylene compounds). Average ambient concentrations were measured using passive diffusion tube samplers. NO_2 was measured at 24 sites on the island, using Palmes type diffusion tubes. Hydrocarbons were monitored using “BTEX” diffusion tubes at six sites.

This report presents the results obtained in the 2007 survey, and compares the data from Jersey with relevant air quality Limit Values, Objectives and guidelines, data from selected UK monitoring stations and previous years' monitoring programmes.

1.2 Objectives

This survey follows on from those in the years 1997 to 2006[1,2,3,4,5,6,7,8,9,10]. The objective, as in previous surveys, was to monitor at sites where pollutant concentrations were expected to be high, and compare these with background locations. The monitoring sites consisted of a mixture of urban and rural background sites, together with some locations where higher pollutant concentrations might be expected, such as roadside and kerbside sites, and some close to specific emission sources.

2 Details of Monitoring Programme

2.1 Pollutants Monitored

2.1.1 NO_2

A mixture of nitrogen dioxide (NO_2) and nitric oxide (NO) is emitted by combustion processes. This mixture of oxides of nitrogen is termed NO_x. NO is subsequently oxidised to NO_2 in the atmosphere. NO_2 is an irritant to the respiratory system, and can affect human health. Ambient concentrations of NO_2 are likely to be highest in the most built-up areas, especially where traffic is congested, or buildings either side of the street create a "canyon" effect, impeding the dispersion of vehicle emissions. The units used for NO_2 concentration in this report are microgrammes per cubic metre ($\mu g\ m^{-3}$). Some earlier reports in this series have used parts per billion (ppb): to convert to ppb to if required, the following relationship should be used:

1 $\mu g\ m^{-3}$ = 0.523 ppb for nitrogen dioxide at 293K (20°C) and 1013mb.

2.2 Hydrocarbons

There are many sources of hydrocarbon emissions. Methane, for example, is a naturally occurring gas, while xylene compounds are synthetic and used in many applications, for example as a solvent in paint. A range of hydrocarbons is found in vehicle fuel, and occur in vehicle emissions. In most urban areas, vehicle emissions would constitute the major source of hydrocarbons, in particular benzene. Also, there is the potential that they may be released to the air from facilities where fuels are stored or handled (such as petrol stations).

A wide range of hydrocarbons is emitted from both fuel storage and handling, and from fuel combustion in vehicles. It is not easy to measure all of these hydrocarbon species (particularly the most volatile) without expensive continuous monitoring systems. However, there are four moderately volatile species, all of which may be associated with fuels and vehicle emissions, which are easy to monitor using passive samplers. These are benzene, toluene, ethyl benzene and xylene. They are not the largest constituents of petrol emissions, but due to their moderate volatility they can be monitored by diffusion tubes. Diffusion tubes are available for monitoring this group of organic compounds, and are known as "BTEX" tubes (BTEX being an acronym for the compounds measured).

(i) Benzene
Of the organic compounds measured in this study, benzene is the one of most concern, as it is a known human carcinogen; long-term exposure can cause leukaemia. It is found in petrol and other liquid fuels, in small concentrations. In urban areas, the major source is vehicle emissions. In the UK, annual mean benzene concentrations in ambient air are typically less than 3 $\mu g\ m^{-3}$. In this report, concentrations of benzene are expressed in microgrammes per cubic metre ($\mu g\ m^{-3}$). Some earlier reports in the series used parts per billion (ppb): to convert to ppb to if necessary, the following relationship should be used:

1 $\mu g\ m^{-3}$ = 0.307 ppb for benzene at 293K (20°C) and 1013mb.
(only applicable to benzene).

(ii) Toluene
Toluene is also found in petrol in small concentrations. Its primary use is as a solvent in paints and inks; it is also a constituent of tobacco smoke. It has been found to adversely affect human health. Typical ambient concentrations range from trace to 3.8 $\mu g\ m^{-3}$ in rural areas, up to 204 $\mu g\ m^{-3}$ in urban areas, and higher near industrial sources. There are no recommended limits for ambient toluene

concentrations, although there are occupational limits for workplace exposure[11]. The best estimate for the odour threshold of toluene has been reported[12] as 0.16ppm (613μg m^{-3}). In this report, concentrations are expressed in micrograms per cubic metre (μg m^{-3}). Some earlier reports in the series used parts per billion (ppb): to convert to ppb to if necessary, the following relationship should be used:

1 μg m^{-3} = 0.261 ppb for toluene at 293K (20°C) and 1013mb.
(only applicable to toluene).

(iii)ethyl benzene
Again, there are no limits for ambient concentration of ethyl benzene, and although there are occupational limits relating to workplace exposure[11], as discussed in previous reports in this series, they are several orders of magnitude higher than typical outdoor ambient concentrations.

(iv)xylene
Xylene exists in ortho (o), para (p) and meta (m) isomers. Occupational limits relating to workplace exposure, are 100 ppm over 8 hours, and 150 ppm over 10 minutes. Xylene, like toluene, can cause odour nuisance near processes (such as vehicle paint spraying), which emit it. Its odour threshold varies according to the isomer, but the best estimate for the odour threshold of mixed xylenes is 0.016ppm (16 ppb or 70 μg m^{-3})[12].

In this report, concentrations of ethylbenzene and xylenes are expressed in micrograms per cubic metre (μg m^{-3}). Some earlier reports in this series used parts per billion (ppb): to convert to ppb to if required, the following relationship should be used:

1 μg m^{-3} = 0.226 ppb for ethyl benzene or xylenes at 293K (20°C) and 1013mb.
(applicable to ethylbenzene, m-, p- and o-xylene).

2.3 Air Quality Limit Values And Objectives

2.3.1 World Health Organisation

In 2000, the World Health Organisation published revised air quality guidelines[13] for pollutants including NO_2. These were set using currently available scientific evidence on the effects of air pollutants on health and vegetation. The WHO guidelines are advisory only, and do not carry any mandatory status. They are summarised in Appendix 1. There are WHO guidelines for ambient NO_2 concentrations (hourly and annual means) but not benzene.

2.3.2 European Community

Throughout Europe, ambient air quality is regulated by EC Directives. These set Limit Values, which are mandatory, and other requirements for the protection of human health and ecosystems. EC Daughter Directives covering pollutants including NO_2 and benzene [14,15] have been published in recent years. The Limit Values are summarised in Appendix 1. The States of Jersey have agreed to meet the EU health limits.

2.3.3 UK Air Quality Strategy

The UK Air Quality Strategy (AQS) contains standards and objectives for a range of pollutants including NO_2 and benzene[16]. These are also summarised in Appendix 1. Only those Objectives relating to the whole UK (as opposed to specifically England, Wales, etc.) are applicable to Jersey, and the AQS does not at present have mandatory status in the States of Jersey.

2.4 Methodologies

The survey was carried out using diffusion tubes for NO_2 and BTEX. These are "passive" samplers, i.e. they work by absorbing the pollutants direct from the surrounding air and need no power supply.

Palmes-type diffusion tubes were used for NO_2. These consist of a small plastic tube, approximately 7 cm long. During sampling, one end is open and the other closed. The closed end contains an absorbent for the gaseous species to be monitored, in this case NO_2. The tube is mounted vertically with the open end at the bottom. Ambient NO_2 diffuses up the tube during exposure, and is absorbed as nitrite. The average ambient pollutant concentration for the exposure period is calculated from the amount of pollutant absorbed.

BTEX diffusion tubes are different in appearance to NO_2 tubes. They are longer, thinner, and made of metal rather than plastic. These tubes are fitted at both ends with brass Swagelok fittings. A separate "diffusion cap" is supplied. Immediately before exposure, the Swagelok end fitting is replaced with the diffusion cap. The cap is removed after exposure, and is replaced with the Swagelok fitting. BTEX diffusion tubes are very sensitive to interference by solvents.

As of February 2007, diffusion tubes were prepared by Gradko International Ltd for AEA Energy & Environment. They were supplied to local Technical Officers of Jersey's Public Health Services, who carried out the tube changing. The tubes were supplied in sealed condition prior to exposure. The tubes were exposed at the sites for a set period of time. After exposure, the tubes were again sealed and returned to Gradko for analysis. The year was divided into twelve exposure periods approximating to calendar months. The duration of the exposure periods varied between four and five weeks.

Diffusion tubes are an indicative technique, and the results therefore have a greater uncertainty than those of more sophisticated automatic methods. The laboratory states that the margins of uncertainty on the diffusion tube analyses are typically $\pm$ 3.5% for NO_2 and $\pm$ 12% for BTEX hydrocarbons. However, uncertainties arising from the exposure phase also contribute to the overall uncertainty: it is usually estimated that the overall uncertainty on diffusion tube measurements is approximately $\pm$ 25% for NO_2 and $\pm$ 25% for BTEX hydrocarbons. The limits of detection vary from month to month, but are typically 0.4 μg m^{-3} for NO_2 and 0.2 μg m^{-3} for BTEX. It should be noted that tube results that are less than 10 x the limit of detection will have a higher level of uncertainty associated with them.

The Local Air Quality Management Technical Guidance LAQM.TG(03)[17] states that when using diffusion tubes for indicative NO_2 monitoring, correction should be made where applicable for any systematic bias (i.e. over-read or under-read compared to the automatic chemiluminescent technique, which is the reference method for NO_2). The bias adjustment factor applied to the annual mean diffusion tube measurements in this survey was **0.87**. This is based on 10 studies carried out by UK Local Authorities, using tubes of the same type and from the same supplier. It was obtained from a spreadsheet database maintained by Air Quality Consultants, available on the Web at http://www.uwe.ac.uk/aqm/review/diffusiontube290208.xls . (This applies only to NO_2 diffusion tubes, not BTEX tubes, as the latter are not affected by the same sources of interference). ***The NO_2 diffusion tube results in this report are uncorrected except where clearly specified.***

2.5 Monitoring Sites

Monitoring of NO_2 was carried out at 24 sites, the majority of which have been in use since 2000. Three new monitoring sites were started up during the year: a roadside site at Liberation Station, an urban background site at Seaton Place, and another roadside site at Central Market (Halkett Place, St Helier). At the Central Market site, diffusion tubes are exposed in triplicate. It is also co-located with the newly installed automatic monitoring site (data will be available from the latter from January 2008).

Table 1. NO_2 Monitoring Sites in Jersey

Site Name	Grid Reference	Description
Le Bas Centre	658 489	Urban Background
Mont Felard	629 501	Residential background, to SW of waste incinerator and 20m from busy road
Les Quennevais	579 496	Residential Background
Rue des Raisies	689 529	Rural Background
First Tower	636 497	Kerbside on major road
Weighbridge	651 483	Roadside at bus station near centre of St Helier
Langley Park	660 501	Residential background
Georgetown	661 480	Kerbside on major road
Clos St Andre	638 499	Residential area near Bellozanne Valley refuse Incinerator. Background
Beaumont	597 516	Kerbside
The Parade *	648 489	Roadside site at General Hospital
Maufant	683 512	Background site in Maufant village
Jane Sandeman	652 494	Urban background on housing estate
Saville Street	648 492	Background
Broad Street	652 486	Urban background
Beresford Street	653 486	Urban background
La Pouquelaye	654 496	Kerbside on St Helier ring road.
Union Street	653 486	Kerbside in St Helier – corner of Union St. & New St.
New Street	653 485	Kerbside in St Helier
Havre des Pas		Kerbside, beside main A4 in/out of St Helier
Commercial Buildings		Kerbside, Commercial Buildings, St Helier
Seaton Place	648 487	Kerbside to assess complaint re air quality
Liberation Station	652 485	Kerbside oppsite entrance to new bus station
Central Market	653 486	Halkett Pl., St Helier – co-located with automatic site.

*The Parade site was moved to its current roadside location at the end of 2000.

Kerbside: less than 1m from kerb of a busy road.
Roadside: 1-5m from kerb of a busy road.
Background: > 50m from the kerb of any major road.

Note: all grid references are from OS 1:25000 Leisure Map of Jersey and are given to the nearest 100m.

Figure 1a. Site Locations Outside St Helier

Figure 1b. Sites in St Helier town

Key:

1	Le Bas Centre	NO_2, BTEX
2	Mont Felard	NO_2
3	Les Quennevais	NO_2
4	Rue Des Raisies	NO_2
5	First Tower	NO_2
6	Weighbridge	NO_2
7	Langley Park	NO_2
8	Georgetown	NO_2
9	Clos St Andre	NO_2, BTEX
10	Union Street	NO_2
11	New Street	NO_2
12	Beaumont	NO_2
13	The Parade	NO_2
14	Maufant	NO_2
15	Jane Sandeman	NO_2
16	Saville Street	NO_2
17	Broad Street	NO_2
18	Beresford Street	NO_2, BTEX
19	La Pouquelaye	NO_2
20	Havre Des Pas	NO_2
21	Commercial Buildings	NO_2
22	Springfield Garage	BTEX
23	Airport	BTEX
24	Handsford Lane	BTEX
25	Central Market	NO_2, Auto
26	Seaton Place	NO_2
27	Liberation Station	NO_2

BTEX hydrocarbons were monitored at six sites during 2007. These are shown in Table 2. The aim was to investigate sites likely to be affected by different emission sources, and compare these with background sites. The sites at Beresford Street and Le Bas Centre are intended to monitor hydrocarbon concentrations at an urban roadside and urban background location respectively.

The Handsford Lane site is close to a paint spraying process – a potential source of hydrocarbon emissions, especially toluene and xylenes. This site replaced a similar site in Elizabeth Lane, which ceased operation when the process closed down in October 2003.

The Springfield Garage site is located by a fuel filling station, a potential sources of hydrocarbon emissions including benzene. In December 2003, the fuel supplier began using vapour recovery when filling the tanks; it was anticipated that subsequent results for this site would show a reduction in ambient concentrations of hydrocarbons.

The Clos St Andre site is located near the Bellozane Valley waste incinerator, and the Airport site is located at Jersey Airport, overlooking the airfield.

Table 2. BTEX Monitoring sites

Site Name	Grid Reference	Description
Beresford Street	653 486	Urban Roadside
Le Bas Centre	658 489	Urban Background
Springfield Garage	656 495	Urban background near fuel filling station
Clos St Andre	638 499	Residential area near Bellozanne Valley refuse incinerator.
Airport	587 509	Jersey Airport, overlooking airfield
Handsford Lane	633 499	Urban background near a paint spraying process.

2.6 Calendar of Exposure Periods

The calendar of exposure periods used for the NO_2 and BTEX diffusion tubes is shown below. They were intended to approximate to calendar months.

Month	*Start Date*	*End Date*
January	03-Jan-07	02-Feb-07
February	02-Feb-07	28-Feb-07
March	28-Feb-07	04-Apr-07
April	04-Apr-07	02-May-07
May	02-May-07	30-May-07
June	30-May-07	05-Jul-07
July	05-Jul-07	01-Aug-07
August	01-Aug-07	29-Aug-07
September	29-Aug-07	03-Oct-07
October	03-Oct-07	31-Oct-07
November	31-Oct-07	28-Nov-07
December	28-Nov-07	02-Jan-08

3 Results and Discussion

3.1 Nitrogen Dioxide

3.1.1 Summary of NO_2 Results

NO_2 diffusion tube results are presented in Table 3, and Figures 2 (kerbside and roadside sites) and 3 (background sites). Individual monthly mean NO_2 results ranged from 4.0 μg m^{-3} (in July at the residential background Rue de Raisies site), to 55.2 μg m^{-3} (in April at the kerbside Commercial Buildings site).

There were three occasions when no result was obtained because the tube went missing from the site during the exposure period. Evidence of a barbecue fire was found at Maufant after the July exposure period, but this does not appear to have affected the result.

Annual mean NO_2 concentrations ranged from 6.8 μg m^{-3} (at the rural Rue des Raisies site) to 41.4 μg m^{-3} at the Weighbridge site. The latter is a location in the centre of St Helier which is used as a central stopping point for buses.

3.1.2 Comparison with NO_2 Guidelines, Limit Values, and Objectives

Limit Values, AQS Objectives and WHO guidelines for NO_2 are shown in Appendix 1. These are based on the hourly and annual means. Because of the long sampling period of diffusion tubes, it is only possible to compare the results from this study against limits relating to the annual mean.

The WHO non-mandatory guideline[13] for NO_2 is that the annual mean should not exceed 40 μg m^{-3}. The EC 1st Daughter Directive[14] contains Limit Values for NO_2 as follows:

- 200 μg m^{-3} as an hourly mean, not to be exceeded more than 18 times per calendar year. To be achieved by 1st January 2010.
- 40 μg m^{-3} as an annual mean, for protection of human health. To be achieved by 1st January 2010.
- There is also a limit for annual mean total oxides of nitrogen (NO_x), of 30 μg m^{-3}, for protection of vegetation (relevant in rural areas).

The UK Air Quality Strategy[15] contains Objectives for NO_2, which are very similar to the EC Daughter Directive limits above: the only difference being that they had to be achieved by 31st December 2005.

Annual mean NO_2 exceeded 40μg m^{-3} at just one site in 2007: Weighbridge. This urban kerbside site in the centre of St Helier has recorded relatively high annual mean NO_2 concentrations in previous years of this survey.

However, as explained in Section 2.4, it is necessary to take into account any systematic bias when comparing annual mean NO_2 concentrations based on diffusion tube results with the AQS Objective[17]. As explained in section 2.4, a bias adjustment factor of 0.87 was obtained for Gradko International's NO_2 diffusion tubes, based upon the combined results of 10 co-location studies carried out by UK Local Authorities using tubes of the same type and from the same supplier (see http://www.uwe.ac.uk/aqm/review/diffusiontube290208.xls).

Applying this factor reduces the annual means at all sites to below the AQS Objective of 40μg m^{-3}. The highest annual mean (at Weighbridge) is reduced from 41.4 μg m^{-3} (unadjusted) to 36.0 μg m^{-3} (adjusted). All Jersey sites therefore met the AQS Objective for annual mean NO_2.

The 30μg m^{-3} limit for protection of vegetation is only applicable at the one rural background site, Rue des Raisies; the annual mean NO_2 concentration at this site was well within the limit.

Table 3. NO_2 Diffusion Tube Results 2007, Jersey. Concentrations in $\mu g\ m^{-3}$.

Site	Jan-07	Feb-07	Mar-07	Apr-07	May-07	Jun-07	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	Average	*Bias adjusted*
First Tower (K)	34.8	32.7	27.9	40.8	31.7	28.4	34.6	33.6	32.3	35.5	38.7	30.5	33.5	*29.1*
Weighbridge (K)	48.2	31.7	31.7	45.2	44.4	46.5	53.3	45.7	41.6	33.8	44.2	30.4	**41.4**	*36.0*
Georgetown (K)	33.7	34.5	27.5	52.5	35.8	33.0	34.1	32.1	34.1	48.4	42.5	40.0	37.4	*32.5*
Beaumont (K)	41.7	33.8	33.9	44.4	43.0	40.0	41.2	TM	34.7	37.1	49.0	36.7	39.6	*34.4*
The Parade (K)	30.8	21.9	28.2	33.4	26.8	24.8	26.5	26.7	22.8	30.7	28.4	33.4	27.9	*24.2*
Broad Street (K)	38.0	32.4	30.4	34.3	36.3	39.8	42.7	32.2	26.0	TM	40.3	36.9	35.4	*30.8*
La Pouquelaye (K)	37.7	31.3	32.5	43.3	36.5	31.9	35.8	33.4	29.6	40.7	42.8	35.3	35.9	*31.2*
Havre des Pas (K)	22.3	20.3	20.7	32.6	18.4	18.5	21.0	20.7	20.3	25.4	21.0	21.3	21.9	*19.0*
Commercial Buildings (K)	33.2	26.9	36.0	55.2	33.6	21.7	26.5	35.5	36.7	43.9	42.6	24.1	34.7	*30.2*
New Street (R)	26.3	17.2	23.4	29.0	22.2	18.1	20.9	20.1	29.6	32.8	35.4	27.8	25.2	*22.0*
Union Street (R)	39.5	31.7	30.7	35.4	31.5	34.4	38.2	30.8	18.3	25.7	32.7	36.6	32.1	*27.9*
Central Market (avg. of 3 tubes) (R)		28.5	33.7	42.1	36.0	33.7	33.9	32.8	27.6	36.6	39.3	33.2	34.3	*29.8*
Liberation Stn (R)										40.2	42.1	33.2	38.5	*33.5*
Le Bas Centre (UB)	26.3	25.3	23.0	30.9	18.1	21.6	19.5	19.4	20.9	24.7	26.9	23.9	23.4	*20.3*
Seaton Place (UB)						18.3	21.7	23.0	20.9	28.2	30.8	29.2	24.6	*21.4*
Jane Sandeman (UB)	14.4	15.1	11.7	17.3	11.2	10.9	11.1	11.1	12.2	14.3	18.5	18.9	13.9	*12.1*
Saville Street (UB)	27.0	24.9	25.7	32.5	24.1	18.8	22.0	27.6	22.1	31.6	34.9	24.4	26.3	*22.9*
Beresford St (UB)	32.2	29.5	27.8	TM	27.4	28.4	27.3	25.9	34.4	35.9	34.4	32.1	30.5	*26.5*
Mont Felard (UB)	22.9	22.5	22.6	38.7	27.0	22.4	24.6	26.9	24.0	27.8	30.2	25.0	26.2	*22.8*
Les Quennevais (RB)	10.8	12.9	8.6	15.6	8.3	7.1	6.4	8.5	8.7	12.6	9.8	14.7	10.3	*9.0*
Langley Park (RB)	16.8	14.8	14.8	20.0	13.3	10.1	11.2	11.8	14.7	16.6	17.5	20.0	15.1	*13.2*
Clos St.Andre (RB)	15.8	19.8	14.1	21.1	11.0	12.2	12.7	11.3	14.6	16.0	15.6	20.0	15.4	*13.4*
Maufant (RB)	9.1	9.9	7.8	8.1	7.9	4.9	6.7	10.8	16.3	12.7	12.8	16.2	10.3	*8.9*
Rue Des Raisies (Rural)	8.3	7.4	6.3	10.9	5.4	4.3	4.0	5.7	5.4	7.4	6.3	9.8	6.8	*5.9*

K = Kerbside, R = Roadside, UB = Urban Background, RB = Residential Background, Rural = Rural Background. TM = tube missing, bdl = below detection limit.
*Annual mean concentrations greater than 40$\mu g\ m^{-3}$ highlighted in **bold**.*

Figure 2. Comparison of Annual Nitrogen Dioxide Concentrations at All Jersey Sites, 2007 (Bias Adjustment Factor Applied)

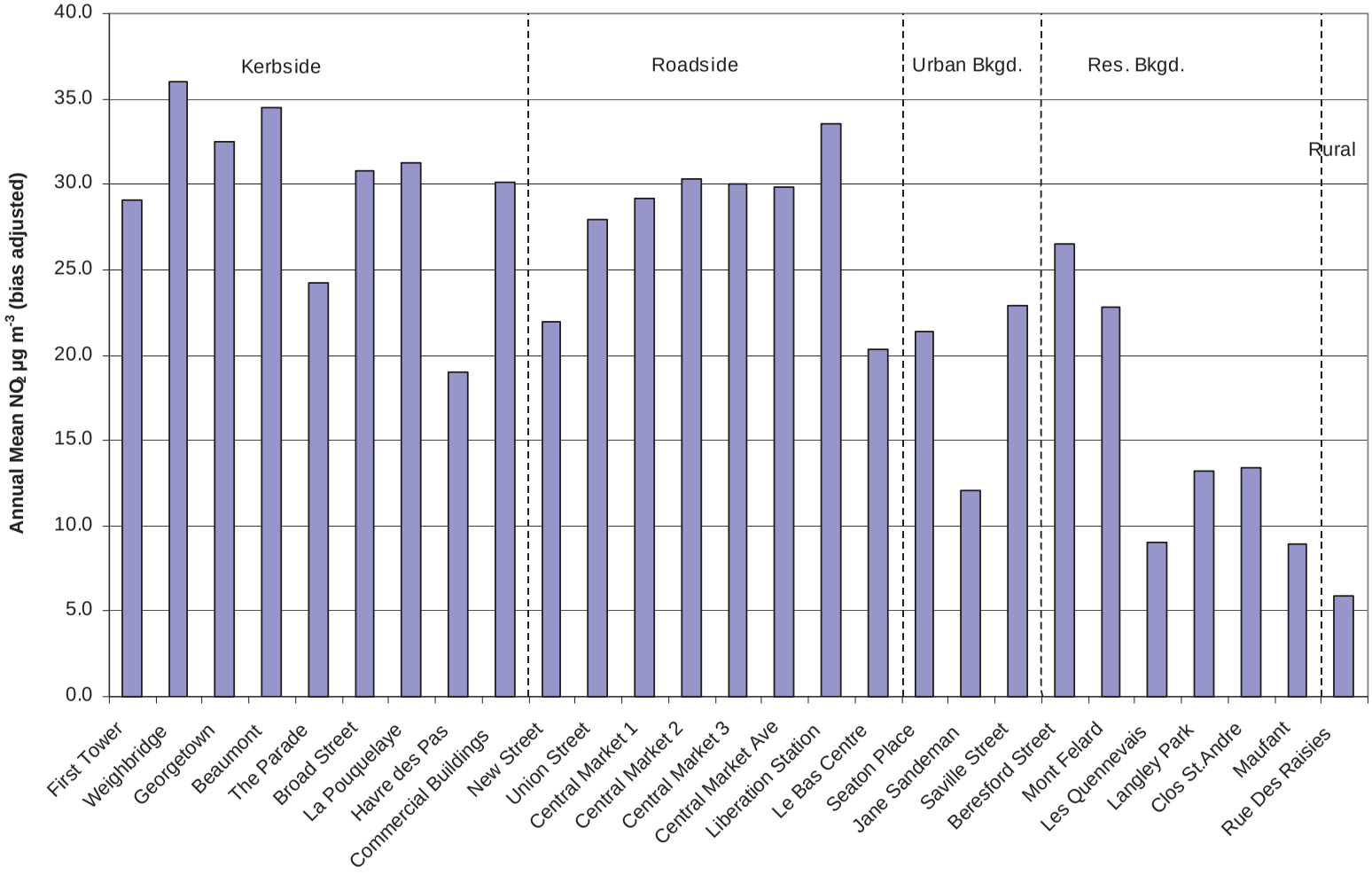
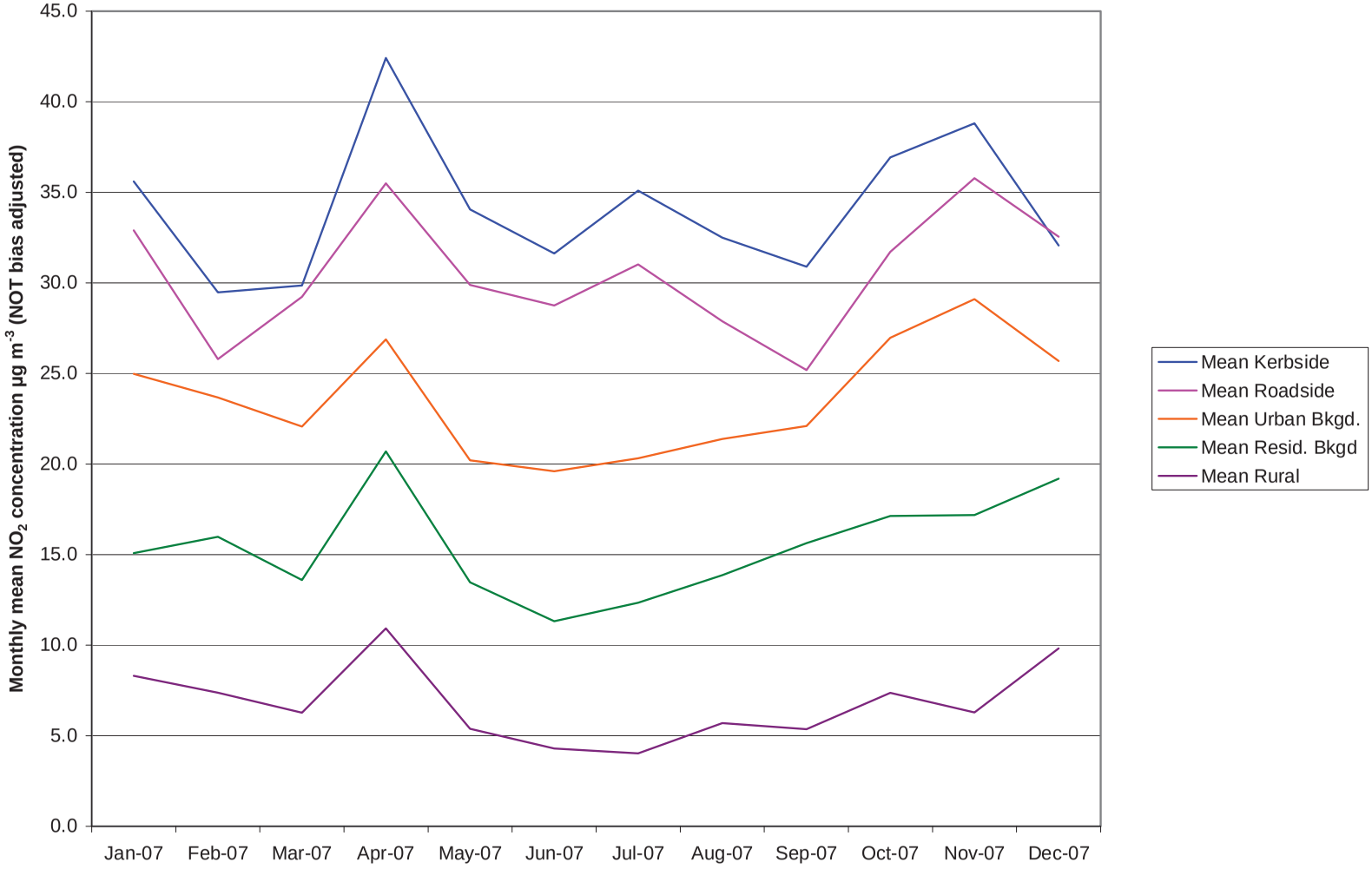


Figure 3. Seasonal Variation in Monthly Mean NO2 Concentration, Averaged for Each Site Type (NOT bias-adjusted).



3.1.3 Seasonal Variation in NO_2 Concentrations

Figure 3 shows how the monthly concentration varied throughout the year, for each of the various site types (kerbside, roadside, urban background, urban residential and rural sites). All site types showed a noticeable peak in nitrogen dioxide during April 2007: apart from this, there were no pronounced seasonal patterns. At urban, residential and rural background sites, NO_2 concentrations were slightly higher during winter months when emissions from heating etc. are typically greater.

3.1.4 Precision of Diffusion Tubes

Diffusion tubes were exposed in triplicate at the new Central Market site: this allows an investigation of diffusion tube precision. Precision may be expressed in terms of the coefficient of variation (CV) of the three replicate measurements. This parameter, also known as the relative standard deviation, is the standard deviation expressed as a percentage of the mean.

For diffusion tubes exposed in triplicate, the CV is usually expected to be within 10% on average. (This is based purely on experience of what a competent laboratory is typically able to achieve, although it can be affected by conditions at the site, or by bad handling of the tubes by the site operator). At Central Market, the CV of tube triplets ranged from 1.4% to 18.1%, with a mean of 6.4%.

The CV was within 10% on all but one occasion. This occasion was October 2007, when the three results were more widely spread than usual, leading to a CV of 18%. It is not uncommon for diffusion tube precision to occasionally be poor; this is not a cause for concern as the precision over the rest of the year was consistently good.

3.1.5 Comparison with UK NO_2 data

Table 4 shows annual mean NO_2 concentrations measured at a selection of UK air quality monitoring stations using automatic (chemiluminescent) NO_2 analysers. The automatic data have been fully ratified. The sites used for comparison are as follows:

- Exeter Roadside – a roadside site in the centre of Exeter, Devon.
- Brighton Roadside – a roadside site in the coastal city of Brighton, Sussex.
- Brighton Preston Park – an urban background site in Brighton.
- Southend on Sea – an urban background site in the coastal town of Southend, Essex.
- Lullington Heath - a rural site on the South Coast of England near the town of Eastbourne.
- Harwell - a rural site in the south of England, within 10km of a power station.

Table 4. Comparison of NO_2 in Jersey with UK Automatic Sites

Site	2007 Annual average NO_2, $\mu g\ m^{-3}$
Exeter Roadside	39
Brighton Roadside	41
Brighton Preston Park	22
Southend on Sea	25
Lullington Heath	10
Harwell	12

The bias adjusted annual mean NO_2 concentrations measured at the kerbside and roadside sites in Jersey ranged from 19 to 36 $\mu g\ m^{-3}$. The annual means at Exeter Roadside and Brighton Roadside were at the upper end of this range. The Jersey urban background sites had (bias adjusted) annual mean NO_2 concentrations ranging from 12 $\mu g\ m^{-3}$ to 27 $\mu g\ m^{-3}$; the urban background sites in Southend and Brighton were therefore towards the upper end of this range. Residential background sites well outside Jersey's larger towns (e.g. Les Quennevais, Clos St Andre, Maufant, with the exception of Mont Felard) had bias-adjusted annual mean NO_2 ranging from 9 $\mu g\ m^{-3}$ to 13 $\mu g\ m^{-3}$, and thus were more comparable with rural sites such as Lullington Heath and Harwell. (Mont Felard, although designated residential background, had an annual mean more comparable with a coastal urban background site and has been redesignated as an urban background location). The bias-

adjusted annual mean of 5.9 μg m^{-3} at the Jersey rural background site, Rue des Raisies, as in previous years, was considerably lower than that measured at either Harwell or Lullington Heath.

3.1.6 Comparison with Previous Years' Nitrogen Dioxide Results

Annual mean NO_2 concentrations for 2007, at the majority of sites, were comparable with previous year's results. With a few exceptions they were predominantly lower than last year. Some degree of fluctuation in annual mean concentrations is expected, due to meteorology.

Long-term trends were also investigated. The majority of the NO_2 monitoring sites in this survey have been in operation since 2000. However, the survey includes three longer-running sites, which were part of the former UK Nitrogen Dioxide Network and have been in operation since 1993. These are Beaumont (kerbside), Jane Sandeman Road (urban residential) and Maufant (residential background, rural location).

Table 5 and Figure 4 show annual mean NO_2 concentrations for all sites in the kerbside and roadside, urban background and residential background categories. Also shown are annual means from 1993 onwards for the three long-running sites. ***These data are not adjusted for diffusion tube bias; prior to 2002 there was no reliable information on which to carry out bias adjustment, so for consistency, unadjusted data are used in this section.***

Of the three long-running Jersey sites, only the residential background Jane Sandeman road site shows a small but consistent downward trend. In the case of the Maufant site, NO_2 concentrations are lower than they were in the early 1990s, but there is no clear trend in recent years. Nor is there any clear trend for the kerbside Beaumont site.

The average NO_2 concentration for all roadside and kerbside sites appears to show a small but consistent downward trend since 2000, with a particularly marked reduction since 2003 (which was a notably high year). Using Theil's non-parametric analysis, a significant downward trend has been confirmed in the annual mean NO_2 concentration, averaged over all Jersey's kerbside and roadside sites, over the past eight years. It is sites of this type which have in previous years been identified as at risk of exceeding the EC annual mean Limit Value of 40 μg m^{-3}, so any trends at these sites is of particular interest. However, it shold be noted that several of them remain close to the Limit Value.

There is no clear trend in the mean of all urban background sites, or all residential background sites. As observed in previous reports in this series, this means that sites which are currently at risk of exceeding the Limit Value will remain so for the foreseeable future. However, as all the urban background, urban residential and rural sites are well below the EC Limit Value of 40 μg m^{-3}, the fact that NO_2 concentrations at these sites are stable is not a cause for great concern.

Figure 4. Trends in Annual Mean NO_2 Concentrations (not corrected for diffusion tube bias).

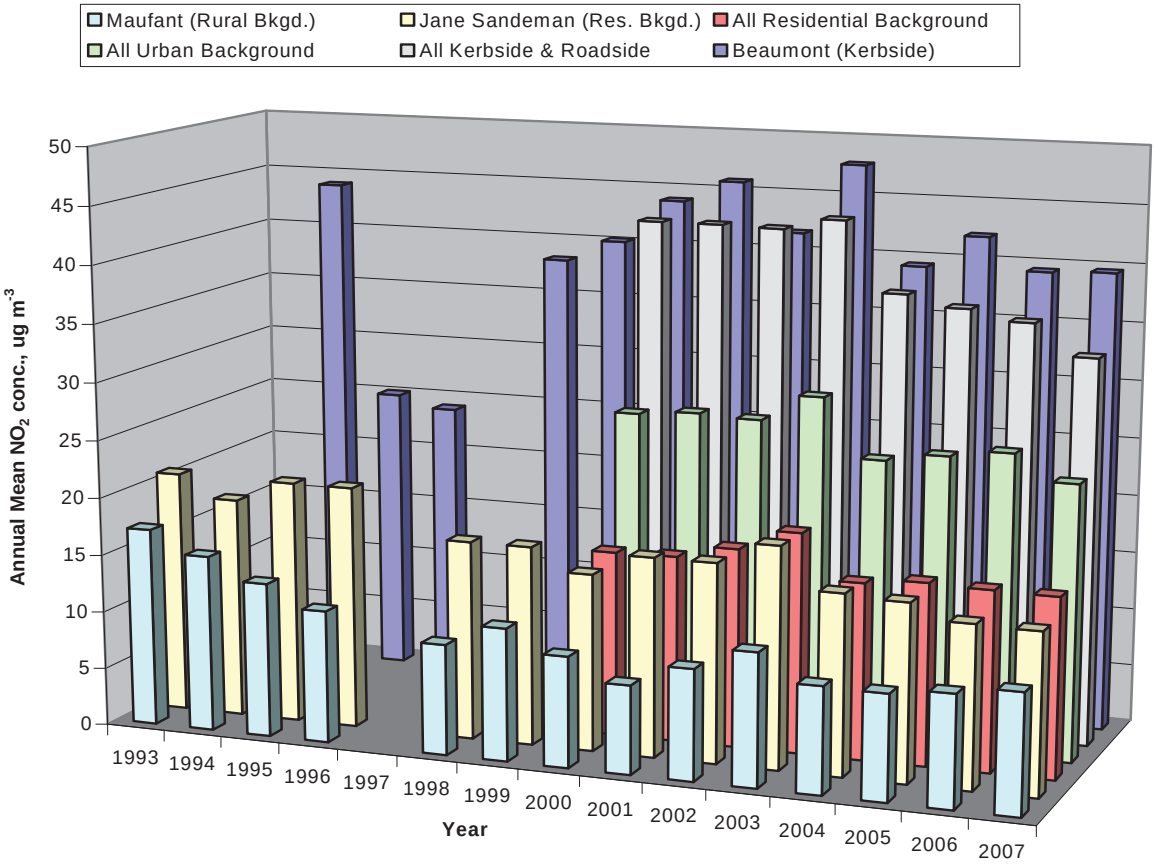


Table 5. Annual mean NO_2 concentrations, μg m^{-3} (not bias adjusted)

Site	Beaumont (Kerbside)	Jane Sandeman (Res. Bkgd.)	Maufant (Rural Bkgd.)	Mean All Kerbside & Roadside	Mean All Urban Background	Mean All Residential Background
1993		21	17	-	-	-
1994	44	19	15	-	-	-
1995	25	21	13	-	-	-
1996	24	21	11	-	-	-
1997	-	-	-	-	-	-
1998	38	17	10	-	-	-
1999	40	17	11	-	-	-
2000	44	15	10	43	27	16
2001	46	17	8	43	27	16
2002	42	17	10	43	27	17
2003	48	19	11	44	30	19
2004	39	16	9	38	25	15
2005	42	15	9	37	25	16
2006	39	14	10	36	26	16
2007	40	14	10	33	24	15

3.2 Hydrocarbons

Results of the hydrocarbon survey for the six sites are shown in Appendix 2, Tables A2.1 to A2.6 respectively. Graphical representations are shown in Figures 5 to 10.

A summary of annual average hydrocarbon concentrations is shown in Table 6. Some measurements, particularly at the Airport site, were below the detection limit. By convention, when calculating annual averages and plotting graphs, such results are assumed to be half the detection limit.

Table 6. Summary of Average Hydrocarbon Concentrations, Jersey, 2007

Site	Benzene, $\mu g\ m^{-3}$	Toluene, $\mu g\ m^{-3}$	Ethyl Benzene, $\mu g\ m^{-3}$	m+p Xylene, $\mu g\ m^{-3}$	o Xylene, $\mu g\ m^{-3}$
Beresford Street	1.7	10.4	1.7	4.4	1.8
Le Bas Centre	1.5	6.5	1.3	3.2	1.3
Handsford Lane *(paint spraying)*	1.1	6.7	2.2	6.4	2.2
Springfield Garage *(petrol station)*	4.3	29.5	4.0	11.9	4.4
Clos St Andre	0.8	2.9	0.8	1.8	1.2
Airport	0.8	3.4	0.5	1.0	0.4

Not all sites achieved full data capture for hydrocarbons in 2007. The following losses of data occurred:

(i) Beresford Street: the April BTEX tube went missing from the site, and the November tube was returned without its cap, thus invalidating the result.
(ii) Le Bas Centre: the August tube was returned to the laboratory without its cap.
(iii) Springfield Garage: the June and August tubes were returned to the laboratory without caps.
(iv) Clos St Andre: the June tube was returned without its cap.
(v) Airport: the June, August and November tubes were returned without their caps.

The majority of lost data was due to not replacing the caps tightly enough before returning the tubes for analysis. The tube changing procedure has been updated, which should prevent future recurrence.

In addition, the following data anomalies occurred:

1. the reported results for Handsford Lane for November were very low, while the travel blank results were unusually high. It appeared from the exposure record sheet that the blank tube had been exposed instead of the intended tube at this site. (This error is not unlikely, as the ID numbers of the tubes differed by just one digit.) We have therefore assumed this is the case.
2. Similarly, low results were also obtained for September at the same site. These have been rejected as the tube appeared unexposed, and in this case there was no evidence that any tubes had been mixed up.
3. An unusually high result was obtained for o-xylene in March, at Clos St Andre. This is inconsistent with the concentrations of other hydrocarbon species measured by the same tube. The most likely explanation is tube contamination, but in the absence of any evidence of this, the value has not been rejected

The Springfield Garage monitoring site continues to record the highest annual mean concentrations of all five BTEX compounds, as it typically has in previous years. The Handsford Lane site (near a paint spraying process) has in previous years also measured slightly higher levels of toluene, ethylbenzene and xylenes than most of the other sites. The Airport site, which is in rural surroundings, recorded the lowest annual mean concentrations of most of the BTEX hydrocarbons.

Benzene concentrations at Handsford Lane were no higher than those at Beresford Street or Le Bas; the nearby paint spraying process is not a significant source of benzene.

Figure 5. Monthly mean hydrocarbon concentrations at Beresford Street, 2007

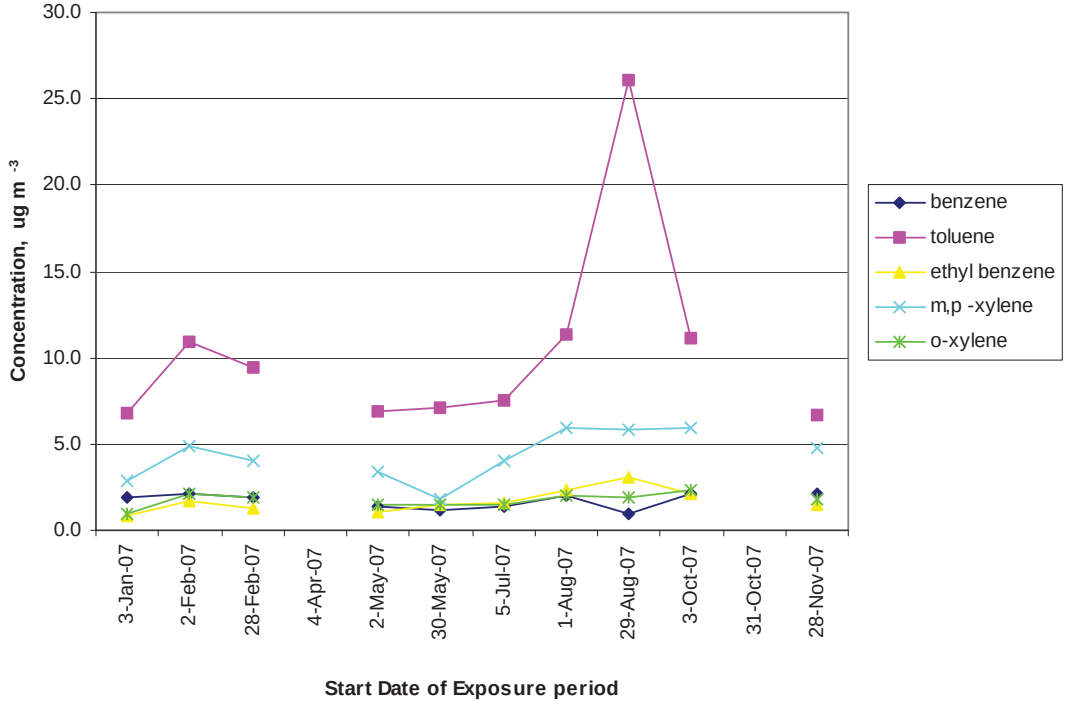


Figure 6. Monthly mean hydrocarbon concentrations at Le Bas Centre, 2007

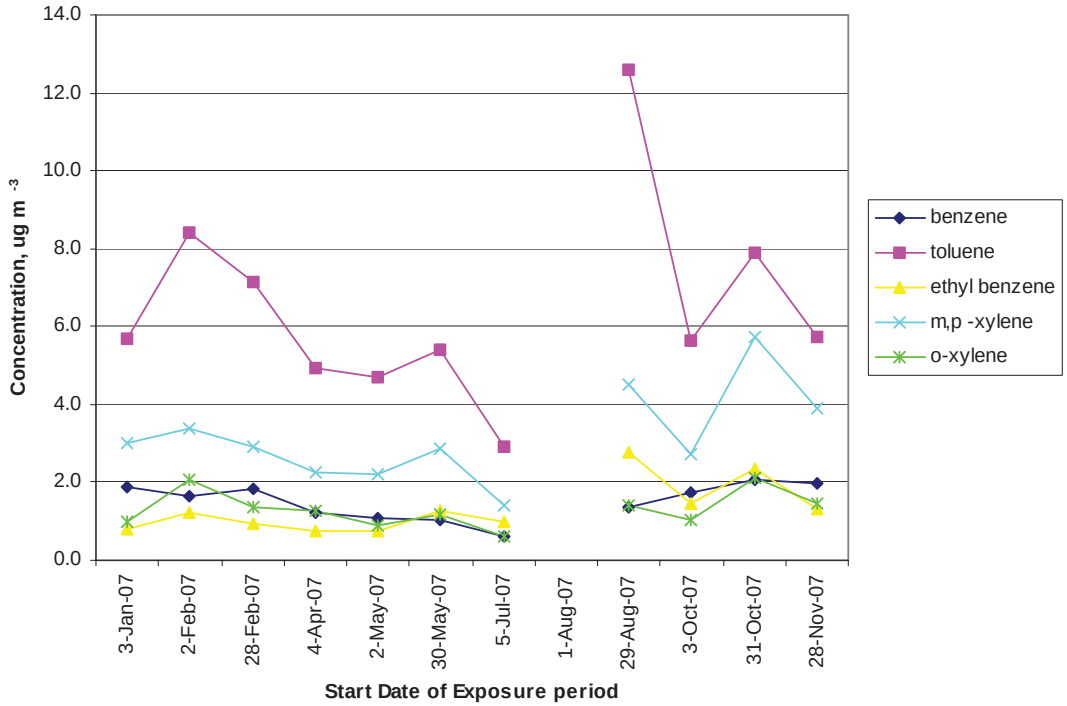


Figure 7. Monthly mean hydrocarbon concentrations at Handsford Lane, 2007

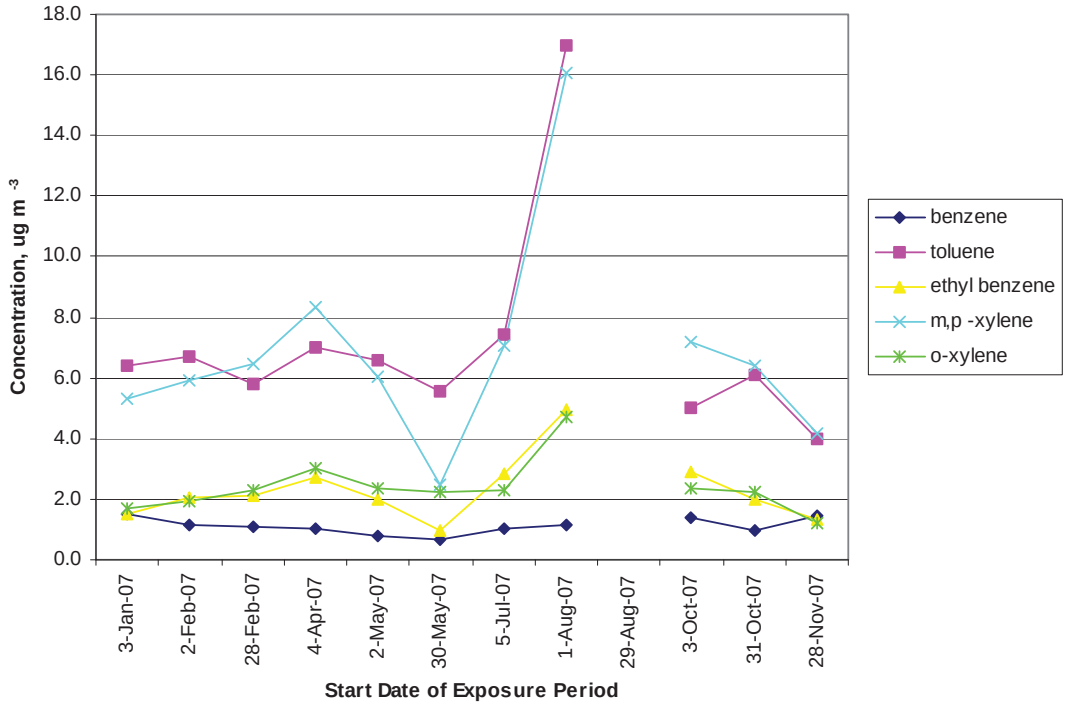


Figure 8. Monthly mean hydrocarbon concentrations at Springfield Garage, 2007

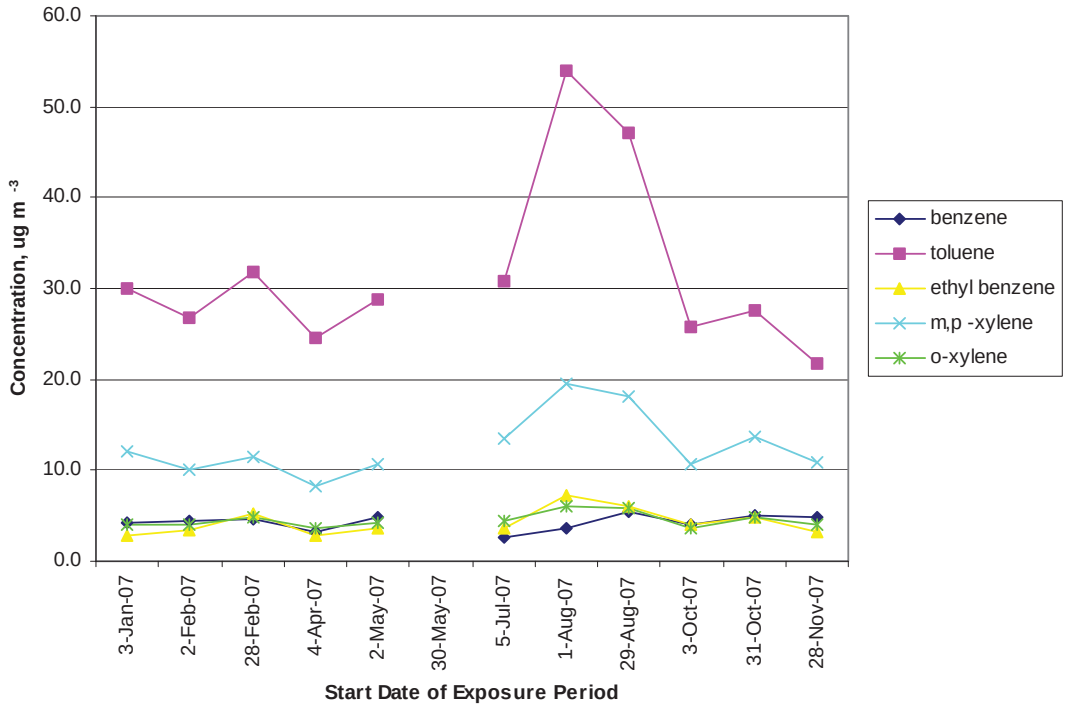


Figure 9. Monthly mean hydrocarbon concentrations at Clos St Andre, 2007

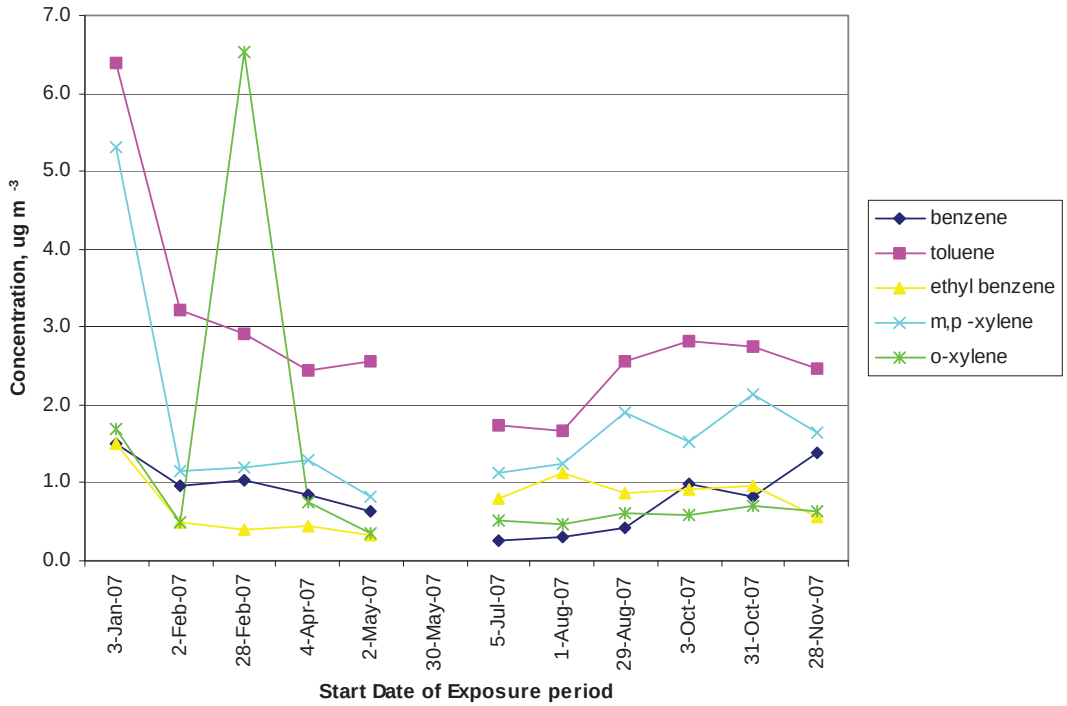
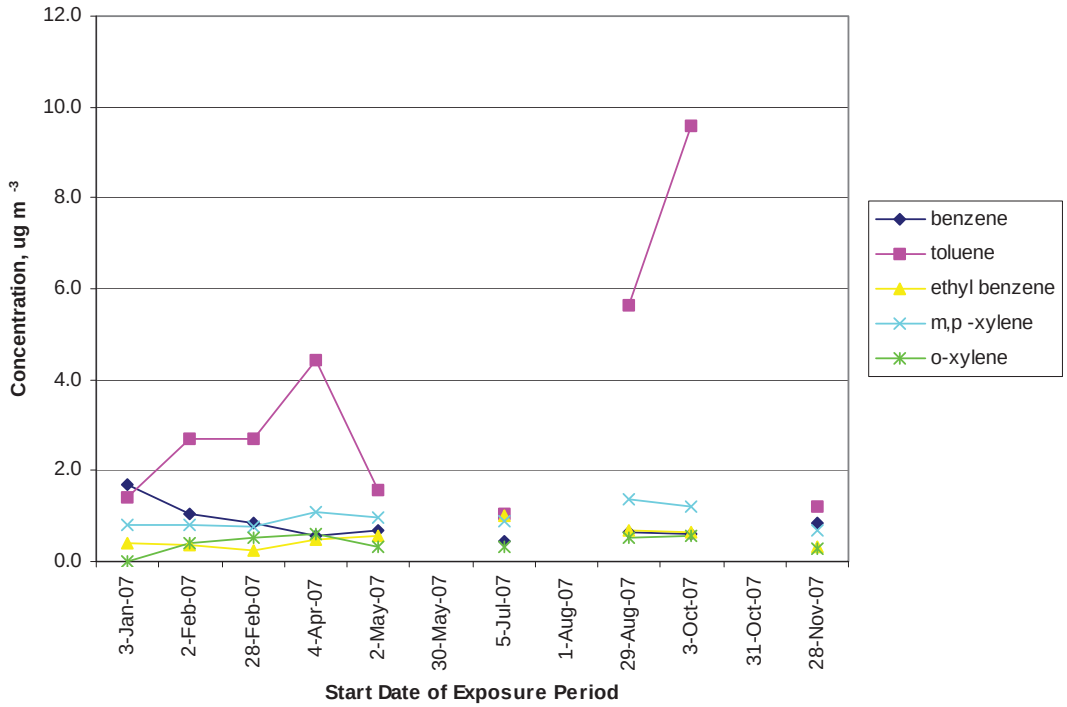


Figure 10. Monthly mean hydrocarbon concentrations at the Airport, 2007



3.2.1 Comparison With Limit Values and Objectives

Of the hydrocarbon species monitored, only benzene is the subject of any applicable air quality standards. The UK Air Quality Strategy sets the following objectives for benzene:

- 16.25μg m^{-3} (for the running annual mean), to have been achieved by 31st December 2003
- 3.25 μg m^{-3} (for the calendar year mean), to be achieved by 31st December 2010.

These are applicable to the whole UK (though not at present mandatory in Jersey). The annual mean benzene concentration (which can be considered a good indicator of the running annual mean) did not exceed 16.25μg m^{-3} at any of the Jersey sites. The calendar year mean was less than the 2010 objective of 3.25 μg m^{-3}, at all sites except Springfield Garage.

The EC 2nd Daughter Directive[15] sets a limit of 5μg m^{-3} for annual mean benzene, to be achieved by 2010. All sites met this limit in 2007.

3.2.2 Comparison with UK Benzene Data

Benzene was measured using pumped-tube samplers at a large UK-wide network of 30 UK sites in 2007. Annual mean concentrations ranged from 0.57 μg m^{-3} (at Bournemouth) to 1.87 μg m^{-3} (at Yarm, Stockton-on-Tees), but were typically in the range of 0.7- 1.5 μg m^{-3} at most urban sites.

Table 7 compares benzene data from the Jersey sites, with that from a selection of UK monitoring stations, located in cities on the south coast of England. The sites used for comparison are:

- Bournemouth – an urban background site in a coastal town.
- Hove Roadside – a roadside site in the coastal town of Hove, near Brighton, Sussex.
- Plymouth – an urban background site in the coastal city of Plymouth, Devon
- Portsmouth – an urban background site in Portsmouth , Hampshire
- Southampton – a roadside site in the city of Southampton
- Southend on Sea – an urban background site in Southend, Essex.

Table 7. Comparison with Benzene Concentrations at Other UK Sites, Calendar Year 2007 (With data capture in brackets).

Site	Benzene, μg m^{-3}
Jersey Sites	
Beresford Street	1.7
Le Bas Centre	1.5
Handsford Lane *(paint spraying)*	1.1
Springfield Garage *(petrol station)*	4.3
Clos St Andre	0.8
Airport	0.8
Mainland UK sites	
Bournemouth	0.57
Hove Roadside	1.01
Plymouth	1.04
Portsmouth	0.65
Southampton	0.99
Southend	0.71

The annual mean benzene concentration at Springfield Garage (where fuels are stored) was higher than any of the other Jersey or UK Network sites, including the roadside sites at Southampton and Hove. Prior to 2006 it was reported in this series of reports that benzene levels at Clos St Andre and the Airport were lower than typical UK urban levels; however, UK urban levels are decreasing and this is no longer the case.

3.2.3 Comparison with Previous Years' Hydrocarbon Results

Table 8 shows annual mean hydrocarbon concentrations for these sites, for years 1997 – 2007. Figures 11 to 15 illustrate how annual mean concentrations of these hydrocarbons have changed over the years of monitoring.

As well as the six sites currently in operation, Table 8 also shows previous years' results from a site at Elizabeth Lane. This site was located close to a paint spraying process: when the process closed down, monitoring was re-located to Handsford Lane, which is close to another similar process.

Annual mean levels of benzene at all sites were very slightly higher in 2007 than in the previous year; this is in contrast to the UK, where annual mean concentrations of this pollutant were typically lower than the previous year.

Annual mean toluene concentrations at all sites except Handsford Lane were slightly lower in 2006 compared to 2005. Annual mean concentrations of ethylbenzene and xylenes were lower compared to 2005 at all sites except the Airport. However, it is important to remember that pollutant concentrations are expected to show considerable year-to-year variation, due to meteorological and other factors. Year-to year changes are therefore of less importance than the observation of long-term trends, which are discussed below.

Table 8. Comparison of Hydrocarbon Concentrations, Jersey, 1997 - 2007.

	benzene, $\mu g\ m^{-3}$	toluene, $\mu g\ m^{-3}$	ethylbenzene $\mu g\ m^{-3}$	m+p xylene, $\mu g\ m^{-3}$	o-xylene, $\mu g\ m^{-3}$
Beresford Street					
1997	10.4	20.7	5.3	11.9	5.3
1998	8.1	18.8	4.0	10.2	4.4
1999	5.9	13.8	2.7	7.5	3.5
2000	2.9	14.2	3.5	10.2	4.0
2001	3.3	14.9	3.5	9.7	3.5
2002	2.6	13.0	2.7	8.0	3.1
2003	2.0	11.5	2.2	6.6	2.2
2004	1.9	9.8	5.1	5.5	2.0
2005	1.7	8.9	1.8	5.3	1.9
2006	2.2	7.4	1.3	4.6	1.6
2007	1.7	10.4	1.7	4.4	1.8
Le Bas Centre					
1997	9.1	17.2	5.3	9.7	4.4
1998	7.5	16.1	3.1	8.4	4.0
1999	3.6	11.1	2.2	5.7	2.7
2000	2.9	12.6	3.1	8.4	3.1
2001	2.6	13.4	2.7	7.5	3.1
2002	2.0	8.0	1.8	5.7	2.2
2003	1.3	8.0	1.8	4.9	1.8
2004	1.3	6.6	3.3	3.9	1.4
2005	1.3	5.3	1.1	3.4	1.2
2006	1.5	4.4	0.8	2.8	1.0
2007	1.5	6.5	1.3	3.2	1.3
Elizabeth Lane					
1997	6.2	16.9	6.2	7.5	9.7
1998	6.2	19.2	3.1	7.1	3.5
1999	3.3	12.6	2.2	5.3	2.7
2000	2.3	12.6	3.1	8.0	2.7
2001	2.3	15.7	3.1	8.8	3.5
2002	1.6	11.1	2.2	6.2	1.8
2003	2.0	11.9	2.2	6.2	2.2
Springfield Garage					
1997	25.0	47.9	8.4	19.0	8.4
1998	25.0	47.1	6.6	19.0	7.5
1999	14.6	41.7	5.7	16.8	6.6
2000	5.2	35.2	8.0	22.1	8.8
2001	6.8	42.9	8.0	23.0	8.4
2002	5.5	36.8	6.2	19.0	7.1
2003	4.9	34.1	5.7	15.9	5.7
2004	4.7	30.9	13.5	14.5	5.2
2005	3.3	22.8	3.6	11.2	4.0
2006	3.9	21.7	2.6	10.2	3.7
2007	4.3	29.5	4.0	11.9	4.4

Table 8. Comparison of Hydrocarbon Concentrations, *-continued :* Jersey, 1997 - 2007.

	benzene, $\mu g\ m^{-3}$	toluene, $\mu g\ m^{-3}$	ethylbenzene $\mu g\ m^{-3}$	m+p xylene, $\mu g\ m^{-3}$	o-xylene, $\mu g\ m^{-3}$
Stopford Road Outdoor					
2000	3.9	32.2	8.0	23.4	9.7
2001	5.7	46.8	9.8	30.0	11.6
Clos St Andre					
2000	1.0	3.4	0.9	2.7	0.9
2001	1.3	4.6	1.3	2.7	1.3
2002	1.0	2.7	0.9	2.2	0.9
2003	1.0	4.2	0.9	1.8	0.4
2004	0.7	2.2	1.2	1.2	0.4
2005	0.7	2.2	0.5	1.3	0.5
2006	1.0	2.0	0.4	1.2	0.4
2007	0.8	2.9	0.8	1.8	1.2
Airport					
2002	1.0	2.7	0.9	2.2	0.9
2003	1.0	3.1	0.4	0.9	0.4
2004	0.6	1.1	1.1	0.6	0.3
2005	0.6	1.6	0.2	0.6	0.2
2006	1.0	1.4	0.5	0.9	0.3
2007	0.8	3.4	0.5	1.0	0.4
Handsford Lane					
2004	1.0	16.1	7.3	8.5	2.0
2005	1.0	3.7	2.1	7.1	2.2
2006	1.2	4.8	1.3	5.1	1.6
2007	1.1	6.7	2.2	6.4	2.2

Figure 11. Trends in Benzene Concentration

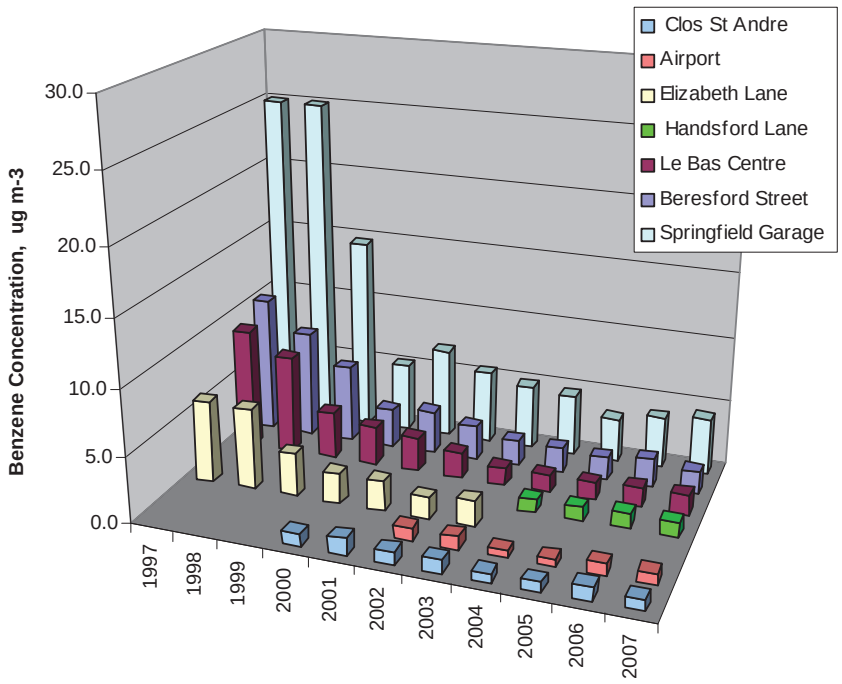


Figure 12. Trends in Toluene Concentration

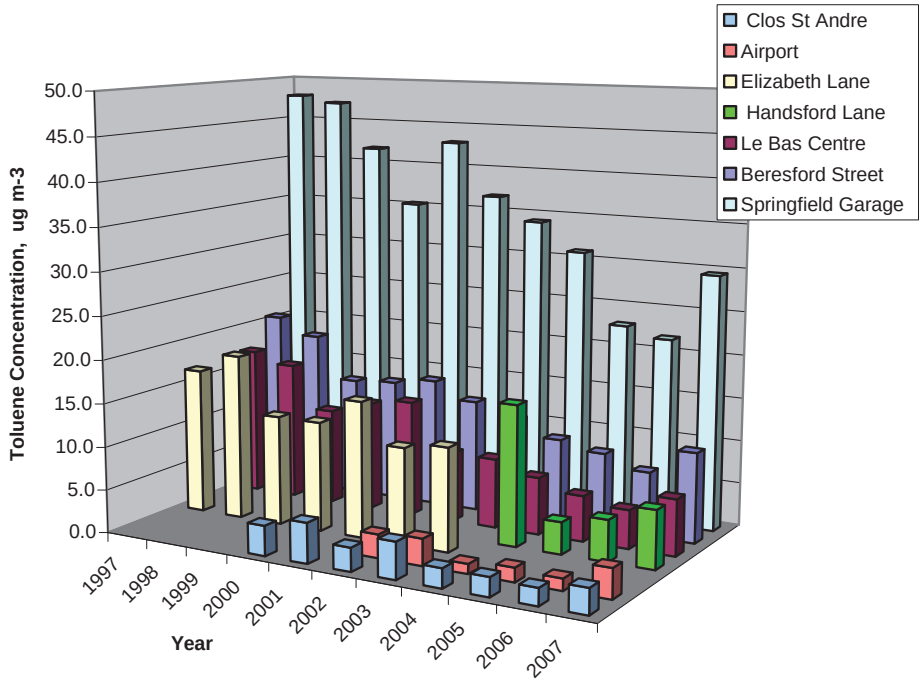


Figure 13. Trends in Ethylbenzene Concentration

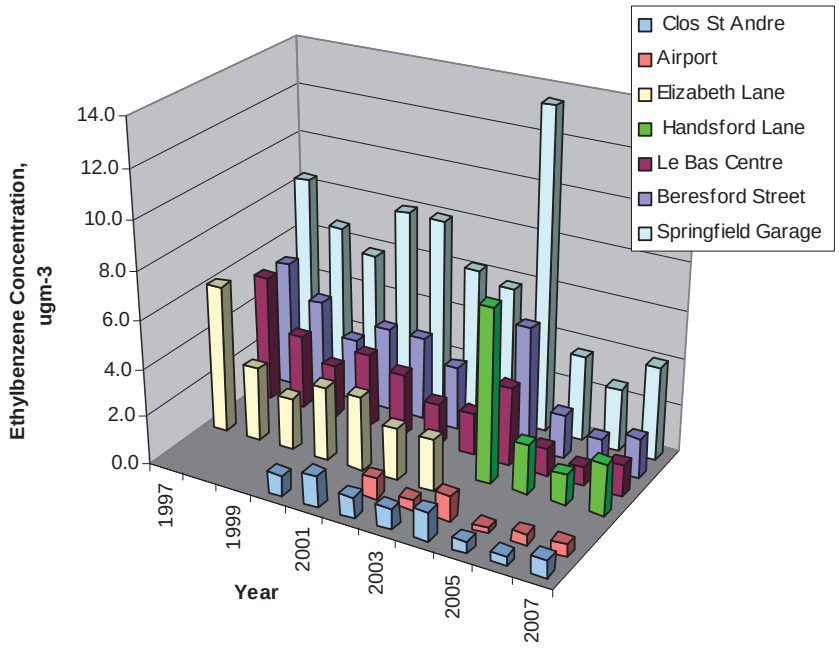


Figure 14. Trends in m+p- Xylene Concentration

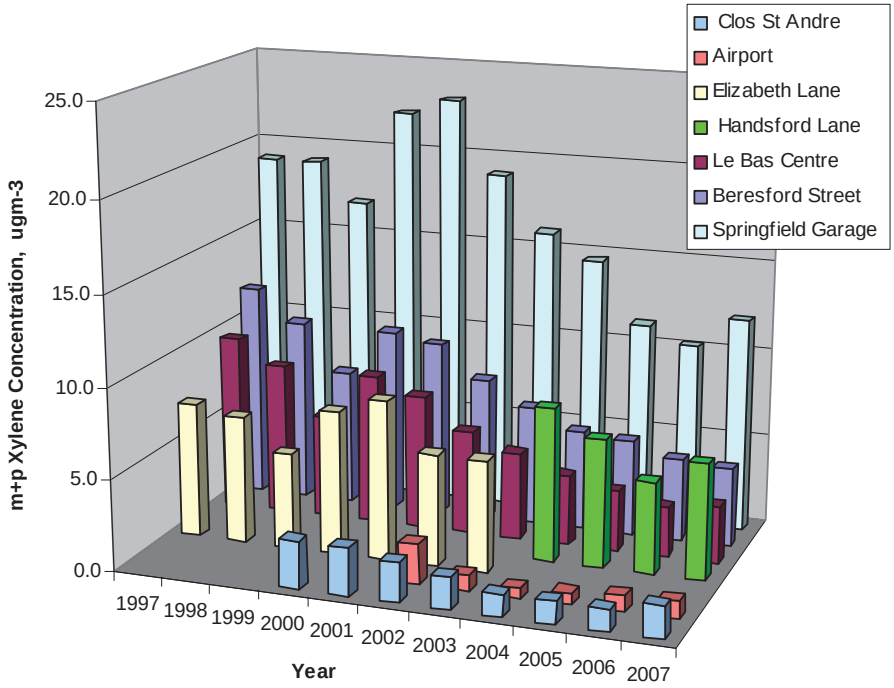
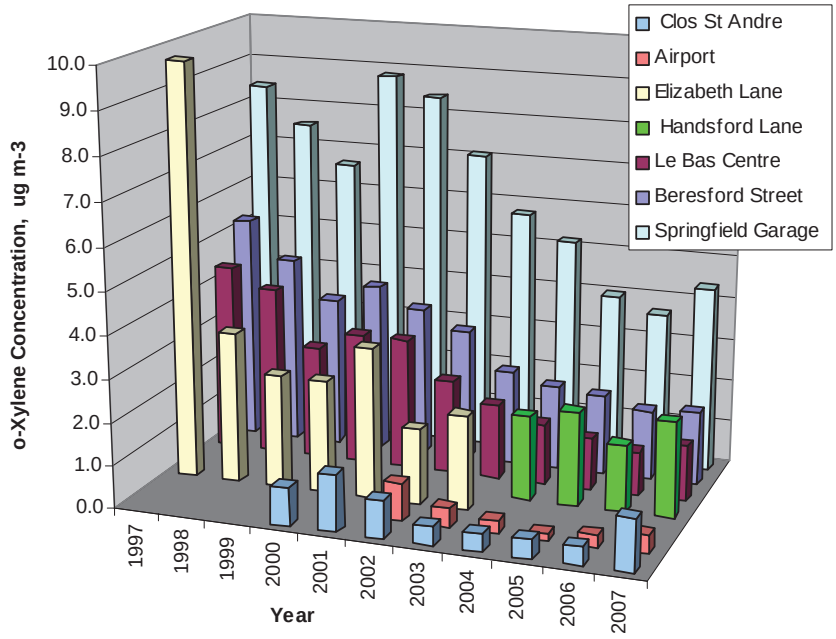


Figure 15. Trends in o-Xylene Concentration



Most hydrocarbon species appear to have decreased over the ten years of monitoring, being in most cases lower now than in the late 1990s.

- Benzene showed a marked drop in 2000: this is due to the maximum permitted benzene content of petrol sold in the UK being reduced from 2% in unleaded (5% in super unleaded), to 1% as of 1st January 2000. Concentrations have continued to fall slightly year on year.
- Toluene concentrations show a small but steady downward trend over the 11 years of the survey (1997-2007).
- Ethylbenzene concentrations have also generally decreased, despite an unexplained increase in 2004.
- Concentrations of m+p xylene, and of o-xylene, are also now generally lower than in the early years of the survey.

4 Conclusions

AEA Energy & Environment has undertaken a year-long diffusion tube monitoring study in Jersey during 2007, on behalf of the States of Jersey Public Health Services . This monitoring study has now been undertaken for eleven consecutive years.

- Diffusion tubes were used to monitor NO_2 at 24 sites.
- Hydrocarbons (benzene, toluene, ethyl benzene and xylenes, collectively termed BTEX) were measured at 6 sites.
- The sites were located at a range of different locations on the island, many of which have been in operation since 2000, and some since 1997.
- Three new sites were set up for monitoring of NO_2: a roadside site at the Central Market (at which diffusion tubes are co-located, in triplicate, with the new automatic monitoring station), a roadside site at Liberation Station, and an urban background site at Seaton Place.

NO_2 results

- The annual mean (uncorrected) NO_2 concentration at one kerbside site (Weighbridge) was above the EC Directive Limit Value and AQS Objective of 40 μg m^{-3}.
- Applying the analytical laboratory's recommended correction factor for diffusion tube bias to this annual mean results reduced it to 36 μg m^{-3}.
- Annual mean NO_2 concentrations at all urban, residential and rural background sites were all well below the EC Limit Value.
- Annual mean NO_2 concentrations at the monitoring sites were comparable with the previous year's results.
- A statistically significant downward trend has been identified, in the average annual mean NO_2 concentrations for all kerbside and roadside sites. This is of particular interest, as it is sites of these types that are currently close to the Limit Value and AQS Objective of 40μg m^{-3} for annual mean NO_2 concentration.
- There does not appear to be any clear trend in NO_2 concentrations at urban background sites, or urban residential sites; these appear to be remaining stable. However, as they are all well below the Limit Value and AQS Objective, this is not a cause for great concern.

Hydrocarbon tube results

- No sites had annual mean benzene concentrations greater than the UK Air Quality Strategy Objective of 16.25 μg m^{-3}, which was to be achieved by the end of 2003.
- No sites had annual mean benzene concentrations greater than the EC 2nd Daughter Directive Limit Value of 5 μg m^{-3} (which is to be achieved by 2010).
- One site (Springfield Garage) had an annual mean benzene concentration greater than the UK Air Quality Strategy Objective of 3.25 μg m^{-3}, which is to be achieved by January 2010.
- Annual mean concentrations of BTEX hydrocarbons were mostly slightly higher than, but still comparable with, those measured in 2006.
- The general pattern is that concentrations of most BTEX hydrocarbons are decreasing.
- There was significant data loss due to BTEX tubes losing their caps in transit: action has been taken to prevent this.

5 Recommendations

Results of the diffusion tube survey indicate that all monitoring sites in Jersey meet the UK Air Quality Strategy Objective of 40μg m^{-3} for the annual mean NO_2 concentration. However, some kerbside and roadside locations remain fairly close to this objective, despite some decrease in recent years. Monitoring at these sites should continue.

Significant data loss was caused this year by BTEX tubes being returned after exposure without their caps which had come off in transit. This problem has now been addressed.

6 Acknowledgements

AEA Energy & Environment gratefully acknowledges the help and support of the staff of the States of Jersey Health Protection Services, in the completion of this monitoring study.

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Appendices

Appendix 1: Air Quality Limit Values, Objectives and Guidelines

Appendix 2: Monthly Hydrocarbon Dataset

Appendix 1

Air Quality Limit Values, Objectives and Guidelines

Air Pollution Guidelines Used in this Report.

UK and International Ambient Air Quality Limit Values, Objectives and Guidelines

Nitrogen Dioxide

Guideline Set By	Description	Criteria Based On	Value(1) / µgm^{-3} (ppb)
The Air Quality Strategy(2)	Objective for Dec. 31st 2005, for protection of human health	1-hour mean	200 (105) Not to be exceeded more than 18 times per calendar year.
Set in regulations(3) for all UK:	Objective for Dec. 31st 2005, for protection of human health	Annual mean	40 (21)
Not intended to be set in regulations:	Objective for Dec. 31st 2000, for protection of vegetation.	Annual mean NO_x (NO_x as NO_2)	30 (16)
European Community 1985 NO_2 Directive (4) Limit remains in force until fully repealed 01/01/2010.	Limit Value	Calendar year of data: 98%ile of hourly means.	200 (105)
1st Daughter Directive(5)	Limit Value for protection of human health. To be achieved by Jan. 1st 2010	1 hour mean	200 (105) not to be exceeded more than 18 times per calendar year
	Limit Value for protection of human health. To be achieved by Jan. 1st 2010	Calendar year mean	40 (21)
	Limit Value (total NO_x) for protection of vegetation. To be achieved by Jul. 19th 2001	Calendar year mean	30 (16)
World Health Organisation(6) **(Non-Mandatory Guidelines)**	Health Guideline	1-hour mean	200
	Health Guideline	Annual mean	40

(1) Conversions between µg m^{-3} and ppb are as used by the EC, i.e. 1ppb NO_2 = 1.91 µg m^{-3} at 20°C and 1013 mB.
(2) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. January 2000. ISBN 0-10-145482-1 & Addendum 2003.
(3) Air Quality (England) Regulations 2000 (SI 2000/928), Air Quality (Scotland) Regulations 2000 (SSI 2000/97), Air Quality (Wales) Regulations 2000 (SI 2000/1940 (W138)).
(4) Council Directive 85/203/EEC.
(5) Council Directive 1999/30/EC. Transposed into UK Air Quality Regulations in England by SI 2001/2315, in Scotland by SSI 2001/224, in Wales by SI 2001/2683 (W224), and by Statutory Rule 2002 (94) in Northern Ireland.
(6) WHO Guidelines for Air Quality WHO/SDE/OEH/00.02 (2000).

Benzene

Guideline Set By	Description	Criteria Based On	Value[1] / µgm^{-3} (ppb)
The Air Quality Strategy[2,3] All UK	Objective for Dec. 31st 2003	Running annual mean	16.25 (5)
England[4] & Wales[5] only:	Objective for Dec. 31st 2010	Annual mean	5 (1.54)
Scotland[6] & Northern Ireland	Objective for Dec. 31st 2010	Running annual mean	3.25 (1.0)
European Community 2nd Daughter Directive[8]	Limit Value. To be achieved by Jan 1st 2010	Annual calendar year mean	5 (1.5)

(1) Conversions between µg m^{-3} and ppb are those used by the EC, i.e. 1ppb benzene = 3.25 µg m^{-3} at 20°C and 1013 mB.
(2) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. January 2000. ISBN 0-10-145482-1 & Addendum 2003.
(3) Air Quality (England) Regulations 2000 (SI 2000/928), Air Quality (Scotland) Regulations 2000 (SSI 2000/97), Air Quality (Wales) Regulations 2000 (SI 2000/1940 (W138)).
(4) Air Quality (Amendment) (England) Regulations 2002 (SI 2002/3043)
(5) Air Quality (Amendment) (Wales) Regulations 2002 (SI 2002/3182 (W298))
(6) Air Quality (Amendment) (Scotland) Regulations 2002 (SI 2002/297)
(7) Council Directive 2000/69/EC. Transposed into UK Air Quality Regulations in England by SI 2002/3117, in Scotland by SSI 2002/556, in Wales by SI 2002/3183 (W299), and by Statutory Rule 2002 (357) in Northern Ireland.

Appendix 2

Monthly Mean Hydrocarbon Results

Contents

Table A2.1 Monthly Hydrocarbon concentrations at Beresford Street (μg m^{-3})

Exposure period start	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-07	1.9	6.8	0.9	2.9	1.0
2-Feb-07	2.2	10.9	1.7	4.9	2.1
28-Feb-07	1.9	9.4	1.3	4.0	1.9
4-Apr-07	missing	missing	missing	missing	missing
2-May-07	1.3	6.8	1.1	3.4	1.5
30-May-07	1.1	7.2	1.5	1.8	1.5
5-Jul-07	1.4	7.5	1.6	4.1	1.5
1-Aug-07	2.0	11.4	2.3	6.0	2.0
29-Aug-07	1.0	26.0	3.1	5.9	1.9
3-Oct-07	2.2	11.1	2.2	6.0	2.3
31-Oct-07	cap off	cap off	cap off	cap off	cap off
28-Nov-07	2.2	6.7	1.4	4.8	1.8
Average	**1.7**	**10.4**	**1.7**	**4.4**	**1.8**

Table A2.2 Monthly Hydrocarbon concentrations at Le Bas Centre (μg m^{-3})

Exposure period start	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-07	1.9	5.7	0.8	3.0	1.0
2-Feb-07	1.6	8.4	1.2	3.4	2.1
28-Feb-07	1.8	7.1	0.9	2.9	1.4
4-Apr-07	1.2	4.9	0.8	2.3	1.3
2-May-07	1.1	4.7	0.8	2.2	0.9
30-May-07	1.0	5.4	1.3	2.9	1.2
5-Jul-07	0.6	2.9	1.0	1.4	0.6
1-Aug-07	cap off	cap off	cap off	cap off	cap off
29-Aug-07	1.4	12.6	2.7	4.5	1.4
3-Oct-07	1.7	5.6	1.5	2.7	1.1
31-Oct-07	2.1	7.9	2.4	5.7	2.1
28-Nov-07	2.0	5.7	1.3	3.9	1.5
Average	**1.5**	**6.5**	**1.3**	**3.2**	**1.3**

Table A2.3 Monthly Hydrocarbon Concentrations at Handsford Lane (μg m^{-3})

Exposure period start	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-07	1.5	6.4	1.5	5.3	1.7
2-Feb-07	1.2	6.7	2.0	5.9	1.9
28-Feb-07	1.1	5.8	2.1	6.5	2.3
4-Apr-07	1.0	7.0	2.7	8.4	3.0
2-May-07	0.8	6.6	2.0	6.0	2.4
30-May-07	0.7	5.6	0.9	2.5	2.3
5-Jul-07	1.0	7.5	2.8	7.1	2.3
1-Aug-07	1.1	17.0	4.9	16.1	4.7
29-Aug-07	-	-	-	-	-
3-Oct-07	1.4	5.0	2.9	7.2	2.4
31-Oct-07	0.4	1.8	0.6	1.6	0.5
28-Nov-07	1.4	4.0	1.3	4.2	1.2
Average	**1.1**	**6.7**	**2.2**	**6.4**	**2.2**

Tube from period beginning 29 Aug was apparently unexposed.

Table A2.4 Monthly Hydrocarbon Concentrations at Springfield Garage (μg m^{-3})

Exposure period start	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-07	4.2	30.0	2.9	12.0	4.1
2-Feb-07	4.4	26.7	3.4	10.0	4.0
28-Feb-07	4.5	31.7	5.3	11.4	4.8
4-Apr-07	3.2	24.5	2.9	8.2	3.6
2-May-07	4.8	28.7	3.7	10.7	4.2
30-May-07	cap off	cap off	cap off	cap off	cap off
5-Jul-07	2.6	30.8	3.7	13.6	4.5
1-Aug-07	cap off	cap off	cap off	cap off	cap off
29-Aug-07	5.5	47.2	6.0	18.2	5.9
3-Oct-07	4.1	25.7	3.9	10.6	3.7
31-Oct-07	5.0	27.6	4.8	13.7	4.9
28-Nov-07	4.8	21.7	3.3	10.9	4.1
Average	**4.3**	**29.5**	**4.0**	**11.9**	**4.4**

Table A2.5 Monthly Hydrocarbon Concentrations at Clos St Andre (μg m^{-3})

Exposure period start	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-07	1.5	6.4	1.5	5.3	1.7
2-Feb-07	1.0	3.2	0.5	1.1	0.5
28-Feb-07	1.0	2.9	0.4	1.2	6.5
4-Apr-07	0.8	2.4	0.4	1.3	0.7
2-May-07	0.6	2.6	0.3	0.8	0.4
30-May-07	cap off	cap off	cap off	cap off	cap off
5-Jul-07	0.3	1.7	0.8	1.1	0.5
1-Aug-07	0.3	1.7	1.1	1.2	0.5
29-Aug-07	0.4	2.6	0.9	1.9	0.6
3-Oct-07	1.0	2.8	0.9	1.5	0.6
31-Oct-07	0.8	2.7	1.0	2.1	0.7
28-Nov-07	1.4	2.5	0.6	1.6	0.6
Average	**0.8**	**2.9**	**0.8**	**1.8**	**1.2**

Table A2.6 Monthly Hydrocarbon Concentrations at the Airport (μg m^{-3})

Exposure period start	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-07	1.7	1.4	0.4	0.8	bdl
2-Feb-07	1.0	2.7	0.4	0.8	0.4
28-Feb-07	0.8	2.7	0.2	0.8	0.5
4-Apr-07	0.6	4.4	0.5	1.1	0.6
2-May-07	0.7	1.6	0.6	1.0	0.3
30-May-07	cap off	cap off	cap off	cap off	cap off
5-Jul-07	0.5	1.1	1.0	0.9	0.3
1-Aug-07	cap off	cap off	cap off	cap off	cap off
29-Aug-07	0.7	5.6	0.7	1.4	0.5
3-Oct-07	0.6	9.6	0.6	1.2	0.6
31-Oct-07	cap off	cap off	cap off	cap off	cap off
28-Nov-07	0.8	1.2	0.3	0.7	0.3
Average	**0.8**	**3.4**	**0.5**	**1.0**	**0.4**

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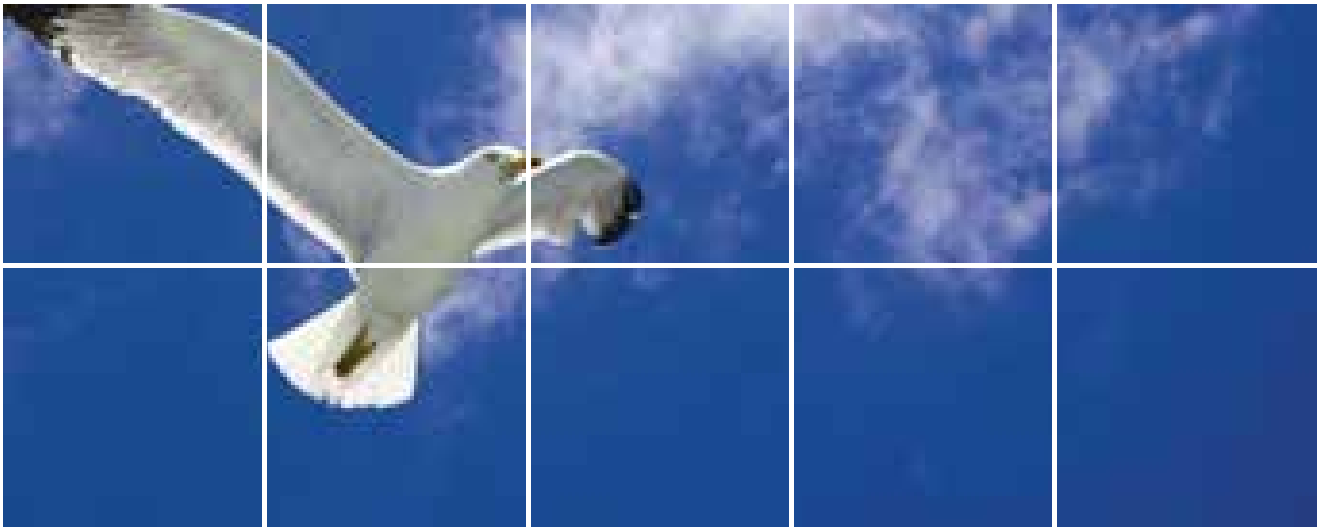

Air Quality Monitoring in Jersey 2008

Report to Public Health Services, States of Jersey

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Executive summary

This report presents the results for 2008 of an ongoing programme of air quality monitoring in Jersey, carried out by AEA on behalf of the Public Health Services and Planning and Environment Department of the States of Jersey.

In early 2008, an automatic monitoring station was installed in the Central Market, Halkett Place, St Helier. This was used to monitor nitrogen dioxide (NO_2) throughout the year. This was supplemented by non-automatic monitoring of NO_2 and a suite of four hydrocarbon pollutants (benzene, toluene, ethylbenzene and xylenes).

The non-automatic monitoring was the continuation of a long-term monitoring programme that has operated in Jersey for the past 12 years. Diffusion tube samplers were used for indicative monitoring of nitrogen dioxide (NO_2) at 24 sites, and hydrocarbons at six sites. Monitoring sites included areas likely to be affected by specific emission sources (such as petrol stations or the waste incinerator), as well as general background locations. In February 2008, the NO_2 monitoring programme was streamlined, and the number of NO_2 diffusion tube sites reduced to 12.

NO_2 and hydrocarbon diffusion tubes were exposed for twelve periods approximating to calendar months. The tubes were supplied and analysed by Gradko International Ltd, and changed by Technical Officers of Jersey's Environmental Health Section.

The automatic monitoring site at Halkett Place met the EC Directive Limit Value (and AQS Objective) for both the 1-hour mean NO_2 concentration and the annual mean NO_2 concentration.

Twelve NO_2 diffusion tube monitoring sites remained in operation for the full year. Annual mean concentrations at all 12 of these sites were within the EC Directive Limit Value, and were generally comparable with the previous year's results.

All six hydrocarbon monitoring sites met the EC Directive Limit Value for benzene (5 μg m^{-3} as an annual mean, to be achieved by 2010).

All sites met the current (2003) UK Air Quality Strategy objective for benzene. Five of the six sites also met the 2010 UK Air Quality Strategy Objective for this pollutant (3.25 μg m^{-3}, to be achieved by January 2010). However, one site (Springfield Garage) had an annual mean benzene concentration of 4.2 μg m^{-3} and therefore does not at present meet the 2010 benzene objective.

The diurnal pattern in concentrations of oxides of nitrogen at Halkett Place showed a clear peak in the early morning (0600 – 0800). This is thought to reflect the early morning activity of market retailers arriving to set up for the day, and of daily refuse collections.

Data from long-running diffusion tube sites confirm that levels of NO_2 at urban roadside and kerbside sites continued to decrease in 2008. NO_2 concentrations at residential and rural background sites do not appear to show any upward or downward trend, but are already low.

Hydrocarbon concentrations (particularly that of benzene) are also now lower than during the earlier years of the survey.

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1 Introduction

1.1 Background

AEA, on behalf of the States of Jersey Public Health Services, has undertaken a further programme of air quality monitoring on the island of Jersey in 2008. This is the twelfth in a series of extensive annual monitoring programmes that began in 1997, and has since provided a long-term dataset of pollutant concentrations.

The pollutants measured were nitrogen dioxide (NO_2), and a range of hydrocarbon species (benzene, toluene, ethyl benzene and three xylene compounds). An automatic monitoring station at Halkett Place was used to monitor NO_2. This was supplemented by indicative monitoring of NO_2 using low cost passive samplers (Palmes type diffusion tubes) at 12 sites on the island. In addition, the suite of four hydrocarbons was monitored using "BTEX" diffusion tubes at six sites.

This report presents the results obtained in the 2008 survey, and compares the data from Jersey with relevant air quality Limit Values, Objectives and guidelines, data from selected UK monitoring stations and previous years' monitoring programmes.

1.2 Objectives

This survey follows on from those in the years 1997 to 2007[1,2,3,4,5,6,7,8,9,10,11]. The objective, as in previous surveys, was to monitor at sites where pollutant concentrations were expected to be high, and compare these with background locations. The monitoring sites consisted of a mixture of urban and rural background sites, together with some locations where higher pollutant concentrations might be expected, such as roadside and kerbside sites, and some close to specific emission sources.

2 Details of Monitoring Programme

2.1 Pollutants Monitored

2.1.1 NO_2

A mixture of nitrogen dioxide (NO_2) and nitric oxide (NO) is emitted by combustion processes. This mixture of oxides of nitrogen is termed NO_x. NO is subsequently oxidised to NO_2 in the atmosphere. NO_2 is an irritant to the respiratory system, and can affect human health. Ambient concentrations of NO_2 are likely to be highest in the most built-up areas, especially where traffic is congested, or where buildings either side of the street create a "canyon" effect, impeding the dispersion of vehicle emissions. The units used for NO_2 concentration in this report are microgrammes per cubic metre ($\mu g\ m^{-3}$). Some earlier reports in this series have used parts per billion (ppb): to convert from $\mu g\ m^{-3}$ to ppb for comparison with the earlier reports if required, the following relationship should be used:

1 $\mu g\ m^{-3}$ = 0.523 ppb for nitrogen dioxide at 293K (20°C) and 1013mb.

2.1.2 Hydrocarbons

There are many sources of hydrocarbon emissions. Methane, for example, is a naturally occurring gas, while xylene compounds are synthetic and used in many applications, for example as a solvent in paint. A range of hydrocarbons is found in vehicle fuel, and occur in vehicle emissions. In most urban areas, vehicle emissions constitute the major source of hydrocarbons, in particular benzene. Also, there is the potential that they may be released to the air from facilities where fuels are stored or handled (such as petrol stations).

A wide range of hydrocarbons is emitted from both fuel storage and handling, and from fuel combustion in vehicles. It is not easy to measure all of these hydrocarbon species (particularly the most volatile) without expensive continuous monitoring systems. However, there are four species associated with fuels and vehicle emissions which, though not the largest constituent of such emissions, are easy to monitor using passive samplers due to their moderate volatility. These are benzene, toluene, ethyl benzene and xylene. Diffusion tubes are available for monitoring this group of organic compounds, and are known as "BTEX" tubes (BTEX being an acronym for the compounds measured).

(i) Benzene
Of the organic compounds measured in this study, benzene is the one of most concern, as it is a known human carcinogen; long-term exposure can cause leukaemia. It is found in petrol and other liquid fuels, in small concentrations. In urban areas, the major source is vehicle emissions. In the UK, annual mean benzene concentrations in ambient air are typically less than 3 $\mu g\ m^{-3}$. In this report, concentrations of benzene are expressed in microgrammes per cubic metre ($\mu g\ m^{-3}$). Some earlier reports in the series used parts per billion (ppb): to convert to ppb to if necessary, the following relationship should be used:

1 $\mu g\ m^{-3}$ = 0.307 ppb for benzene at 293K (20°C) and 1013mb.
(only applicable to benzene).

(ii) Toluene
Toluene is also found in petrol in small concentrations. Its primary use is as a solvent in paints and inks; it is also a constituent of tobacco smoke. It has been found to adversely affect human health. Typical ambient concentrations range from trace to 3.8 $\mu g\ m^{-3}$ in rural areas, up to 204 $\mu g\ m^{-3}$ in urban areas, and higher near industrial sources. There are no recommended limits for ambient toluene concentrations, although there are occupational limits for workplace exposure[12]. The best estimate for the odour threshold of toluene has been reported as 0.16ppm (613$\mu g\ m^{-3}$) [13]. In the present report,

concentrations are expressed in microgrammes per cubic metre (μg m^{-3}). Some earlier reports in the series used parts per billion (ppb): to convert to ppb to if necessary, the following relationship should be used:

1 μg m^{-3} = 0.261 ppb for toluene at 293K (20°C) and 1013mb.
(only applicable to toluene).

(iii)ethyl benzene
Again, there are no limits for ambient concentration of ethyl benzene, and although there are occupational limits relating to workplace exposure[12], as discussed in previous reports in this series, they are several orders of magnitude higher than typical outdoor ambient concentrations.

(iv)xylene
Xylene exists in ortho (o), para (p) and meta (m) isomers. Occupational limits relating to workplace exposure, are 100 ppm over 8 hours, and 150 ppm over 10 minutes. Xylene, like toluene, can cause odour nuisance near processes (such as vehicle paint spraying), which emit it. Its odour threshold varies according to the isomer, but the best estimate for the odour threshold of mixed xylenes is 0.016ppm (16 ppb or 70 μg m^{-3})[13].

In this report, concentrations of ethylbenzene and xylenes are expressed in microgrammes per cubic metre (μg m^{-3}). Some earlier reports in this series used parts per billion (ppb): to convert to ppb to if required, the following relationship should be used:

1 μg m^{-3} = 0.226 ppb for ethyl benzene or xylenes at 293K (20°C) and 1013mb.
(applicable to ethylbenzene, m-, p- and o-xylene).

2.2 Air Quality Limit Values And Objectives

This report compares the results of the monitoring survey with air quality Limit Values and Objectives applicable worldwide, in Europe and the UK. These are summarized in Appendix 1 and below.

2.2.1 World Health Organisation

In 2000, the World Health Organisation published revised air quality guidelines[14] for pollutants including NO_2. These were set using currently available scientific evidence on the effects of air pollutants on health and vegetation. The WHO guidelines are advisory only, and do not carry any mandatory status. They are summarised in Appendix 1. There are WHO guidelines for ambient NO_2 concentrations (hourly and annual means) but not benzene. The WHO non-mandatory guideline[14] for NO_2 is that the annual mean should not exceed 40 μg m^{-3}.

2.2.2 European Community

Throughout Europe, ambient air quality is regulated by the EC Directive on Ambient Air Quality and Cleaner Air for Europe (2008/50/EC)[15]. This Directive sets Limit Values, which are mandatory, and other requirements for the protection of human health and ecosystems. Both NO_2 and benzene are covered by this Directive. The States of Jersey have agreed to meet the EU health limits.

The EC Directive on Ambient Air Quality and Cleaner Air for Europe[15] contains Limit Values for NO_2 as follows:

- 200 μg m^{-3} as an hourly mean, not to be exceeded more than 18 times per calendar year. To be achieved by 1st January 2010.
- 40 μg m^{-3} as an annual mean, for protection of human health. To be achieved by 1st January 2010.

- There is also a limit for annual mean total oxides of nitrogen (NO_x), of 30 μg m^{-3}, for protection of vegetation (relevant in rural areas).

The EC Directive on Ambient Air Quality and Cleaner Air for Europe[15] sets a limit of 5 μg m^{-3} for annual mean benzene, to be achieved by 2010.

2.2.3 UK Air Quality Strategy

The UK Air Quality Strategy (AQS) contains standards and objectives for a range of pollutants including NO_2 and benzene[16]. These are also summarised in Appendix 1. Only those Objectives relating to the whole UK (as opposed to specifically England, Wales, etc.) are applicable to Jersey, and the AQS does not at present have mandatory status in the States of Jersey.

The UK Air Quality Strategy's objectives for NO_2 are very similar to the EC Directive limits above: the only difference being that they had to be achieved by 31st December 2005

The UK Air Quality Strategy[16] sets the following objectives for benzene:

- 16.25μg m^{-3} (for the running annual mean), to have been achieved by 31st December 2003
- 3.25 μg m^{-3} (for the calendar year mean), to be achieved by 31st December 2010.

2.3 Methodologies

Oxides of nitrogen were monitored using a chemiluminescent analyser, located at the Central Market, Halkett Place, St Helier. This automatic monitoring site started operation in January 2008.

The chemiluminescent NOx analyser provides a continuous output, proportional to the pollutant concentration. This output is recorded and stored every 10 seconds, and averaged to 15-minute average values by internal data loggers. The analysers are connected to a modem and interrogated by telephone to download the data to AEA. Data are downloaded daily.

The automatic monitoring site at Halkett Place was supplemented by indicative monitoring, using diffusion tubes, for NO_2 and BTEX hydrocarbons. Diffusion tubes are "passive" samplers, i.e. they work by absorbing the pollutants direct from the surrounding air and need no power supply.

Palmes-type diffusion tubes were used for NO_2. These consist of a small plastic tube, approximately 7 cm long. During sampling, one end is open and the other closed. The closed end contains an absorbent for the gaseous species to be monitored, in this case NO_2. The tube is mounted vertically with the open end at the bottom. Ambient NO_2 diffuses up the tube during exposure, and is absorbed as nitrite. The average ambient pollutant concentration for the exposure period is calculated from the amount of pollutant absorbed.

BTEX diffusion tubes are different in appearance to NO_2 tubes. They are longer, thinner, and made of metal rather than plastic. These tubes are fitted at both ends with brass Swagelok fittings. A separate "diffusion cap" is supplied. Immediately before exposure, the Swagelok end fitting is replaced with the diffusion cap. The cap is removed after exposure, and is replaced with the Swagelok fitting. BTEX diffusion tubes are very sensitive to interference by solvents.

Diffusion tubes were prepared and analysed by Gradko International Ltd. They were supplied to local Technical Officers of Jersey's Public Health Services, who carried out the tube changing. The tubes were supplied in sealed condition prior to exposure. The tubes were exposed at the sites for a set period of time. After exposure, the tubes were again sealed and returned to Gradko for analysis. The year was divided into twelve exposure periods approximating to calendar months. The duration of the exposure periods varied between four and five weeks.

Diffusion tubes are an indicative technique, and the results therefore have a greater uncertainty than those of more sophisticated automatic methods. The laboratory states that the margins of uncertainty

on the diffusion tube analyses are typically ± 3.5% for NO_2 and ± 12% for BTEX hydrocarbons. However, uncertainties arising from the exposure phase also contribute to the overall uncertainty: it is usually estimated that the overall uncertainty on diffusion tube measurements is approximately ± 25% for NO_2 and ± 25% for BTEX hydrocarbons. The limits of detection vary from month to month, but are typically 0.4 μg m^{-3} for NO_2 and 0.2 μg m^{-3} for BTEX. It should be noted that tube results that are less than 10 x the limit of detection will have a higher level of uncertainty associated with them.

The Local Air Quality Management Technical Guidance LAQM.TG(09)[17] states that when using diffusion tubes for indicative NO_2 monitoring, correction should be made where applicable for any systematic bias (i.e. over-read or under-read compared to the automatic chemiluminescent technique, which is the reference method for NO_2). By co-locating diffusion tubes with the automatic monitoring site at Halkett Place, it was possible to calculate a bias adjustment factor, which could then be applied to the annual mean diffusion tube measurements in this survey. (This applies only to NO_2 diffusion tubes, not BTEX tubes, as the latter are not affected by the same sources of interference). ***The NO_2 diffusion tube results in this report are uncorrected except where clearly specified.***

2.4 Monitoring Sites

Automatic monitoring of oxides of nitrogen was carried out at the Central Market, Halkett Place, in St Helier (Figure 1). This represents a roadside site where levels of NO_2 were expected to be high, and where members of the public are regularly exposed for periods of one hour or more.

Figure 1 Automatic NOx Monitoring Site, Halkett Place, St Helier

Figure 1 shows the location of the monitoring site. The inlet funnel (not visible) protrudes from the side of the building façade on the left hand side of the road, near the far end of the row of arched entrances. It is at a height of about 5m.

At the beginning of 2008, 24 NO_2 diffusion tubes were in operation. The majority of these had been in use since 2000. However, at the end of February 2008 the States of Jersey streamlined their monitoring programme, reducing the number of sites to 12.

Diffusion tubes are also co-located with the automatic monitoring site at Halkett Place which began operation in January 2008. The tubes at this site are exposed in triplicate, all others are single.

Table 1 NO_2 Monitoring Sites in Jersey

Site Name	Grid Reference	Method	Description
Central Market, Halkett Place	653 486	Automatic analyser Diffusion tubes in triplicate	Halkett Pl., St Helier – co-located with automatic site.
Le Bas Centre	658 489	Diffusion tube	Urban Background
Mont Felard (Ceased Feb 2008)	*629 501*	*Diffusion tube*	*Residential background, to SW of waste incinerator and 20m from busy road*
Les Quennevais	579 496	Diffusion tube	Residential Background
Rue des Raisies	689 529	Diffusion tube	Rural Background
First Tower (Ceased Feb 2008)	*636 497*	*Diffusion tube*	*Kerbside on major road*
Weighbridge	651 483	Diffusion tube	Roadside at bus station near centre of St Helier
Langley Park (Ceased Feb 2008)	*660 501*	*Diffusion tube*	*Residential background*
Georgetown	661 480	Diffusion tube	Kerbside on major road
Clos St Andre (Ceased Feb 2008)	*638 499*	*Diffusion tube*	*Residential area near Bellozanne Valley refuse Incinerator. Background*
Beaumont	597 516	Diffusion tube	Kerbside
The Parade *	648 489	Diffusion tube	Roadside site at General Hospital
Maufant (Ceased Feb 2008)	*683 512*	*Diffusion tube*	*Background site in Maufant village*
Jane Sandeman (Ceased Feb 2008)	*652 494*	*Diffusion tube*	*Urban background on housing estate*
Saville Street (Ceased Feb 2008)	*648 492*	*Diffusion tube*	*Background*
Broad Street	652 486	Diffusion tube	Urban background
Beresford Street (Ceased Feb 2008)	*653 486*	*Diffusion tube*	*Urban background*
La Pouquelaye (Ceased Feb 2008)	*654 496*	*Diffusion tube*	*Kerbside on St Helier ring road.*
Union Street	653 486	Diffusion tube	Kerbside in St Helier – corner of Union St. & New St.
New Street	653 485	Diffusion tube	Kerbside in St Helier
Havre des Pas (Ceased Feb 2008)		*Diffusion tube*	*Kerbside, beside main A4 in/out of St Helier*
Commercial Buildings (Ceased Feb 2008)		*Diffusion tube*	*Kerbside, Commercial Buildings, St Helier*
Seaton Place (Ceased Feb 2008)	*648 487*	*Diffusion tube*	*Kerbside to assess complaint re air quality*
Liberation Station	652 485	Diffusion tube	Kerbside opposite entrance to new bus station

*The Parade site was moved to its current roadside location at the end of 2000.
Kerbside: less than 1m from kerb of a busy road.
Roadside: 1-5m from kerb of a busy road.
Background: > 50m from the kerb of any major road.
Note: all grid references are from OS 1:25000 Leisure Map of Jersey and are given to the nearest 100m.

Figure 2a Site Locations Outside St Helier

Figure 2b Sites in St Helier town

Key:

1	Le Bas Centre	NO_2, BTEX
2	Mont Felard	NO_2
3	Les Quennevais	NO_2
4	Rue Des Raisies	NO_2
5	First Tower	NO_2
6	Weighbridge	NO_2
7	Langley Park	NO_2
8	Georgetown	NO_2
9	Clos St Andre	NO_2, BTEX
10	Union Street	NO_2
11	New Street	NO_2
12	Beaumont	NO_2
13	The Parade	NO_2
14	Maufant	NO_2
15	Jane Sandeman	NO_2
16	Saville Street	NO_2
17	Broad Street	NO_2
18	Beresford Street	NO_2, BTEX
19	La Pouquelaye	NO_2
20	Havre Des Pas	NO_2
21	Commercial Buildings	NO_2
22	Springfield Garage	BTEX
23	Airport	BTEX
24	Handsford Lane	BTEX
25	Halkett Place	NO_2, Auto
26	Seaton Place	NO_2
27	Liberation Station	NO_2

BTEX hydrocarbons were monitored at six sites during 2008. These sites, which have been used for several years, are shown in Table 2. The aim was to investigate sites likely to be affected by different emission sources, and compare these with background sites. The sites at Beresford Street and Le Bas Centre are intended to monitor hydrocarbon concentrations at an urban roadside and urban background location respectively.

The Handsford Lane site is close to a paint spraying process – a potential source of hydrocarbon emissions, especially toluene and xylenes. This site replaced a similar site in Elizabeth Lane, which ceased operation when the process closed down in October 2003.

The Springfield Garage site is located by a fuel filling station, a potential sources of hydrocarbon emissions including benzene. As of December 2003, the fuel supplier has used vapour recovery when filling the tanks.

The Clos St Andre site is located near the Bellozane Valley waste incinerator, and the Airport site is located at Jersey Airport, overlooking the airfield.

Table 2 BTEX Diffusion Tube Monitoring sites

Site Name	Grid Reference	Description
Beresford Street	653 486	Urban Roadside
Le Bas Centre	658 489	Urban Background
Springfield Garage	656 495	Urban background near fuel filling station
Clos St Andre	638 499	Residential area near Bellozanne Valley refuse incinerator.
Airport	587 509	Jersey Airport, overlooking airfield
Handsford Lane	633 499	Urban background near a paint spraying process.

2.5 Calendar of Diffusion Tube Exposure Periods

The calendar of exposure periods used for the NO_2 and BTEX diffusion tubes is shown in Table 3 below. They were intended to approximate to calendar months.

Table 3 Diffusion Tube Exposure Periods

Month	*Start Date*	*End Date*
January	03/01/2008	30/01/2008
February	30/01/2008	28/02/2008
March	28/02/2008	02/04/2008
April	02/04/2008	30/04/2008
May	30/04/2008	28/05/2008
June	28/05/2008	02/07/2008
July	02/07/2008	29/07/2008
August	29/07/2008	03/09/2008
September	03/09/2008	01/10/2008
October	01/10/2008	29/10/2008
November	29/10/2008	03/12/2008
December	03/12/2008	07/01/2009

3 Quality Assurance and Data Capture

3.1 Quality Assurance And Quality Control

A full intercalibration audit of the Jersey Halkett Place air quality monitoring site takes place annually. In addition to instrument and calibration standard checking, the air intake sampling system is cleaned and all other aspects of site infrastructure are checked.

Following the instrument and calibration gas checking, and the subsequent scaling and ratification of the data, the overall accuracy and precision figures for the pollutants monitored at Jersey can be summarised as in Table 4:

Table 4 Estimated Accuracy and Precision of the Data Presented

Pollutant	Precision	Accuracy %
NO	±5 ppb	±15%
NO_2	±5 ppb	±15%

3.2 Data Capture

Overall data capture statistics for the monitoring site are given in Table 5. A data capture rate of 90% or greater for ratified data is recommended in the Defra Technical Guidance LAQM.TG(09)[17].

Table 5 Jersey Halkett Place - Data Capture Statistics 2008

Site	NO	NO_2	NO_X
Jersey Halkett Place	90.0 %	90.0 %	90.0 %

Data capture of 90% was achieved for NO_2: thus the data capture target of LAQM.TG(09) was met. However, the following significant gaps in data capture occurred during the year, as shown in Table 6:

Table 6 Data Gaps 2008

Site	Pollutant	Period	No. of Days	Reason
Jersey Halkett Place	All NOx	1st – 22nd Jan	22	Prior to site start-up.
		28th Aug – 11th Sep	15	Analyser service

4 Results and Discussion

4.1 Presentation of Results

4.1.1 Automatic NO_2 Monitoring Results

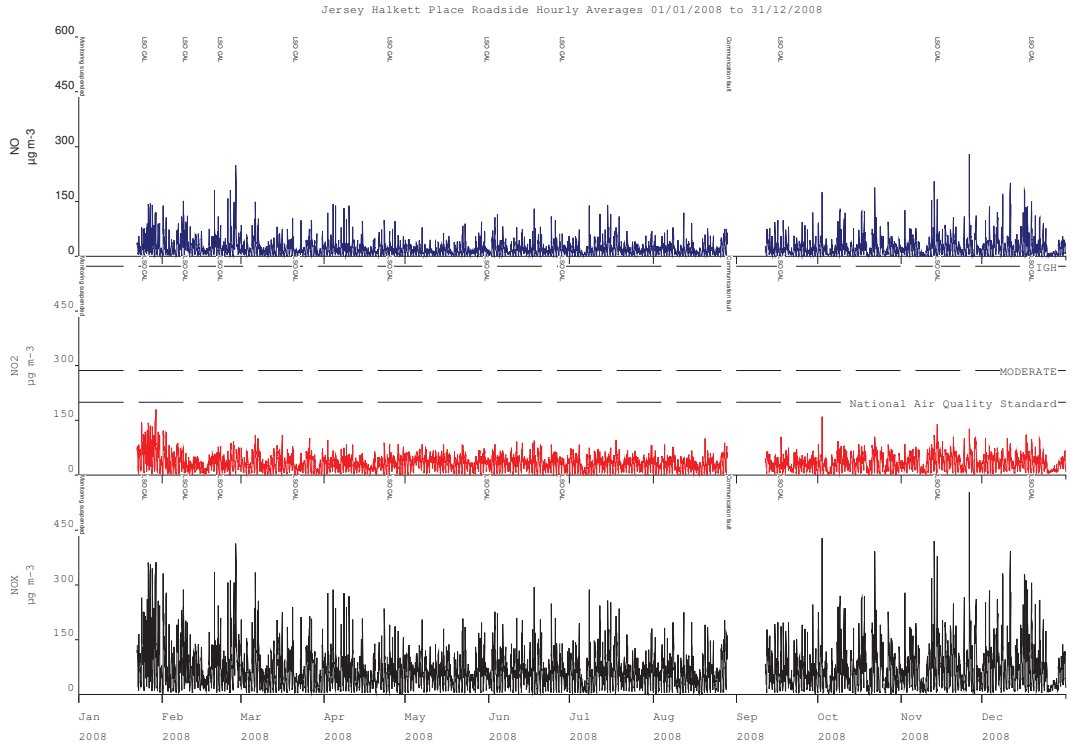
Table 7 shows the key statistics for oxides of nitrogen measured by the automatic analyser at Halkett Place. Figure 3 shows timeseries plots of hourly mean NO, NO_2 and NOx concentrations.

Table 7 Oxides of Nitrogen: Air Quality Statistics for 2008

POLLUTANT	NO $\mu g\ m^{-3}$	NO_2 $\mu g\ m^{-3}$	NO_X $\mu g\ m^{-3}$
Maximum 15-minute mean	524	367	884
Maximum hourly mean	279	180	554
Maximum running 8-hour mean	165	117	285
Maximum running 24-hour mean	93	77	179
Maximum daily mean	83	71	169
Average	21	32	64
Data capture	90.0 %	90.0 %	90.0 %

All mass units are at 20 Celsius and 101.3 kPa.

Figure 3 Time series plots of hourly mean pollutant concentrations at Halkett Place, 2008



4.1.2 NO_2 Diffusion Tube Results

NO_2 diffusion tube results are presented in Table 8 and Figure 4. Although reported by the analyst to two decimal places, the monthly mean results reported here have been rounded to the nearest integer, in view of the estimated uncertainty of +/- 25% on diffusion tube measurements.

Individual monthly mean NO_2 results ranged from 3 $\mu g\ m^{-3}$ (in July at the rural background Rue de Raisies site), to 55 $\mu g\ m^{-3}$ (in May at the kerbside Beaumont site). One tube (the November tube, at Georgetown) inadvertently had the wrong end cap removed and gave a result below the detection limit (which was rejected).

Results from the Halkett Place site (where diffusion tubes are co-located with an automatic analyser) were used to calculate a bias adjustment factor of 0.98 – see Appendix 2.

Annual mean NO_2 concentrations (after application of this bias adjustment factor) ranged from 6 $\mu g\ m^{-3}$ (at the rural Rue des Raisies site) to 38 $\mu g\ m^{-3}$ at the Weighbridge site. The latter is a location in the centre of St Helier which is used as a central stopping point for buses, and has produced the highest annual mean concentration in several previous years.

4.1.3 Precision and Accuracy of NO_2 Diffusion Tubes

Diffusion tubes were exposed in triplicate at the automatic Halkett Place site: this allows an investigation of diffusion tube precision. Precision may be expressed in terms of the coefficient of variation (CV) of the three replicate measurements. This parameter, also known as the relative standard deviation, is the standard deviation expressed as a percentage of the mean.

For diffusion tubes exposed in triplicate, the CV is usually expected to be within 10% on average. This is based purely on experience of what a competent laboratory is typically able to achieve, although it can be affected by conditions at the site. It is not uncommon for diffusion tube precision to occasionally be poor; this is not a cause for concern if the precision over the rest of the year is consistently good.

At Central Market, the CV of the monthly tube triplets ranged from 1% to 28%, with a mean of 11%. There were three occasions when this value was particularly high. In January, the three results were 19 $\mu g\ m^{-3}$, 29 $\mu g\ m^{-3}$ and 32 $\mu g\ m^{-3}$. The lowest of these results is much lower than the other two. It therefore appears to be an outlier (possibly a faulty tube), and was been rejected from the dataset. Similarly, in August the three results were 18 $\mu g\ m^{-3}$, 12 $\mu g\ m^{-3}$ and 19 $\mu g\ m^{-3}$. The lowest of these appears to be an outlier and was rejected as most likely a faulty tube. In June, the three results were 21 $\mu g\ m^{-3}$, 31 $\mu g\ m^{-3}$ and 37 $\mu g\ m^{-3}$. In this case, there is no obvious outlier and none of the three results have been rejected.

The rejected values were not included in the calculation of the annual mean result for the site, or in calculating the bias adjustment factor. Removing these two values reduced the mean CV to 8%. Once these two outlying values had been removed, the mean NO_2 concentration as measured by the diffusion tubes was 32 $\mu g\ m^{-3}$. The bias adjustment factor was calculated as 0.98.

4.2 Comparison with NO_2 Guidelines, Limit Values, and Objectives

Limit Values, AQS Objectives and WHO guidelines for NO_2 are shown in Appendix 1. These are based on the hourly and annual means.

The WHO non-mandatory guideline[14] for NO_2 is that the annual mean should not exceed 40 μg m^{-3}. The EC Directive on Ambient Air Quality and Cleaner Air for Europe[15] contains Limit Values for NO_2 as follows:

- 200 μg m^{-3} as an hourly mean, not to be exceeded more than 18 times per calendar year. To be achieved by 1st January 2010.
- 40 μg m^{-3} as an annual mean, for protection of human health. To be achieved by 1st January 2010.
- There is also a limit for annual mean total oxides of nitrogen (NO_x), of 30 μg m^{-3}, for protection of vegetation (relevant in rural areas).

The UK Air Quality Strategy[16] contains Objectives for NO_2, which are very similar to the EC Directive limits above: the only difference being that they had to be achieved by 31st December 2005.

The 1-hour mean at the Halkett Place automatic monitoring site did not exceed 200 μg m^{-3} on any occasion during 2008. Therefore this site meets the hourly mean EC Directive Limit Value and AQS Objective for this parameter. The annual mean concentration of 32 μg m^{-3} at Halkett Place is within the EC Limit Value of 40 μg m^{-3}.

Because of the long sampling period of diffusion tubes, it is only possible to compare the results from the diffusion tube sites in this study against limit values relating to the annual mean. Annual mean NO_2 concentrations did not exceed 40μg m^{-3} at any sites in 2008. The highest annual mean concentration of 38 μg m^{-3} (after bias adjustment) was measured at Weighbridge. This urban kerbside site in the centre of St Helier has recorded relatively high annual mean NO_2 concentrations throughout previous years of this survey, and has, in previous years, exceeded the EC Limit Value. As annual mean NO_2 concentrations can vary considerably from year to year due to meteorological and other factors, it is possible that exceedences could occur in future years.

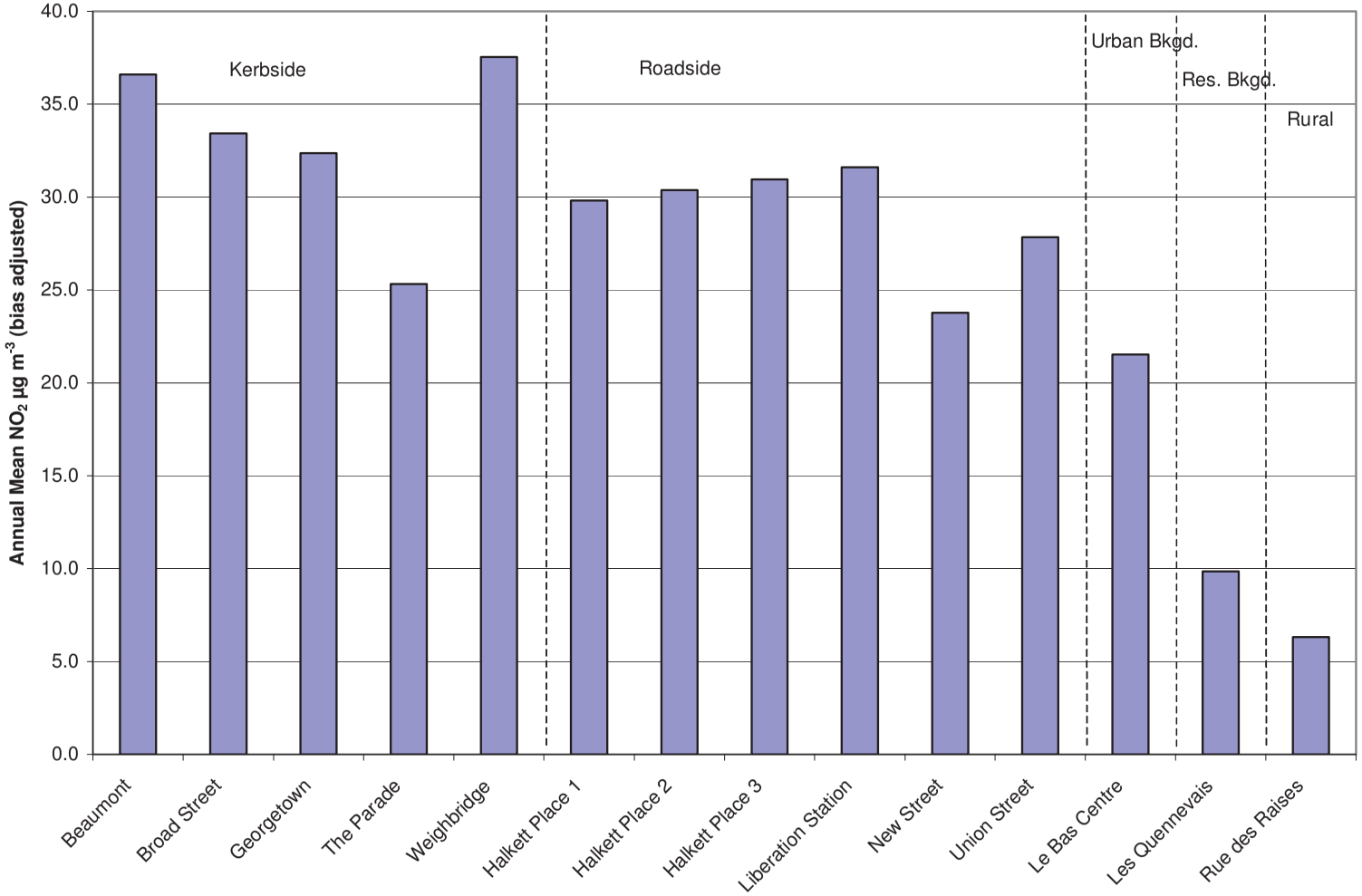
The 30μg m^{-3} limit for protection of vegetation is only applicable at rural sites, and is therefore only relevant to Rue des Raisies. The annual mean NO_2 concentration of 6 μg m^{-3}at this rural site was well within the limit value.

Table 8 NO_2 Diffusion Tube Results 2008, Jersey. Concentrations (rounded to nearest integer) in $\mu g\ m^{-3}$.

Site	Jan-08	Feb-08	Mar-08	Apr-08	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Mean	*Bias adjusted*
First Tower (K)	33	43												
Weighbridge (K)	36	38	36	41	41	40	46	31	24	49	41	38	**38**	***38***
Georgetown (K)	29	46	27	36	49	36	30	14	23	36	no data	38	**33**	***32***
Beaumont (K)	30	45	36	47	55	45	37	16	20	28	45	46	**37**	***37***
The Parade (K)	30	40	27	29	22	19	25	13	14	30	30	31	**26**	***25***
Broad Street (K)	34	44	37	38	31	38	39	23	17	44	36	28	**34**	***33***
La Pouquelaye (K)	38	52												
Havre des Pas (K)	19	32												
Commercial Buildings (K)	19	43												
New Street (R)	26	48	21	36	34	14	18	16	17	18	16	27	**24**	***24***
Union Street (R)	47	33	35	24	22	25	28	16	17	31	32	33	**28**	***28***
Halkett Place 1 (R)	(19 *)	43	31	38	33	37	24	18	25	31	35	32	**31**	***31***
Halkett Place 2 (R)	29	41	29	34	39	31	31	(12 *)	23	35	34	34	**33**	***32***
Halkett Place 3 (R)	31	39	31	37	39	21	33	19	27	33	34	36	**32**	***31***
Halkett Place (avg. of 3 tubes) (R)	**30**	**41**	**30**	**37**	**37**	**30**	**29**	**18**	**25**	**33**	**34**	**34**	**32**	***32***
Liberation Stn (R)	26	41	28	37	41	38	34	18	18	30	38	38	**32**	***32***
Le Bas Centre (UB)	26	33	21	25	23	15	21	13	14	22	24	26	**22**	***22***
Seaton Place (UB)	34	44												
Jane Sandeman (UB)	16	24												
Saville Street (UB)	15	36												
Beresford St (UB)	30	43												
Mont Felard (UB)	21	32												
Les Quennevais (RB)	10	19	6	10	14	7	6	5	8	10	12	15	**10**	***10***
Langley Park (RB)	16	25												
Clos St.Andre (RB)	16	24												
Maufant (RB)	15	23												
Rue Des Raisies (Rural)	6	13	4	7	7	6	4	3	4	5	7	12	**7**	***6***

** = outlying values in co-located triplet, rejected.*
K = Kerbside, R = Roadside, UB = Urban Background, RB = Residential Background, Rural = Rural Background.

Figure 4 Comparison of Annual Mean Nitrogen Dioxide Concentrations at All Jersey Sites, 2008 (Bias Adjustment Factor Applied)



4.3 Diurnal and Seasonal Variation in NO_2 Concentration

4.3.1 Diurnal variation in NO_2 concentration at Halkett Place

Figure 5 shows how concentrations of nitrous oxide (NO) and nitrogen dioxide (NO_2) typically varied over the course of the day, at Halkett Place.

The curve for NO (which is a primary pollutant, i.e. directly emitted from source, and arises from road vehicles and other combustion sources) shows a very sharp morning peak at 0600 - 0800. Concentrations decrease during the middle of the day, with an afternoon “plateau” before concentrations fall at around 1800. There is barely any afternoon or evening rush-hour peak.

For NO_2, which has both primary (directly emitted) and secondary (due to oxidation of NO) components, there is again a pronounced morning rush-hour peak, only slightly lower than for NO. There is no real afternoon peak.

Based on AEA’s experience with data from the Automatic Urban and Rural Network, the morning peak in NO and NO_2 is typical for urban sites, reflecting the increased levels of these pollutants associated with morning rush-hour traffic. However, at Halkett Place it is particularly early and particularly sharp. This may be explained by the fact that there is a market at Halkett Place every day except Sundays: the peak coincides with the time at which the market traders arrive and set up for the day. In addition, a skip lorry arrives at this time to collect the previous day’s refuse. It is believed that vehicle emissions from these activities are responsible for the distinctive morning pattern at Halkett Place.

Halkett Place does not exhibit an afternoon or evening rush-hour peak (as observed at many roadside AURN sites). This is unusual for an urban site: in the afternoon, concentrations of oxidising agents, particularly ozone, in the atmosphere tend to increase, leading to enhanced oxidation of NO to NO_2. This typically causes the afternoon NO_2 peak at many urban sites to be higher than the morning NO_2 peak. However, this is not the case at Halkett Place.

4.3.2 Seasonal variation in NO_2 concentration

Figure 6 shows the monthly mean NO_2 concentrations measured at the diffusion tube sites and at Halkett Place. This shows the means of the five kerbside and four roadside sites which continued operation for the full year, and the monthly means measured at the single urban background site (Le Bas Centre), urban residential site (Les Quennevais) and rural site (Rue des Raisies). Monthly means (based on the same periods as the diffusion tube exposures) are also shown for the Halkett Place automatic site.

The typical pattern in urban areas is for NO_2 concentrations to be generally higher in the winter and lower in the summer. In 2008, the highest concentrations at the diffusion tube sites were typically measured in February (although Halkett Place measured its highest monthly mean in November.) Lowest monthly means occurred in August and September. These general patterns are consistent with those observed in the UK as a whole; much of the UK saw high levels of NOx in February 2008.

Figure 5 Diurnal Variation in concentrations of oxides of nitrogen, Halkett Place

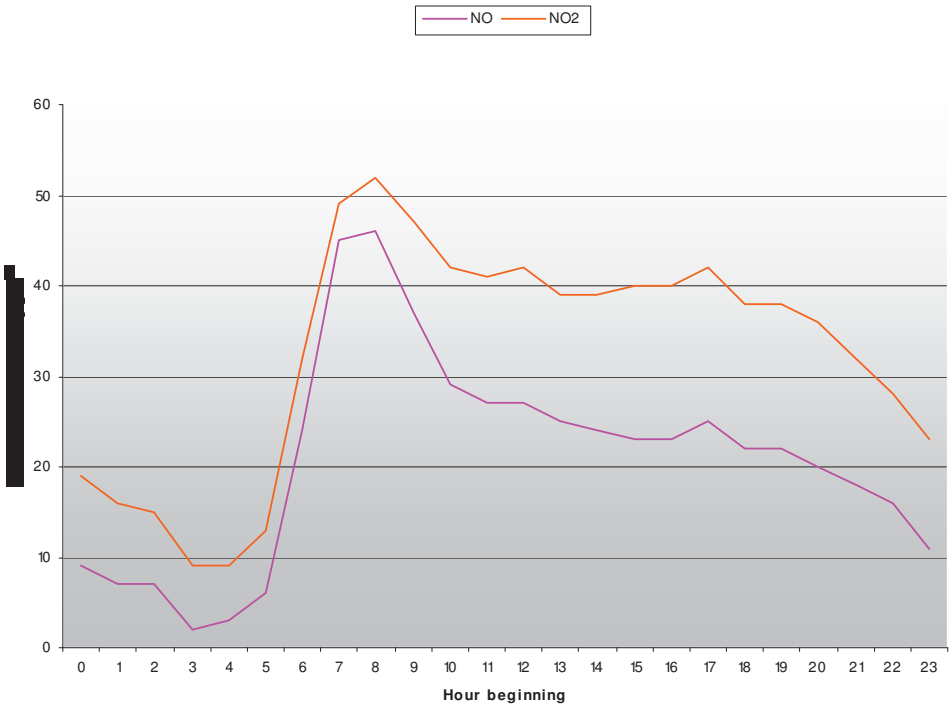
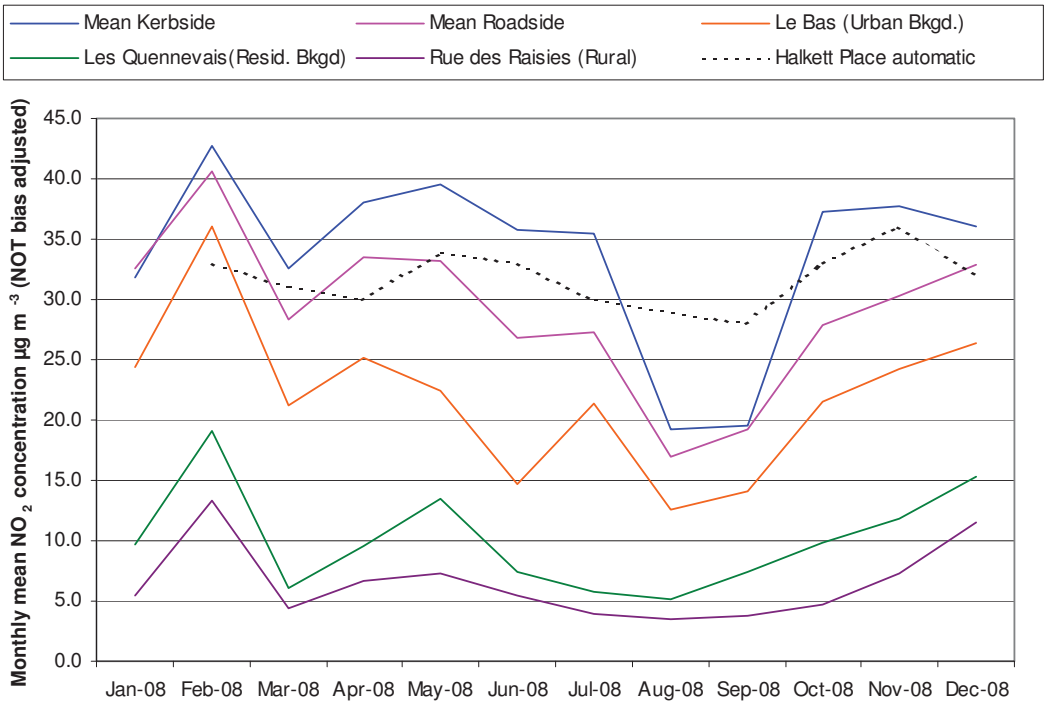


Figure 6 Monthly Mean NO_2 Concentrations at Diffusion Tube Sites and Halkett Place



4.3.3 Comparison with UK NO_2 data

Table 9 compares the NO_2 concentrations measured at Halkett Place with those measured at a selection of UK air quality monitoring stations using automatic (chemiluminescent) NO_2 analysers. The automatic data have been fully ratified. The sites used for comparison are as follows:

- Exeter Roadside – a roadside site in the centre of Exeter, Devon.
- Brighton Roadside – a roadside site in the coastal city of Brighton, Sussex.
- Brighton Preston Park – an urban background site in Brighton.
- Southend on Sea – an urban background site in the coastal town of Southend, Essex.
- Lullington Heath - a rural site on the South Coast of England near the town of Eastbourne.
- Harwell - a rural site in the south of England, within 10km of a power station.

Table 9 Comparison of NO_2 in Jersey with UK Automatic Sites

Site	2008 Annual average NO_2, $\mu g\ m^{-3}$
Exeter Roadside	38
Brighton Roadside	38
Brighton Preston Park	20
Southend on Sea	23
Lullington Heath	9.7
Harwell	10.1
Halkett Place (auto.)	32

The bias adjusted annual mean NO_2 concentrations measured at the kerbside and roadside sites in Jersey (rounded to the nearest integer) ranged from 24 to 38 $\mu g\ m^{-3}$. The annual means at Exeter Roadside and Brighton Roadside were at the upper end of this range, and were higher than the annual mean at the Halkett Place automatic site (and co-located diffusion tubes). The Jersey urban background site at Le Bas Centre had a (bias adjusted) annual mean NO_2 concentration of 22 $\mu g\ m^{-3}$; this is comparable to the annual means from the urban background sites in Southend and Brighton. The residential background site at Les Quennevais had a bias-adjusted annual mean NO_2 concentration of 10$\mu g\ m^{-3}$ - more comparable with rural sites such as Lullington Heath and Harwell. The bias-adjusted annual mean of 6.3 $\mu g\ m^{-3}$ at the Jersey rural background site, Rue des Raisies, as in previous years, was considerably lower than that measured at either Harwell or Lullington Heath.

4.3.4 Comparison with Previous Years' Nitrogen Dioxide Results

In February 2008, the three longest-running NO_2 diffusion tube sites (Beaumont, Jane Sandeman Road and Maufant) were closed as part of the streamlining of the monitoring programme. These sites (which had been in operation since 1993 as part of the former UK Nitrogen Dioxide Network) pre-dated the rest of the survey by several years, and were used to monitor long-term trends in previous reports in this series. However, this poses no difficulty, as several of the remaining sites have been in operation since 2000, which is long enough to assess trends. Accordingly, this section is based on these long-running sites.

Table 10 shows annual mean concentrations at the eight sites in operation since 2000 and remain in operation at the present time. These annual means are also illustrated in Figure 7. ***These data are not adjusted for diffusion tube bias; prior to 2002 there was no reliable information on which to carry out bias adjustment, so for consistency, unadjusted data are used in this section.***

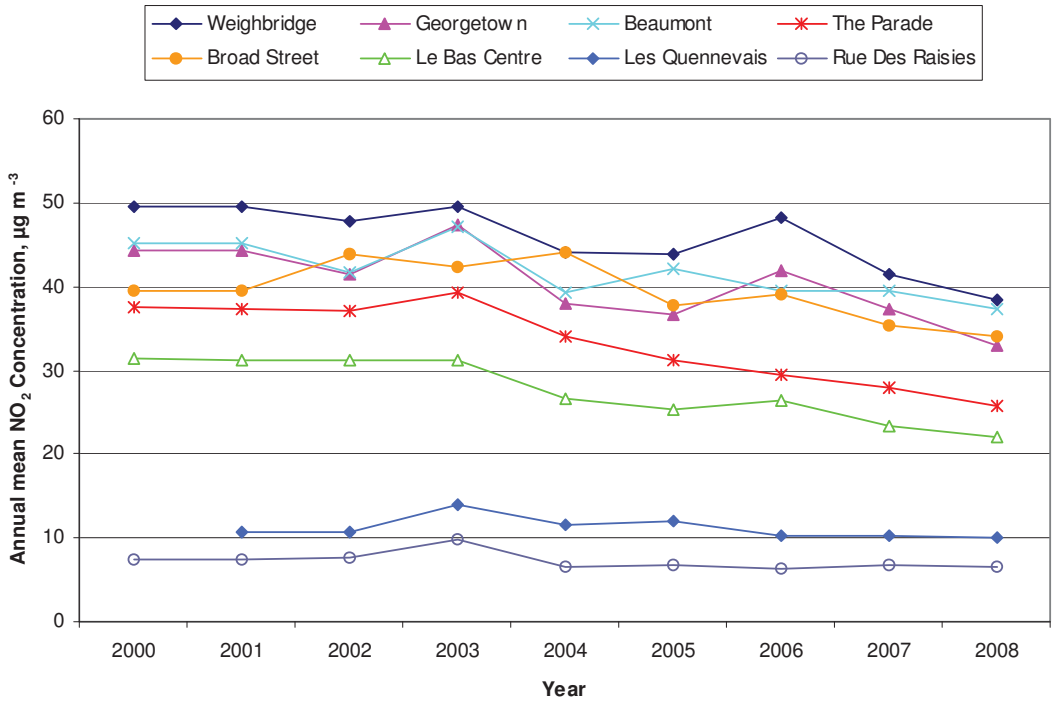
Annual mean NO_2 concentrations at the kerbside, roadside and urban background sites (Weighbridge, Georgetown, Beaumont, the Parade, Broad Street, and Le Bas) gave cause for concern in the early years of the study (2000 to 2003). Many were above the EC Directive Limit Value of 40 $\mu g\ m^{-3}$, and there was no sign of concentrations decreasing. However, from 2004 onwards, concentrations began to decrease, and all are now within the Limit Value (although exceedences in future years cannot be ruled out, as NO_2 concentrations vary from year to year due to meteorological and other factors).

The residential background and rural sites at Les Quennevais and Rue des Raisies do not show any consistent upward or downward trend in NO_2 concentration: but levels here are already low so this is not of concern.

Table 10 Annual mean NO_2 concentrations, $\mu g\ m^{-3}$ (not bias adjusted)

Site	2000	2001	2002	2003	2004	2005	2006	2007	2008
Weighbridge	49	49	48	50	44	44	48	41	38
Georgetown	44	44	41	47	38	37	42	37	33
Beaumont	45	45	42	47	39	42	39	40	37
The Parade	37	37	37	39	34	31	29	28	26
Broad Street	40	39	44	42	44	38	39	35	34
Le Bas Centre	31	31	31	31	27	25	26	23	22
Les Quennevais	-	11	11	14	12	12	10	10	10
Rue Des Raisies	7	7	8	10	6	7	6	7	7

Figure 7 Annual Mean NO_2 Concentrations (not adjusted for diffusion tube bias).



4.4 Hydrocarbons

Full monthly results of the hydrocarbon survey for the six sites are shown in Appendix 3, Tables A3.1 to A3.6. Graphical representations are shown in Figures 8 to 13.

A summary of annual average hydrocarbon concentrations is shown in Table 11.

Table 11 Summary of Average Hydrocarbon Concentrations, Jersey, 2008

Site	Benzene, $\mu g\ m^{-3}$	Toluene, $\mu g\ m^{-3}$	Ethyl Benzene, $\mu g\ m^{-3}$	m+p Xylene, $\mu g\ m^{-3}$	o Xylene, $\mu g\ m^{-3}$
Beresford Street	1.6	6.1	1.4	4.3	1.6
Le Bas Centre	1.4	5.6	1.4	3.7	1.4
Handsford Lane *(paint spraying)*	1.0	4.0	2.2	7.6	2.2
Springfield Garage *(petrol station)*	4.2	21.7	3.5	11.4	4.4
Clos St Andre	0.8	2.1	1.0	1.5	0.5
Airport	0.6	1.7	0.3	0.8	0.3

Full data capture was achieved at all sites, except Springfield Garage, where the November tube went missing and was not returned.

In addition, the following data anomaly occurred: the reported April results for Springfield Garage were very low compared to what is usual at the site, while the reported April results at Clos St Andre were very high compared to the site's usual measurements. It is therefore strongly suspected that the April tubes for these two sites were accidentally confused or mis-labelled at some stage. However, there is no evidence that this has indeed happened, and in the absence of proof, the April results from both sites have been treated as spurious and rejected.

The Springfield Garage monitoring site continues to record the highest annual mean concentrations of all five BTEX compounds, as it typically has in previous years.

The Handsford Lane site (near a paint spraying process) measured second highest levels of ethylbenzene and xylenes than most of the other sites, as it typically has in previous years. However, benzene concentrations at Handsford Lane were no higher than those at Beresford Street or Le Bas; the nearby paint spraying process is not a significant source of benzene. In previous years, Handsford Lane has also measured second highest levels of toluene; but in 2008 toluene concentrations there were no higher than those at the two urban background sites, Beresford Street and Le Bas Centre.

The Airport site, which is in rural surroundings, recorded the lowest annual mean concentrations of all the BTEX hydrocarbons. BTEX concentrations at Clos St Andre were only slightly higher.

Figure 8 Monthly mean hydrocarbon concentrations at Beresford Street, 2008

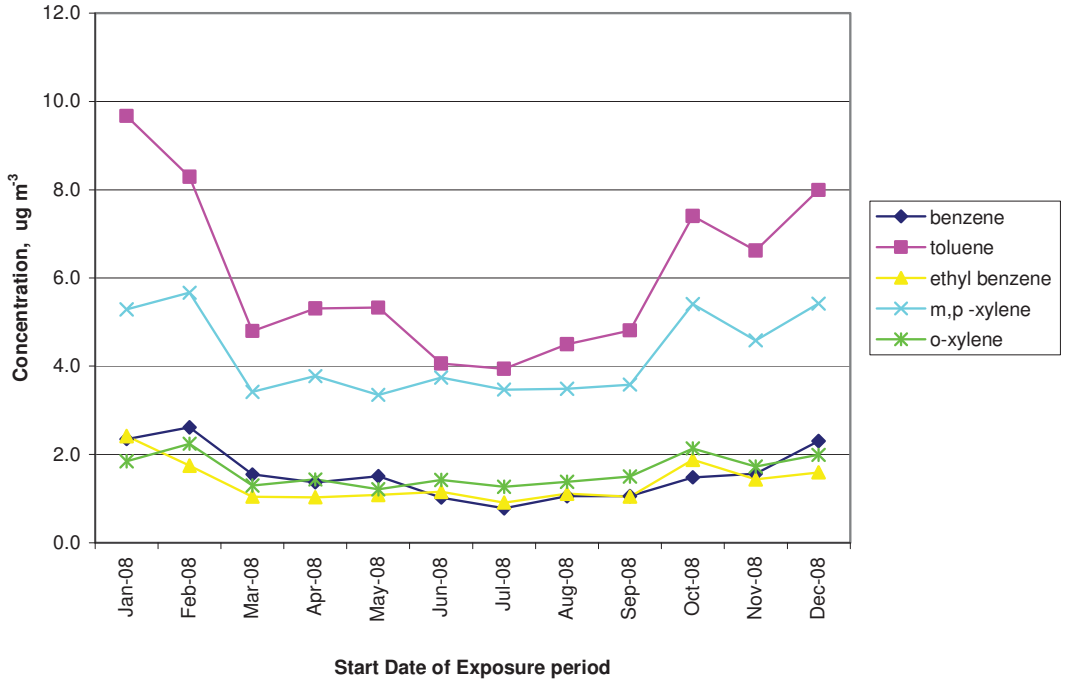


Figure 9 Monthly mean hydrocarbon concentrations at Le Bas Centre, 2008

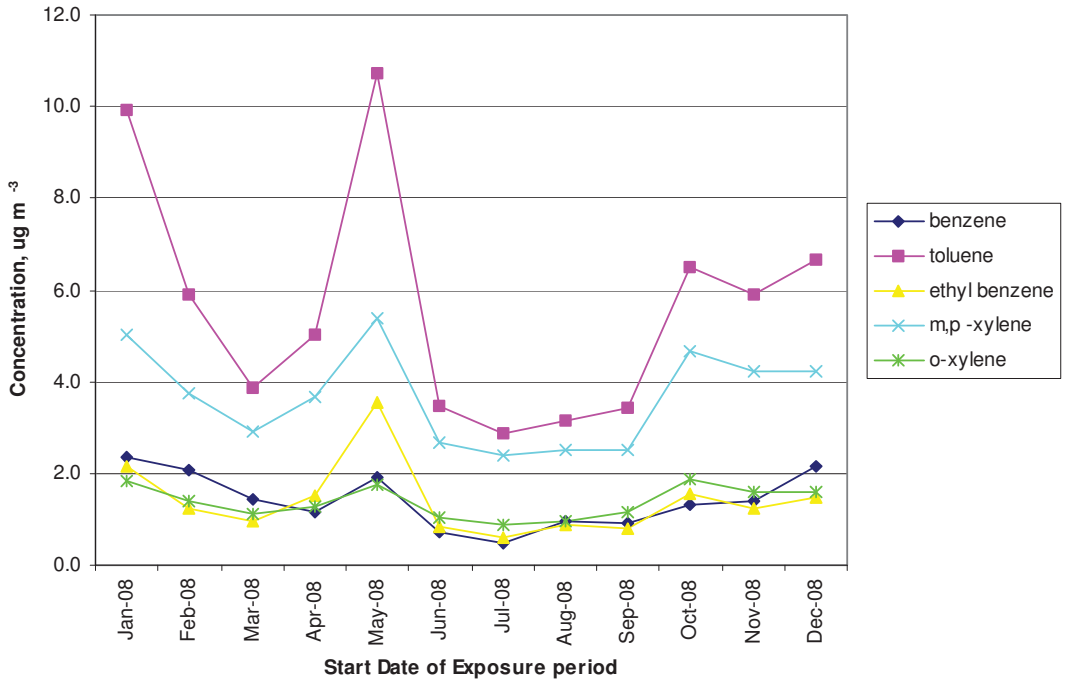


Figure 10 Monthly mean hydrocarbon concentrations at Handsford Lane, 2008

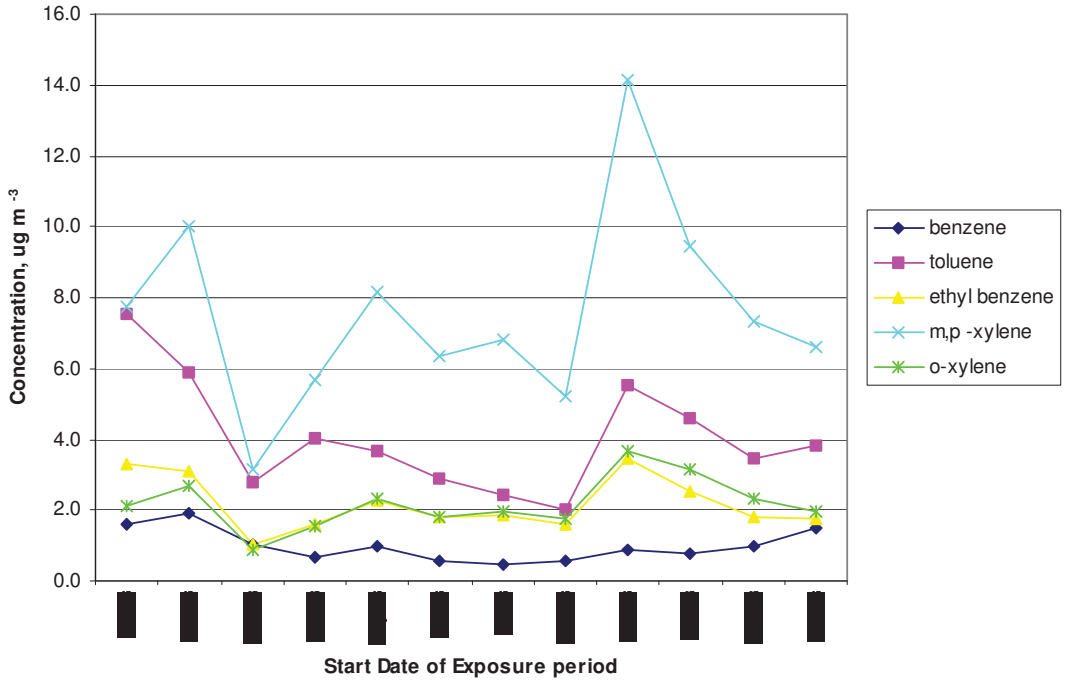


Figure 11 Monthly mean hydrocarbon concentrations at Springfield Garage, 2008

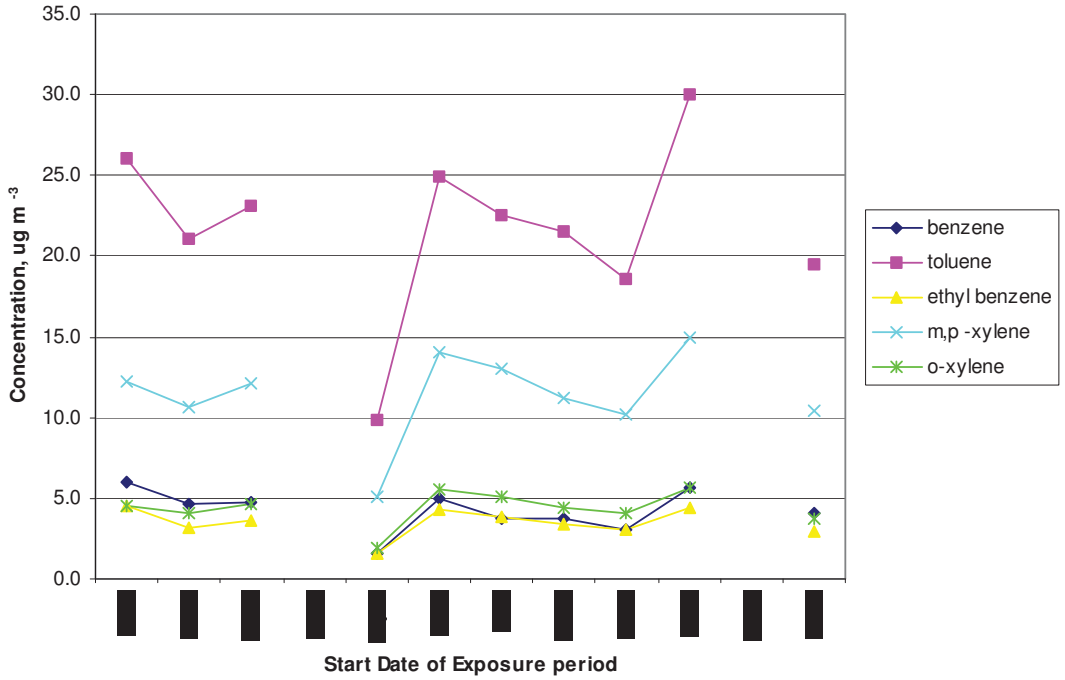


Figure 12 Monthly mean hydrocarbon concentrations at Clos St Andre, 2008

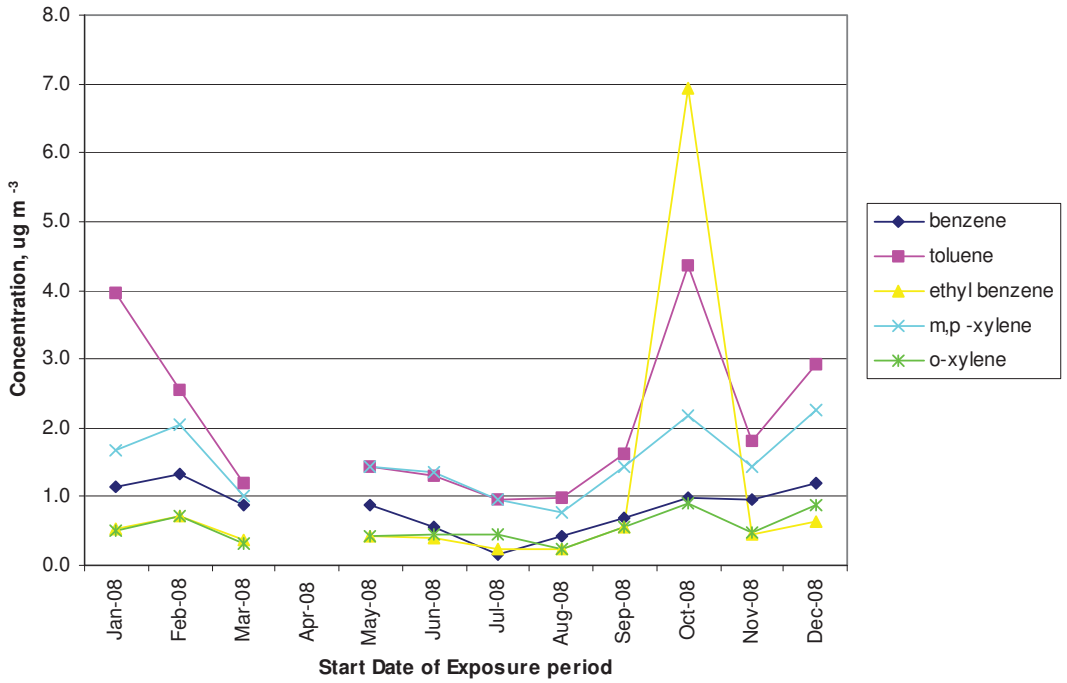
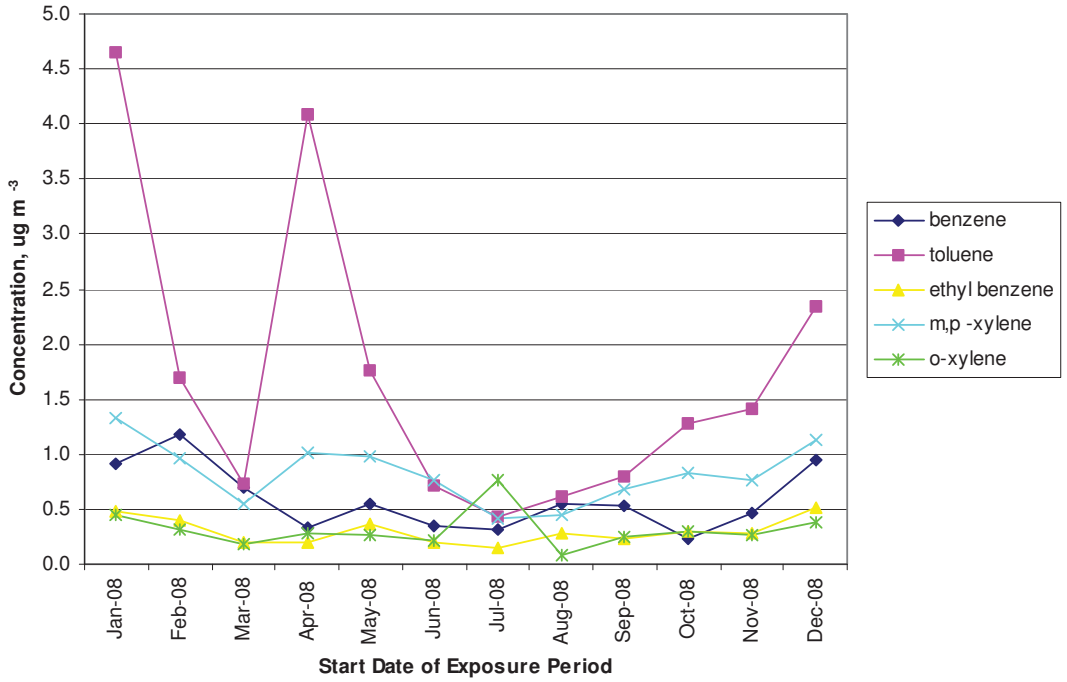


Figure 13 Monthly mean hydrocarbon concentrations at the Airport, 2008



4.4.1 Comparison With Limit Values and Objectives

Of the hydrocarbon species monitored, only benzene is the subject of any applicable air quality standards. The EC Directive on Ambient Air Quality and Cleaner Air for Europe[15] sets a limit of 5 μg m^{-3} for annual mean benzene, to be achieved by 2010. All sites met this limit in 2008.

The UK Air Quality Strategy[16] sets the following objectives for benzene:

- 16.25μg m^{-3} (for the running annual mean), to have been achieved by 31st December 2003
- 3.25 μg m^{-3} (for the calendar year mean), to be achieved by 31st December 2010.

These are applicable to the whole UK (though not at present mandatory in Jersey). The annual mean benzene concentration (which can be considered a good indicator of the running annual mean) did not exceed the 2003 Objective of 16.25μg m^{-3} at any of the Jersey sites. However, one site (Springfield Garage) had an annual mean of 4.2 μg m^{-3}: this is greater than the 2010 objective of 3.25 μg m^{-3}, therefore Springfield Garage does not at present meet this Objective.

4.4.2 Comparison with UK Benzene Data

Benzene was measured using pumped-tube samplers at a large UK-wide network of 30 UK sites in 2008. Annual mean concentrations ranged from 0.44 μg m^{-3} (at Oxford St Ebbes) to 1.44 μg m^{-3} (at Yarm, Stockton-on-Tees).

Table 12 compares benzene data from the Jersey sites, with two UK monitoring stations, located in cities on the south coast of England and one urban background site in central London. (Please note that not all the sites used for comparison in previous years were available for 2008). The comparison sites are:

- Plymouth – an urban background site in the coastal city of Plymouth, Devon
- Southampton – a roadside site in the city of Southampton
- Urban background site in central London

It should be noted that these sites use a different technique (pumped tubes) for measuring benzene than the Jersey sites. Therefore this comparison should be treated as indicative only.

Table 12 Comparison with Benzene Concentrations at Other UK Sites, 2008

Site	Benzene, μg m^{-3}
Jersey Sites	
Beresford Street	1.6
Le Bas Centre	1.4
Handsford Lane *(paint spraying)*	1.0
Springfield Garage *(petrol station)*	4.2
Clos St Andre	0.8
Airport	0.6
Mainland UK sites	
Plymouth	0.58
Southampton	0.94
London Bloomsbury	0.78

The annual mean benzene concentration at Springfield Garage (where fuels are stored) was higher than any of the other Jersey or UK Network sites, including the roadside site at Southampton and

Hove. Prior to 2006 it was reported that benzene levels at Clos St Andre and the Airport were lower than typical UK urban levels; however, UK urban levels have decreased and this is no longer the case.

4.4.3 Comparison with Previous Years' Hydrocarbon Results

Figures 14 – 19 show how annual mean hydrocarbon concentrations at the six Jersey sites have changed over the years of monitoring. These data are also provided in tabular form in Appendix 3.

Annual mean levels of benzene were slightly lower in 2008 than in the previous year, at all sites except Clos St Andre where they were the same. Annual mean toluene concentrations at all sites were lower in 2008 compared to 2007. Annual mean concentrations of ethylbenzene and xylenes were comparable with 2007 concentrations at all sites – at some, they were slightly higher, at others lower. However, it is important to remember that pollutant concentrations are expected to show considerable year-to-year variation, due to meteorological and other factors. Year-to year changes are therefore of less importance than the observation of long-term trends, which are discussed below.

Figure 14 Trends in Benzene Concentration

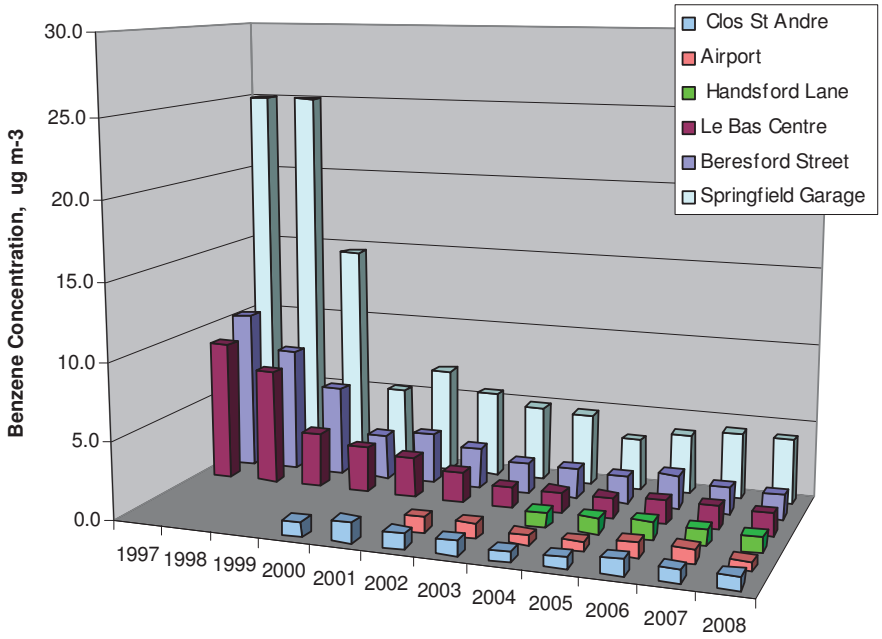


Figure 16 Trends in Toluene Concentration

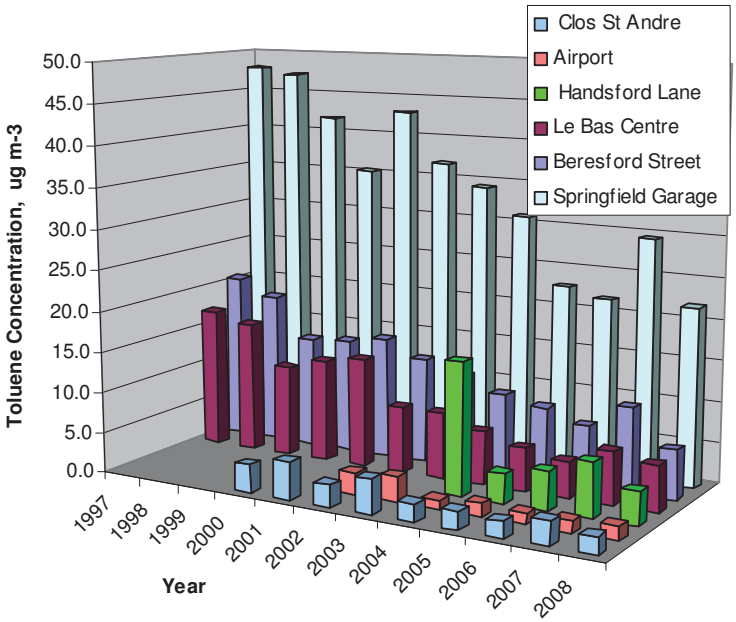


Figure 15 Trends in Ethylbenzene Concentration

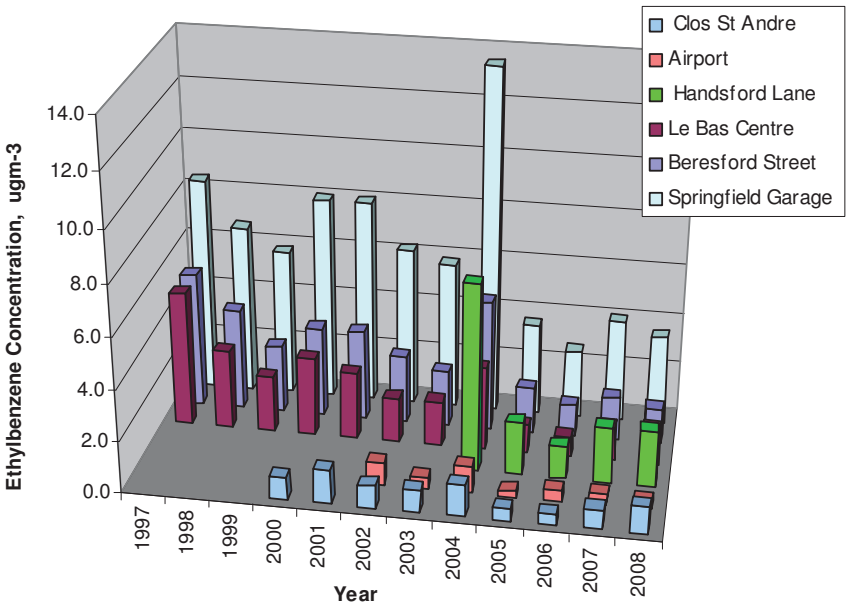


Figure 18 Trends in m+p- Xylene Concentration

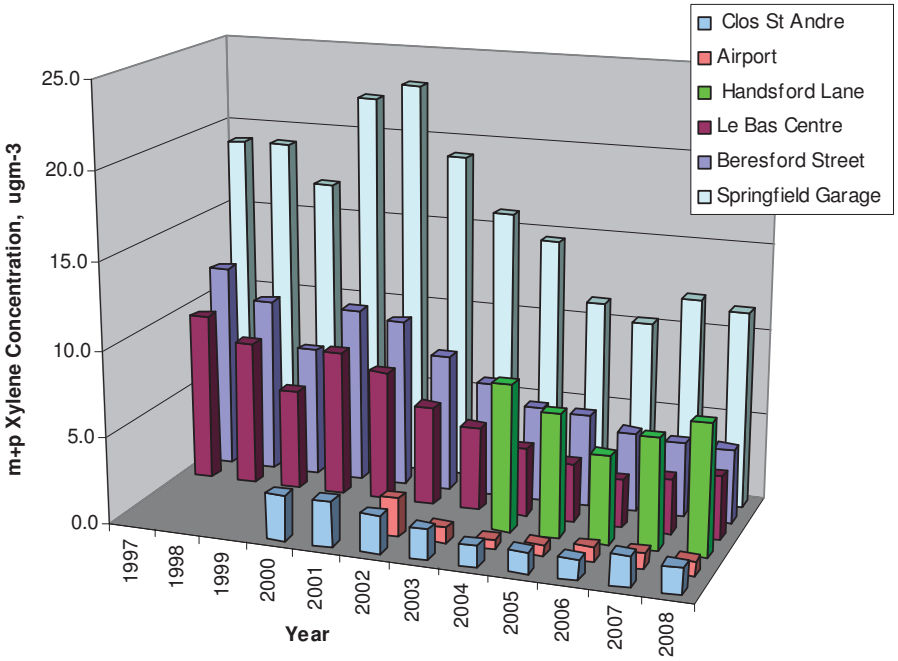
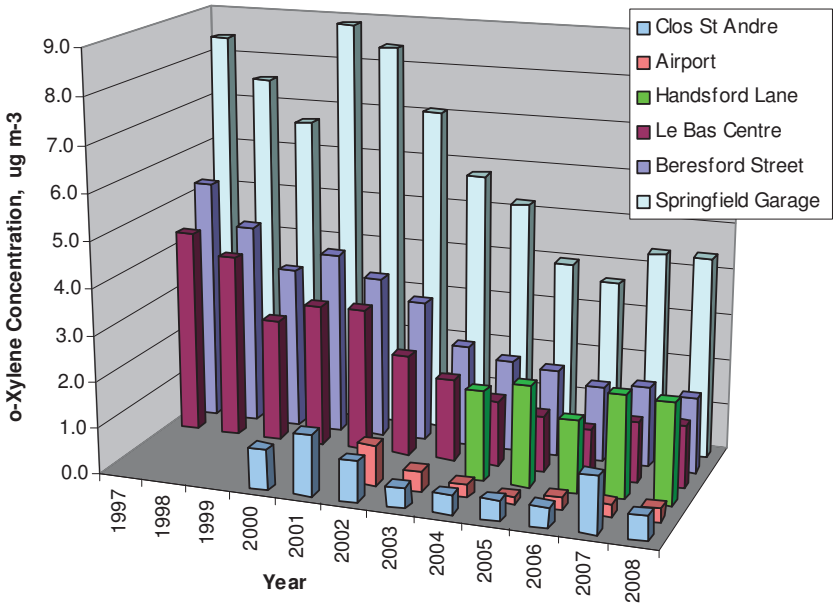


Figure 19 Trends in o-Xylene Concentration



Most hydrocarbon species appear to have decreased over the ten years of monitoring, being in most cases lower now than in the late 1990s. Key observations include:

- Benzene showed a marked drop in 2000, especially at Springfield Garage: this is due to the maximum permitted benzene content of petrol sold in the UK being reduced from 2% in unleaded (5% in super unleaded), to 1% as of 1st January 2000. Concentrations have remained stable (with small fluctuations) since around 2004.
- Toluene concentrations show a downward trend over the earlier years of the survey (1997-2004) but little consistent change thereafter.
- Ethylbenzene concentrations have generally decreased, despite an unexplained increase in 2004.
- Concentrations of m+p xylene, and of o-xylene, are now generally lower than in the early years of the survey.

5 Conclusions

AEA has continued the ongoing air quality monitoring programme in Jersey during 2008, on behalf of the States of Jersey Public Health Services. 2008 was the twelfth year of monitoring. Oxides of nitrogen were monitored at one automatic monitoring station, located in a roadside position at the Central Market, Halkett Place in St Helier. 2008 was the first year of operation of this automatic monitoring station. Diffusion tubes were used to monitor NO_2 at 12 sites (the number of sites was reduced from 24 in February 2008). Diffusion tubes were co-located (in triplicate) with the automatic site at Halkett Place. Hydrocarbons (benzene, toluene, ethyl benzene and xylenes, collectively termed BTEX) were measured at 6 sites, also using diffusion tubes. The sites were located at a range of different locations on the island, many of which have been in operation since 2000, and some since 1997. Conclusions of the monitoring programme were as follows:

NO_2 results

1. The maximum hourly mean NO_2 concentration at the Halkett Place automatic monitoring station was 180 μg m^{-3}. The site therefore met the EC Directive Limit Value (and AQS Objective) of 200 μg m^{-3} for 1-hour mean NO_2 concentration, which must not be exceeded more than 18 times per calendar year.
2. The annual mean NO_2 concentration at Halkett Place was 32 μg m^{-3}. This is within the EC Directive Limit Value and AQS Objective of 40 μg m^{-3}.
3. Annual mean NO_2 concentrations at all 12 diffusion tube monitoring sites were within the EC Limit Value, and were generally comparable with the previous year's results.
4. Eight diffusion tube sites have been in operation since 2000. These indicate that while in the early years of the survey (2000 – 2004) annual mean NO_2 concentrations at kerbside and roadside sites showed little change, they now appear to be decreasing.
5. There does not appear to be any clear trend in NO_2 concentrations at the long running urban background site (Le Bas Centre), urban residential site (Les Quennevais) or rural site (Rue des Raisies); these appear to be remaining stable. However, as they are all well below the Limit Value and AQS Objective, this is not a cause for great concern.

Hydrocarbon diffusion tube results

6. No sites had annual mean benzene concentrations greater than the UK Air Quality Strategy Objective of 16.25 μg m^{-3}, which was to be achieved by the end of 2003.
7. No sites had annual mean benzene concentrations greater than the EC Directive Limit Value of 5 μg m^{-3} (which is to be achieved by 2010).
8. One site (Springfield Garage) had an annual mean benzene concentration greater than the UK Air Quality Strategy Objective of 3.25 μg m^{-3}, which is to be achieved by January 2010.
9. Annual mean concentrations of BTEX hydrocarbons were comparable with those measured in 2007.
10. Concentrations of all BTEX hydrocarbons (especially benzene) are considerably lower than in the early years of the survey. However, there has been little consistent change in the most recent years.

6 Acknowledgements

AEA Energy & Environment gratefully acknowledges the help and support of the staff of the States of Jersey Health Protection Services, in the completion of this monitoring study.

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Appendices

Appendix 1

Air Quality Limit Values, Objectives and Guidelines

Air Pollution Guidelines Used in this Report.

UK and International Ambient Air Quality Limit Values, Objectives and Guidelines

Nitrogen Dioxide

Guideline Set By	Description	Criteria Based On	Value(1) / µgm^{-3} (ppb)
The Air Quality Strategy(2)	Objective for Dec. 31st 2005, for protection of human health	1-hour mean	200 (105) Not to be exceeded more than 18 times per calendar year.
Set in regulations(3) for all UK:	Objective for Dec. 31st 2005, for protection of human health	Annual mean	40 (21)
Not intended to be set in regulations:	Objective for Dec. 31st 2000, for protection of vegetation.	Annual mean NO_x (NO_x as NO_2)	30 (16)
European Community 1985 NO_2 Directive (4) Limit remains in force until fully repealed 01/01/2010.	Limit Value	Calendar year of data: 98%ile of hourly means.	200 (105)
ED Directive on Ambient Air Quality and Cleaner Air for Europe(5)	Limit Value for protection of human health. To be achieved by Jan. 1st 2010	1 hour mean	200 (105) not to be exceeded more than 18 times per calendar year
	Limit Value for protection of human health. To be achieved by Jan. 1st 2010	Calendar year mean	40 (21)
	Limit Value (total NO_x) for protection of vegetation. To be achieved by Jul. 19th 2001	Calendar year mean	30 (16)
World Health Organisation(6) **(Non-Mandatory Guidelines)**	Health Guideline	1-hour mean	200
	Health Guideline	Annual mean	40

(1) Conversions between μg m^{-3} and ppb are as used by the EC, i.e. 1ppb NO_2 = 1.91 μg m^{-3} at 20°C and 1013 mB.
(2) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. January 2000. ISBN 0-10-145482-1 & Addendum 2003.
(3) Air Quality (England) Regulations 2000 (SI 2000/928), Air Quality (Scotland) Regulations 2000 (SSI 2000/97), Air Quality (Wales) Regulations 2000 (SI 2000/1940 (W138)).
(4) Council Directive 85/203/EEC.
(5) Council Directive 2008/50/EC.
(6) WHO Guidelines for Air Quality WHO/SDE/OEH/00.02 (2000).

Benzene

Guideline Set By	Description	Criteria Based On	Value[1] / µgm^{-3} (ppb)
The Air Quality Strategy[2,3] All UK	Objective for Dec. 31st 2003	Running annual mean	16.25 (5)
England[4] & Wales[5] only:	Objective for Dec. 31st 2010	Annual mean	5 (1.54)
Scotland[6] & Northern Ireland	Objective for Dec. 31st 2010	Running annual mean	3.25 (1.0)
ED Directive on Ambient Air Quality and Cleaner Air for Europe [8]	Limit Value. To be achieved by Jan 1st 2010	Annual calendar year mean	5 (1.5)

(1) Conversions between μg m^{-3} and ppb are those used by the EC, i.e. 1ppb benzene = 3.25 μg m^{-3} at 20°C and 1013 mB.
(2) The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. January 2000. ISBN 0-10-145482-1 & Addendum 2003.
(3) Air Quality (England) Regulations 2000 (SI 2000/928), Air Quality (Scotland) Regulations 2000 (SSI 2000/97), Air Quality (Wales) Regulations 2000 (SI 2000/1940 (W138)).
(4) Air Quality (Amendment) (England) Regulations 2002 (SI 2002/3043)
(5) Air Quality (Amendment) (Wales) Regulations 2002 (SI 2002/3182 (W298))
(6) Air Quality (Amendment) (Scotland) Regulations 2002 (SI 2002/297)
(7) Council Directive 2008/50/EC.

Appendix 2

Nitrogen Dioxide Diffusion Tubes: Bias Adjustment Factor

The precision and accuracy of the diffusion tubes in this study were quantified by exposing them in triplicate alongside the automatic NOx analyser at Halkett Place.

The percentage by which the diffusion tubes over-or under-estimate with respect to the automatic chemiluminescent analyser (defined within the European Community as the reference method for NO_2) is calculated as follows:

Percentage bias B = 100 x (D-C)/C

- where D = the average NO_2 concentration as measured using diffusion tubes and C is the average NO2 concentration as measured using the automatic analyser.

The diffusion tube annual mean concentrations measured at the other (non-co-located) sites can be adjusted for the diffusion tube over/under-read, by application of a bias adjustment factor, calculated as follows:

Bias adjustment factor = C/D (where D and C are the annual mean NO_2 concentrations as measured using diffusion tubes and the automatic analyser respectively, as above).

These calculations were carried out using a spreadsheet tool developed by AEA: see Figure A2.1 below. This spreadsheet shows the diffusion tube concentrations to 1 decimal place as reported by the analyst – but given the uncertainty on diffusion tube measurements it is only considered valid to report to the nearest integer in the report.

Figure A2.1 Precision and Bias Spreadsheet, showing Halkett Place dataset.

Checking Precision and Accuracy of Triplicate Tubes

AEA Energy & Environment
From the AEA group

Diffusion Tubes Measurements

Period	Start Date dd/mm/yyyy	End Date dd/mm/yyyy	Tube 1 μgm^{-3}	Tube 2 μgm^{-3}	Tube 3 μgm^{-3}	Triplicate Mean	Standard Deviation	Coefficient of Variation (CV)	95% CI of mean
1	03/01/2008	30/01/2008		28.8	31.5	30	1.9	6	17.0
2	30/01/2008	28/02/2008	42.7	40.8	38.5	41	2.1	5	5.2
3	28/02/2008	02/04/2008	30.6	28.1	30.7	30	1.5	5	3.7
4	02/04/2008	30/04/2008	38.2	34.4	37.3	37	2.0	6	5.0
5	30/04/2008	28/05/2008	32.8	39.1	39.3	37	3.7	10	9.1
6	28/05/2008	02/07/2008	37.1	30.7	20.7	30	8.3	28	20.5
7	02/07/2008	29/07/2008	24.4	31.0	32.9	29	4.5	15	11.1
8	29/07/2008	03/09/2008	17.9		18.5	18	0.4	2	3.8
9	03/09/2008	01/10/2008	24.8	23.0	27.3	25	2.1	9	5.3
10	01/10/2008	29/10/2008	31.3	35.1	32.7	33	1.9	6	4.8
11	29/10/2008	03/12/2008	34.7	34.2	33.9	34	0.4	1	1.0
12	03/12/2008	07/01/2009	31.5	34.4	35.8	34	2.2	6	5.5
13									

It is necessary to have results for at least two tubes in order to calculate the precision of the measurements

Automatic Method		Data Quality Check	
Period Mean	Data Capture (% DC)	Tubes Precision Check	Automatic Monitor Data
59	28.7	Good	Poor Data Capture
33	99.3	Good	Good
31	99.6	Good	Good
30	99.7	Good	Good
34	99.7	Good	Good
33	99.6	Poor Precision	Good
30	99.8	Good	Good
29	83.4	Good	Good
28	70.7	Good	Poor Data Capture
33	99.3	Good	Good
36	99.9	Good	Good
32	99.9	Good	Good
Overall survey -->		Good precision	Poor Overall DC

(Check average CV & DC from Accuracy calculations)

Site Name/ ID:	Jersey Halkett Place

Precision: 11 out of 12 periods have a CV smaller than 20%

Accuracy (with 95% confidence interval) without periods with CV larger than 20%

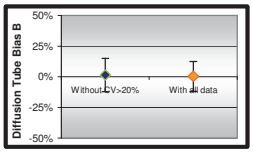
Bias calculated using 9 periods of data

Bias factor A	0.98 (0.87 - 1.13)
Bias B	2% (-12% - 15%)
Diffusion Tubes Mean:	33 μgm^{-3}
Mean CV (Precision):	6
Automatic Mean:	32 μgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	32 (28 - 37) μgm^{-3}

Accuracy (with 95% confidence interval) WITH ALL DATA

Bias calculated using 10 periods of data

Bias factor A	1 (0.89 - 1.13)
Bias B	0% (-12% - 13%)
Diffusion Tubes Mean:	32 μgm^{-3}
Mean CV (Precision):	8
Automatic Mean:	32 μgm^{-3}
Data Capture for periods used:	98%
Adjusted Tubes Mean:	32 (29 - 36) μgm^{-3}



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Version 03 - November 2006

Appendix 3

BTEX Diffusion Tubes: Monthly Dataset and Annual Means 1997-2008

Table A3.1 Monthly mean Hydrocarbon Concentrations, μg m^{-3} – Beresford Street

Start Date	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-08	2.3	9.7	2.4	5.3	1.8
30-Jan-08	2.6	8.3	1.7	5.7	2.2
28-Feb-08	1.5	4.8	1.0	3.4	1.3
2-Apr-08	1.4	5.3	1.0	3.8	1.4
30-Apr-08	1.5	5.3	1.1	3.4	1.2
28-May-08	1.0	4.1	1.2	3.7	1.4
2-Jul-08	0.8	3.9	0.9	3.5	1.3
29-Jul-08	1.1	4.5	1.1	3.5	1.4
3-Sep-08	1.1	4.8	1.0	3.6	1.5
1-Oct-08	1.5	7.4	1.9	5.4	2.1
29-Oct-08	1.6	6.6	1.4	4.6	1.7
3-Dec-08	2.3	8.0	1.6	5.4	2.0
Average	**1.6**	**6.1**	**1.4**	**4.3**	**1.6**

Table A3.2 Monthly mean Hydrocarbon Concentrations, μg m^{-3} – Le Bas Centre

Start Date	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-08	2.3	9.9	2.1	5.0	1.8
30-Jan-08	2.1	5.9	1.2	3.8	1.4
28-Feb-08	1.4	3.9	1.0	2.9	1.1
2-Apr-08	1.2	5.0	1.5	3.7	1.3
30-Apr-08	1.9	10.7	3.5	5.4	1.8
28-May-08	0.7	3.5	0.9	2.7	1.0
2-Jul-08	0.5	2.9	0.6	2.4	0.9
29-Jul-08	0.9	3.2	0.9	2.5	0.9
3-Sep-08	0.9	3.4	0.8	2.5	1.1
1-Oct-08	1.3	6.5	1.5	4.7	1.9
29-Oct-08	1.4	5.9	1.2	4.2	1.6
3-Dec-08	2.2	6.7	1.5	4.2	1.6
Average	**1.4**	**5.6**	**1.4**	**3.7**	**1.4**

Table A3.3 Monthly mean Hydrocarbon Concentrations, μg m^{-3} – Springfield Garage

Start Date	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-08	6.0	26.1	4.5	12.2	4.5
2-Feb-07	4.7	21.0	3.2	10.6	4.1
28-Feb-07	4.7	23.1	3.7	12.1	4.6
4-Apr-07	**(0.5)**	**(1.2)**	**(0.3)**	**(0.8)**	**(0.4)**
2-May-07	1.6	9.8	1.5	5.1	1.9
30-May-07	5.0	24.9	4.3	14.1	5.5
5-Jul-07	3.7	22.5	3.9	13.0	5.1
1-Aug-07	3.7	21.6	3.4	11.2	4.4
29-Aug-07	3.0	18.6	3.0	10.2	4.1
3-Oct-07	5.7	30.0	4.4	14.9	5.7
31-Oct-07	No tube	No tube	No tube	No tube	No tube
28-Nov-07	4.0	19.5	3.0	10.4	3.7
Average	**4.2**	**21.7**	**3.5**	**11.4**	**4.4**

No tube was returned from the site after the November exposure period.

April results at Springfield Garage were unusually low. This was thought to be either a faulty tube, or that the tubes from Springfield Garage and Clos St Andre (where the April results were unusually high) had been accidentally confused. In the absence of proof that the tubes had been mixed up, the April results from these two sites have been rejected as spurious.

Table A3.4 Monthly mean Hydrocarbon Concentrations, μg m^{-3} – Clos St Andre

Start Date	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-08	1.1	4.0	0.5	1.7	0.5
30-Jan-08	1.3	2.6	0.7	2.1	0.7
28-Feb-08	0.9	1.2	0.4	1.0	0.3
2-Apr-08	**(4.1)**	**(22.7)**	**(3.5)**	**(12.0)**	**(4.6)**
30-Apr-08	0.9	1.4	0.4	1.4	0.4
28-May-08	0.6	1.3	0.4	1.4	0.4
2-Jul-08	0.2	1.0	0.2	1.0	0.4
29-Jul-08	0.4	1.0	0.2	0.8	0.2
3-Sep-08	0.7	1.6	0.5	1.4	0.5
1-Oct-08	1.0	4.4	6.9	2.2	0.9
29-Oct-08	1.0	1.8	0.5	1.4	0.5
3-Dec-08	1.2	2.9	0.6	2.3	0.9
Average	**0.8**	**2.1**	**1.0**	**1.5**	**0.5**

April results at Clos St Andre were unusually high. This was thought to be either a contaminated tube, or that the tubes from Clos St Andre and Springfield Garage (where the April results were unusually low) had been accidentally confused. In the absence of proof that the tubes had been mixed up, the April results from these two sites have been rejected as spurious.

Table A3.5 Monthly mean Hydrocarbon Concentrations, μg m^{-3} – Handsford Lane

Start Date	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-08	1.6	7.6	3.3	7.8	2.1
30-Jan-08	1.9	5.9	3.1	10.0	2.7
28-Feb-08	1.1	2.8	1.1	3.1	0.9
2-Apr-08	0.7	4.0	1.6	5.7	1.6
30-Apr-08	1.0	3.7	2.3	8.1	2.3
28-May-08	0.6	2.9	1.8	6.3	1.8
2-Jul-08	0.5	2.4	1.9	6.8	2.0
29-Jul-08	0.6	2.0	1.6	5.2	1.8
3-Sep-08	0.9	5.5	3.5	14.2	3.7
1-Oct-08	0.8	4.6	2.5	9.5	3.2
29-Oct-08	1.0	3.4	1.8	7.3	2.3
3-Dec-08	1.5	3.8	1.7	6.6	2.0
Average	**1.0**	**4.0**	**2.2**	**7.6**	**2.2**

Table A3.6 Monthly mean Hydrocarbon Concentrations, μg m^{-3} – Airport

Start Date	benzene	toluene	ethyl benzene	m,p -xylene	o-xylene
3-Jan-08	0.9	4.6	0.5	1.3	0.4
30-Jan-08	1.2	1.7	0.4	1.0	0.3
28-Feb-08	0.7	0.7	0.2	0.6	0.2
2-Apr-08	0.3	4.1	0.2	1.0	0.3
30-Apr-08	0.6	1.8	0.4	1.0	0.3
28-May-08	0.3	0.7	0.2	0.8	0.2
2-Jul-08	0.3	0.4	0.1	0.4	0.8
29-Jul-08	0.5	0.6	0.3	0.5	0.1
3-Sep-08	0.5	0.8	0.2	0.7	0.2
1-Oct-08	0.2	1.3	0.3	0.8	0.3
29-Oct-08	0.5	1.4	0.3	0.8	0.3
3-Dec-08	0.9	2.3	0.5	1.1	0.4
Average	**0.6**	**1.7**	**0.3**	**0.8**	**0.3**

Table A3.7 Comparison of Hydrocarbon Concentrations, Jersey, 1997 - 2008.

	benzene, $\mu g\ m^{-3}$	toluene, $\mu g\ m^{-3}$	ethylbenzene $\mu g\ m^{-3}$	m+p xylene, $\mu g\ m^{-3}$	o-xylene, $\mu g\ m^{-3}$
Beresford Street					
1997	10.4	20.7	5.3	11.9	5.3
1998	8.1	18.8	4.0	10.2	4.4
1999	5.9	13.8	2.7	7.5	3.5
2000	2.9	14.2	3.5	10.2	4.0
2001	3.3	14.9	3.5	9.7	3.5
2002	2.6	13.0	2.7	8.0	3.1
2003	2.0	11.5	2.2	6.6	2.2
2004	1.9	9.8	5.1	5.5	2.0
2005	1.7	8.9	1.8	5.3	1.9
2006	2.2	7.4	1.3	4.6	1.6
2007	1.7	10.4	1.7	4.4	1.8
2008	1.6	6.1	1.4	4.3	1.6
Le Bas Centre					
1997	9.1	17.2	5.3	9.7	4.4
1998	7.5	16.1	3.1	8.4	4.0
1999	3.6	11.1	2.2	5.7	2.7
2000	2.9	12.6	3.1	8.4	3.1
2001	2.6	13.4	2.7	7.5	3.1
2002	2.0	8.0	1.8	5.7	2.2
2003	1.3	8.0	1.8	4.9	1.8
2004	1.3	6.6	3.3	3.9	1.4
2005	1.3	5.3	1.1	3.4	1.2
2006	1.5	4.4	0.8	2.8	1.0
2007	1.5	6.5	1.3	3.2	1.3
2008	1.4	5.6	1.4	3.7	1.4
Handsford Lane					
2004	1.0	16.1	7.3	8.5	2.0
2005	1.0	3.7	2.1	7.1	2.2
2006	1.2	4.8	1.3	5.1	1.6
2007	1.1	6.7	2.2	6.4	2.2
2008	1.0	4.0	2.2	7.6	2.2

Table A3.7 continued Comparison of Hydrocarbon Concentrations, -*continued :* Jersey, 1997 - 2008.

	benzene, $\mu g\ m^{-3}$	toluene, $\mu g\ m^{-3}$	ethylbenzene $\mu g\ m^{-3}$	m+p xylene, $\mu g\ m^{-3}$	o-xylene, $\mu g\ m^{-3}$
Springfield Garage					
1997	25.0	47.9	8.4	19.0	8.4
1998	25.0	47.1	6.6	19.0	7.5
1999	14.6	41.7	5.7	16.8	6.6
2000	5.2	35.2	8.0	22.1	8.8
2001	6.8	42.9	8.0	23.0	8.4
2002	5.5	36.8	6.2	19.0	7.1
2003	4.9	34.1	5.7	15.9	5.7
2004	4.7	30.9	13.5	14.5	5.2
2005	3.3	22.8	3.6	11.2	4.0
2006	3.9	21.7	2.6	10.2	3.7
2007	4.3	29.5	4.0	11.9	4.4
2008	4.2	21.7	3.5	11.4	4.4
Clos St Andre					
2000	1.0	3.4	0.9	2.7	0.9
2001	1.3	4.6	1.3	2.7	1.3
2002	1.0	2.7	0.9	2.2	0.9
2003	1.0	4.2	0.9	1.8	0.4
2004	0.7	2.2	1.2	1.2	0.4
2005	0.7	2.2	0.5	1.3	0.5
2006	1.0	2.0	0.4	1.2	0.4
2007	0.8	2.9	0.8	1.8	1.2
2008	0.8	2.1	1.0	1.5	0.5
Airport					
2002	1.0	2.7	0.9	2.2	0.9
2003	1.0	3.1	0.4	0.9	0.4
2004	0.6	1.1	1.1	0.6	0.3
2005	0.6	1.6	0.2	0.6	0.2
2006	1.0	1.4	0.5	0.9	0.3
2007	0.8	3.4	0.5	1.0	0.4
2008	0.6	1.7	0.3	0.8	0.3

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Appendix 5

Draft Air Quality Strategy for Jersey 2003

AEAT/ENV/R/0977 Issue 5.1

An Air Quality Strategy for Jersey

A report produced for the States of Jersey

April 2003

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Executive Summary

In 1999 the Planning and Environment's Monitoring Group formed for an Air Quality sub group to produce an Air Quality Strategy for Jersey. This group consisted of representatives from the Environmental Services Unit of the Planning Department, Environmental Health now Health Protection and the Public Services Department.

The Strategy was to address the following objectives:

1. To provide an inventory of significant sources of local pollution and pollutants.

2. To determine appropriate standards to be complied with.

3. To identify those areas where the standards are exceeded.

4. To establish appropriate action plans for improvement, with clear accountabilities for delivery.

5. To design a monitoring programme capable of assessing the efficiency of the above action plans.

6. To provide an estimate of the costs implementing the monitoring programme.

7. To raise public awareness of air quality in Jersey.

The strategy was produced with the assistance of the UK consultants AEA Technology. The strategy is to be submitted to the Environment and Public Services Committee for their endorsement. It is anticipated a steering group chaired by Health Protection will be formed to begin implementation of the action plans and raising public awareness. Health Protection are responsible for protecting and improving the public's health in relation to amongst other things air quality, drinking water and food safety. These areas of work are undertaken by staff with appropriate professional qualifications and training.

In Jersey the principal air pollutant of concern is nitrogen oxides (NOx) where about 68% of the total emissions in Jersey are from road transport sources (NB nitrogen oxides are converted to nitrogen dioxide (NO_2) in the atmosphere). The nitrogen dioxide pollution hot-spots are at Georgetown in St Saviour, Beaumont in St Peter and in St Helier: First Tower, the Bus Station, Broad Street and La Pouquelaye. Other sites also show elevated levels of nitrogen dioxide including Le Bas Centre, Mont Felard, Robin Place, Savile Street/Rouge Bouillon and Bereford Street. Measurements indicate that the European limit value, which has been set for the protection of human health, is currently being exceeded at some of these sites.

Other sources of air pollution have been considered including the power station at La Collette. This station now ceases operation for a significant part of the year over the summer period with a consequent reduction in emissions.

The municipal waste incinerator at Bellozane valley does not comply with EC Directive 89/369/EC and is to be replaced in the next 5 years with a new facility meeting the latest European Union emission standards. The Health and Social Services Crematorium is over 30 years old and does not comply with the UK Environmental Protection Act process guidance note PG5/2(91). There is a proposal to replace the existing cremators in the next 12 months with 2 new units.

In addition to striving to meet EU legislation on air quality, which has been set for the protection of human health, the States of Jersey has international obligations to reduce greenhouse gases under the UN Climate Change Convention.

The most challenging issue for Jersey is the improvement needed in road transport related emissions. Fifteen options have been provisionally assessed in terms of their cost effectiveness at reducing the emissions in the required geographical area. The most cost effective options are listed below:

- Compulsory, periodic testing of vehicle emissions (MOT)
- Park and Ride schemes in St Helier
- Parking (including charges and on street parking restrictions)
- Urban bus schemes
- Vehicle scrapage subsidies
- Vehicle access limits
- Variable tax on engine size and age
- Pedestrianisation
- Alternative fuels
- Walk to school plans
- Traffic management

It is recommended that the States of Jersey carry out a feasibility study into each of these options to determine the cost effectiveness of achieving a measured air quality improvement, and to quantify other potential, socio-economic benefits and impacts.

It is also recommended that the island undertakes continuous monitoring for NO_2 and PM_{10}. For the first year at least, this should be at the highest known pollution "hotspot" (Weighbridge). Once compliance with the Daughter Directive(s) is confirmed at this location, the site could be relocated to an area more representative of general population exposure (eg residential or urban background).

This approach would best be satisfied by purchasing a mobile (or movable) installation. Depending upon the specification, this would involve a capital cost of between £30-40,000, with ongoing costs of approximately £10k per annum (although a lot of this could be offset with skilled/trained local staff). Funding from the Environment fund has already been earmarked for this proposal.

The air quality strategy implementation plan should be managed by Health Protection who would be responsible for communication and integration with other related Island strategies including the Sustainable Transport Strategy, the Island Plan and Sustainability Strategy. Indicators to measure the success of the air quality strategy, and the options chosen to decrease emissions, should be clear from the onset of the implementation. These should include monitoring of air quality, traffic flow reductions, traffic speed increase where there is current congestion and passenger numbers using public transport. Indicators to determine the impact on other environmental and socio-economic issues should also be considered, such as the measurement of noise.

Effective communication of key information will be required to ensure that the suggested transport improvement measures achieve improved air quality and are regarded as socially acceptable for those living and visiting Jersey. Good communication between the stakeholders is also important. Awareness raising campaigns to deliver the messages particularly in relation to the choice of transport mode will be necessary to ensure uptake of policies to deliver air quality targets.

Contents

Glossary

DEFRA	UK Government Department of the Environment, Food and Rural Affairs.
Objectives	are set based on standards, economic efficiency, practicality, technical feasibility and timescale. Typically, an objective will contain a standard, a target date and may be coupled with allowable exceedances.
COMEAP	The Committee on the Medical Effects of Air Pollutantsreports to the Department of Health and discusses health issues.
EPAQS	The Expert Panel on Air Quality Standard reports to the Defra on proposed health based standards for air pollutants.
Standards	are set purely (by EPAQS) on the basis of medical and scientific evidence of how each pollutant affects human health.
NAQS	National Air Quality Strategy - the overarching strategy that UK local authorities must work to comply with the **Environment Act 1995.**
LAQM	Local Air Quality Management, the regime in which UK local authority Environmental Health departments are expected to review and monitor ambient air pollution and ensure it attains Government NAQS standards.
LAPC	Local Authority Pollution Control, the system by which councils regulate the smaller industrial processes.
APEG	Currently disbanded, the Airborne Particle Expert Group has overseen much of the research work and policy formation concerning particles.
QUARG	The Quality of Urban Air Review Group, now defunct, and whose functions were taken over by APEG.
$\mu g\ m^{-3}$	Micrograms per cubic metre. European directives measure pollutants in $\mu g\ m^{-3}$.
µm	One µm, referred to as one micron, is a thousandth of a millimetre. For example, the particle measure PM_{10} refers to particles 10 microns or less in diameter.
PM_{10}	Particles (also known as particulates) of a mean aerodynamic diameter of 10 microns. Particles of sizes $PM_{2.5}$ to PM_{10} are often referred to as the coarse fraction, $PM_{0.1}$ to $PM_{2.5}$ are referred to as fine particles and those below $PM_{0.1}$ (0.1 microns or 100 nanometres) referred to as superfine particles.
PPC	Pollution Prevention and Control legislation originating from a EU Directive, which supersedes IPC (Integrated Pollution Control)

1 IMPORTANCE OF AIR QUALITY

Air is all around us and is essential to life. Polluted air damages health, particularly affecting the most vulnerable in society – the very young and the old. Maintaining good air quality is therefore vital to our long term well being.

Pollutants come from a wide variety of sources including traffic, industry, power generation and domestic activities. Sources of some of the most common pollutants are given in Box 1.

Box 1: Main sources of Air Pollution

Benzene – Motor vehicles account for approximately 90% of emissions in Jersey which includes car refuelling and storage of fuel.

Carbon Monoxide (CO) – Road transport accounts for a significant proportion of emissions

Lead (Pb) – Most airborne lead in the UK arises from motor vehicles. The increasing use of unleaded petrol should cause emissions to fall.

Nitrogen dioxide (NO_2) – Road transport accounts for approximately 40% of total emissions, electricity generation about 19%, shipping about 9% and domestic sources about 4%.

Particulates (PM_{10}) – Road transport contributes a large proportion of the local emissions of particulates. The incinerator and power station on Jersey will also be significant sources. A significant proportion will come from sources outside of Jersey.

Sulphur dioxide (SO_2) – On Jersey the power station and incinerator account for a significant amount of local emissions. Domestic fires make a significant contribution in coal burning areas.

More information on the sources and effects of the main air pollutants affecting Jersey (e.g. NO_2 and PM_{10}) can be found in Appendix A.

In the UK the major air pollutants of concern for the protection of human health are nitrogen oxides and particulate matter. The main contributor to these pollutants is road transport emissions. Industrial emissions of pollution do not, in general, result in exceedence of standards in the UK. This is also true for Jersey.

1.1 Air Quality In Jersey

Jersey is the largest Channel Island at 45 square miles and is only 14 miles from France. It has a population of approximately 87,000 people (Ref: 2000, Census) and at first glance would seem not to have any air quality problems because of the lack of industry and perception by non-islanders that it is possible to walk or cycle everywhere. In reality Jersey has a culture of car dependency, and partly due to its affluence and lack of any Ministry of Transport test (MOT) the number of vehicles has risen to over 94,000 and 83% of households have access to at least one vehicle. Jersey's capital St Helier, unlike many other similar sized towns in the United Kingdom has limited pedestrianisation and vehicles dominate the town centre streets.

Jersey's prevailing wind directions are south westerly, westerly or north westerly. It is accepted that the strength of prevailing winds play a key role in preventing conditions ideal for increased air pollution. As Jersey is an Island it should be less likely to suffer from chronic air pollution episodes than inland UK towns.

Many of the streets in St Helier are canyon type streets which means that air pollution takes longer to disperse and is less affected by wind speed and direction than say an open site.

1.2 The Need For Change

It has already been acknowledged in other Island plans and strategies (Island Plan, 2002 and Sustainability Strategy) that air quality is a matter of concern at certain hot-spots such as the Bellozane Incinerator and certain streets in St Helier due to traffic emissions.

Two important principles, namely the Precautionary Principle and the Polluter Pays Principle have already been endorsed by the States of Jersey in pollution reduction efforts. The Precautionary Principle is important as the major concern of air pollution is the protection of human health. It is well established that prevention is better than cure. Traditional public health approaches have primarily tried to influence individual behaviour. Environmental protection aims at collaborative action to improve a common environment. A key principle of the European Union's environmental policy is that the cost of preventing pollution or of minimising environmental damage due to pollution should be borne by those responsible for the pollution.

The States of Jersey have committed to achieving standards that are as good as or in excess of those applying in the European Union which includes meeting air quality standards within the next 3 to 7 years. In addition, the States of Jersey have international obligations under the Climate Change Convention to reduce emissions of greenhouse gases. It is therefore timely and appropriate that an air quality strategy for Jersey is produced.

The principles of an Air Quality Strategy for Jersey are that:

- It should afford the best practicable protection to human health and the environment taking a precautionary approach where necessary;

- It should take full account and work towards the air quality standards set out in the EU air quality daughter directives, while providing the opportunity for stricter national objectives for some pollution where this is considered appropriate.

- In addition to the health and wider environmental effects of the pollutants, objectives should take account of the practicability of abatement or mitigation measures, their costs and benefits, and other social and economic factors.

- The costs of any pollution abatement should be recovered from those responsible for causing pollution.

- Account should be taken, as far as possible of developments in European legislation, technological and scientific advances.

- Consideration should be given to other Jersey strategies and policies, in particular the Island Plan, Sustainability Strategy and the Island Sustainable Transport Policy to ensure an integrated and consistent approach between Departments.

- Raising public awareness and providing accurate information is vitally important in changing knowledge and attitudes to the importance of air quality.

2 ENVIRONMENTAL IMPACTS OF AIR POLLUTION

Emission estimates were made for a wide variety of pollutants. Each pollutant species is important for one or more impacts- whether it is a toxic compound or contributes to global warming or reduces the ozone layer. Therefore when determining which pollutants are important for Jersey, the importance of the different environmental impacts should first be considered.

In addition, it is important to consider absolute emissions. These place the different environmental impacts in some context. The population of Jersey is approximately 0.1% of the UK, and hence impacts on e.g. global warming are insignificant compared with the UK. Indeed, for Oxides of Nitrogen (NO_x) and Non Methane Volatile Organic Compounds (NMVOC) the emissions from Jersey represent less than 0.3% and 0.2% of the UK total respectively. When the uncertainties associated with the UK total are considered- some 10%, it is clear that the emissions from Jersey are insignificant within the UK or national context. However on a very local level (on particular roads) emissions in Jersey are significant and action should be taken at the local hotspot level. Only local action will bring about an improvement in local air quality in St Helier.

2.1 Greenhouse Gases

Increasing atmospheric concentrations of greenhouse gases (GHGs) originating from anthropogenic(ie man made) activities are leading to enhanced warming of the atmosphere and global climate change. The major greenhouse gases are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) all of which have both natural and anthropogenic sources. In contrast, the three industrial gases: hydrofluorocarbons (HFC), perfluorocarbons (PFC) and sulphur hexafluoride (SF_6), are potent greenhouse gases but do not occur in nature, and hence only originate from anthropogenic sources.

GHG emission estimates for Jersey were made in 1997. CO_2 emissions arose from a number of sources including electricity generation (36%), transport (23%), other sources (32%) and waste incineration (9%). Jersey is committed to the United Nations Framework Convention on Climate Change (UNFCCC). The Bonn Agreement of the Kyoto Protocol of this Convention requires the UK achieve a 12.5% reduction on 1990 levels of greenhouse gases, within the European Union burden sharing mechanism by 2008. The UK aims to move beyond the Kyoto target and reduce its own CO_2 emissions by 20% below 1990 levels by 2010.

In Jersey approximately one third of greenhouse gas emissions are derived from vehicular sources. It is therefore important to note that any actions to reduce air pollution from road transport in Jersey should also aim to reduce greenhouse gas emissions. Indeed, it will be essential to reduce emissions from road transport for Jersey to meet this obligation.

2.1.1 Ozone Formation (O_3)

It is important to differentiate between stratospheric ozone (15-50 km above the earth), which occurs naturally and filters out much but not all the ultra violet radiation reaching the ground. Stratospheric ozone levels are being depleted by Chlorofluorocarbons (CFCs), along with other

chlorine and bromine containing compounds, which is having serious health effects on the health of all living things and world climate.

Chlorofluorocarbons (CFCs), along with other chlorine and bromine containing compounds are used as refrigerants and in the insulation of refrigerators and since approximately 1990 refrigerators have been de-gased in Jersey. They are then shredded and the metals recovered. There is no facility on the island at present to allow separation and incineration of CFC contaminated insulation from waste refrigerators. It is likely that end of life refrigerators will have to be exported to the UK for disposal.

Ozone is also created in the lower atmosphere or troposphere (i.e. ground level to 9 km) as a result of chemical reactions involving vehicle/fossil/industrial emissions and sunlight. These chemical compounds involved in the reactions are called "ozone precursors" e.g. Volatile Organic Compounds (VOCs) and Oxides of Nitrogen (NO_x).

High concentrations of ozone in the troposphere can also have adverse impacts on human health as it is a respiratory irritant. For this reason, pollutants, which are "ozone precursors" are often subject to scrutiny and strategies to ensure reduced emissions. However, ozone impacts at the regional scale, because it takes time for the ozone precursors to react to generate ozone. Given the geographical position of Jersey, ozone formation is not considered a priority issue.

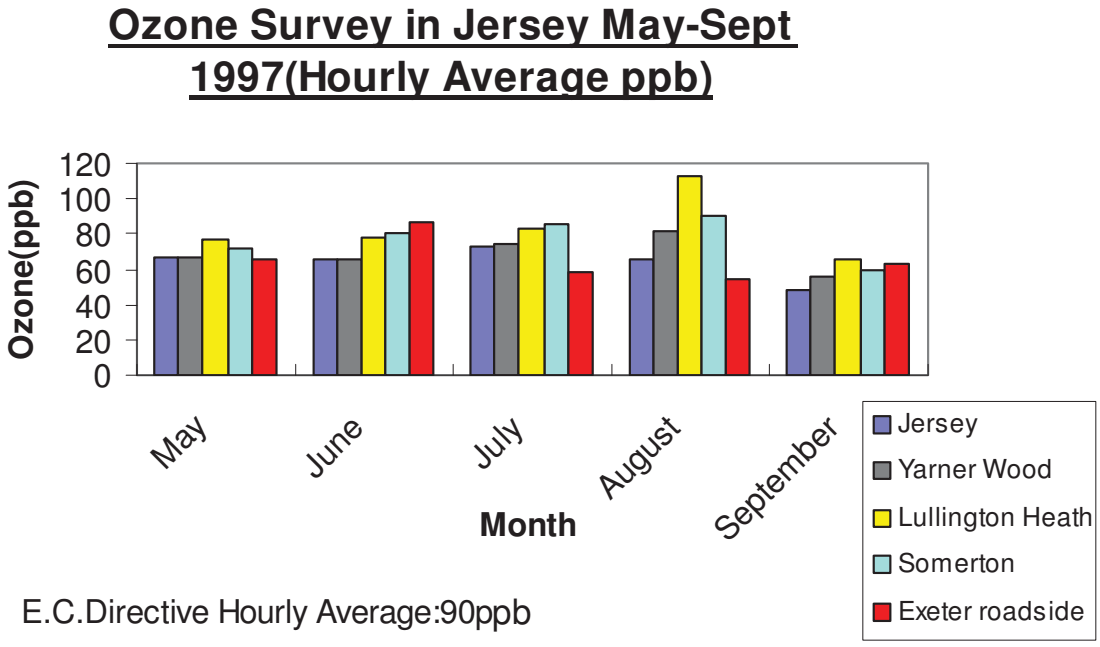
2.1.2 Ozone in Jersey

It should be noted that Jersey is signed up to the NO_x and VOC protocols (both are ozone precursors) as part of the UK. However the reduction targets are applied to the UK and associated territories as a whole, and there are no specific targets for Jersey alone.

The States of Jersey has however monitored ozone at Haut de la Garenne during May to September 1997. Highest concentrations of ozone are expected during the summer months in rural locations. In general concentrations recorded in Jersey were similar to those in the UK mainland. The average ozone for the monitoring period was 37ppb(parts per billion); average background concentrations in rural environments tend to be approximately 35 ppb during the summer months

Photograph 1: The air pollution monitoring equipment housing is shown below.

Figure 2.1



Ozone is formed as a result of chemical reaction between emissions in strong sunlight, a reaction that can take hours to days to occur. As the sources of the ozone pollution in Jersey are often hundreds of miles away, any localised action plan to reduce measured concentrations will have minimal local effect.

2.2 Acidification and Transboundary Pollution

The deposition of acidifying species (eg sulphur dioxide SO_2 and nitrogen dioxide NO_2 which can undergo chemical reactions in the atmosphere to produce acid rain) can have adverse effects on buildings and vegetation, as well as acidifying streams and lakes and damaging the aquatic environment. The transport of acidic species in the atmosphere can be over large distances. However, given the various human activities on Jersey, and the distances to other large land masses, this is not considered to be an issue of highest importance. Nevertheless Jersey must work towards meeting its obligations under the Convention on long-range transboundary air pollution. This protocol is associated with the reduction of emissions of pollutants associated with this environmental impact.

2.3 Local Air Quality

It is the management of local air quality, which is considered to be the priority for the States of Jersey. Although the various anthropogenic activities and geographical situation gives rise to little impact on neighbouring islands, there may be significant impacts on the local population. The extensive use of road transport combined with canyon streeting can trap air emissions in areas frequented by the public. Therefore the focus of the air quality strategy employed by the States must address emissions and public exposure at the local level.

2.3.1 Source Sectors

a) Vehicles

In Jersey in 2001 there were over 94,538 vehicles registered. It is believed a higher proportion of these vehicles are older in Jersey compared to the UK. Approximately 30% are over 10 years old (Ref: Driver and Vehicle Standards Department). The UK Automobile Association has stated that 50% of carbon monoxide emissions are produced by 10% of vehicles with poorly adjusted engines. The lack of an MOT test, generally shorter journeys and high cold start emissions, has lead to high measured concentrations of nitrogen dioxide (NO_2) in St Helier. These emissions from congested traffic in St Helier are not able to readily disperse owing to the nature of the street canyons. Consequently, the current levels measured at certain sites are above the European limit values set for the protection of human health.

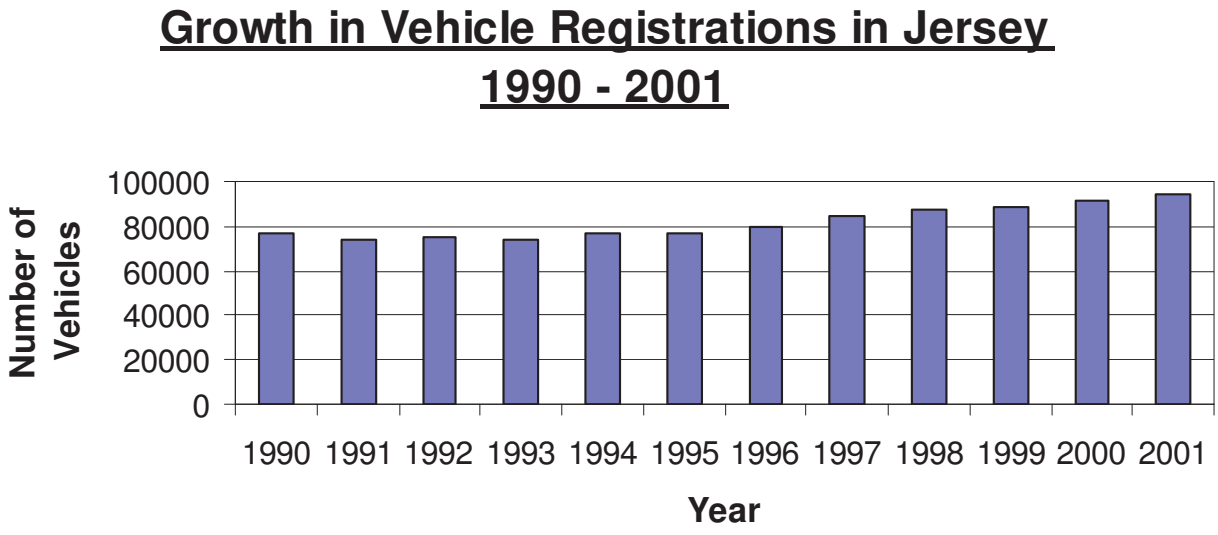
The graph overleaf shows a steady year on year increase in vehicle registrations in Jersey. The true figures are uncertain because the exact numbers of vehicles being scrapped each year is not clear. It is however a concern that the trend continues to rise. Interestingly the number of hire cars, which includes motorcycles and minibuses on the island has fallen from 6102 in 1998 to 4210 in 2000. This is likely to be associated with the downturn in tourists visiting the island.

Jersey is a very car orientated community with one of the highest car ownership levels in the world. Car ownership levels in Jersey compared to other countries are shown below.

Table 2.1 Car ownership levels

Country	Cars/vans per 1000 people
Jersey	620
USA	578
Luxembourg	515
Germany	464
France	419
UK	380
Netherlands	373
Japan	313
Irish Republic	244

Figure 2.2:



As previously mentioned there is virtually no heavy industry in Jersey, and little light industrial activity. This has a significant impact on the relative contribution from different sectors on air emissions. It is also the case that emissions per capita for all types of transport are higher. This is because on a per capita basis, there is increased use of aircraft and shipping as well as motor vehicles. However, there is still some industry in Jersey which causes concern in terms of emission to air.

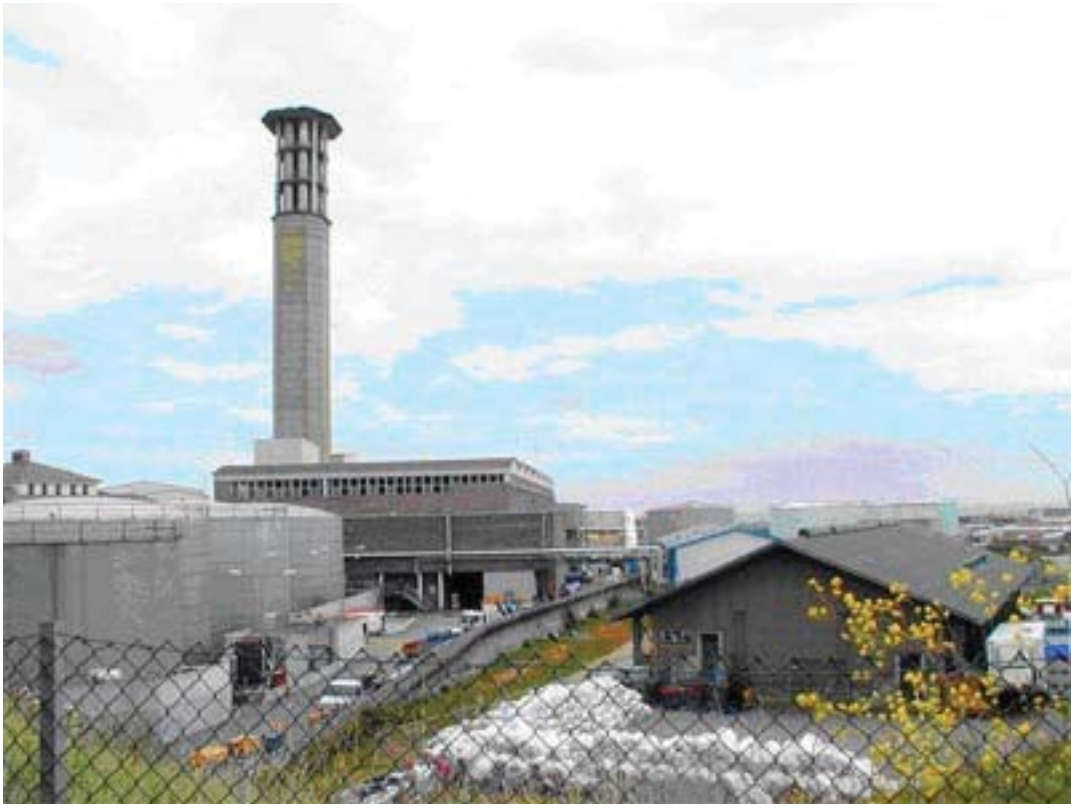
b) Power station

In Jersey the main emitters of high level sulphur dioxide SO_2 and nitrogen dioxide NO_2 are the JEC oil fired power station and the States of Jersey's municipal waste incinerator. The JEC power station as mentioned earlier shuts down for 6/7 months/year as of March 2002 and when running uses reduced sulphur heavy fuel oil (approximately 1%) . Low nitrogen oxides NO_x burners have also been fitted to the largest boiler thereby reducing levels of NO_2 . In 1999, although the power station was not operating to full capacity emissions were estimated to be 384 tonnes of NO_x

c) Municipal waste incinerator

The States of Jersey's municipal waste incinerator does not comply with EC Directive 89/369/EC and is to be replaced in the next 5 years with a new facility meeting the latest emission standards. The Municipal Waste incinerator emitted 464 tonnes of NO_x in 1999. Emissions from the power station and incinerator will be dispersed seawards during certain wind conditions.

Photograph 2: The Jersey Electricity Company power station.



Photograph 3: The Municipal Waste Incinerator

d) Crematoria

Also, the Health and Social Services Crematorium is 30+ years old and does not comply with current UK Environmental Protection Acts 1990 process guidance note PG5/2(91). Pollutants produced from crematoria could include:- dioxins and furans, mercury, particulates, hydrogen chloride and carbon monoxide. It is probable the Jersey's crematorium is the main source of mercury on the island from fillings in teeth. Odour can also be a problem. (There are approximately 500 - 600 cremations a year). There is a proposal to replace the existing cremators in the next 12 months with two new units. The new cremators will meet the current UK process guidance notes standards.

e) Other Industrial Sources

There are a number of smaller industrial operations which together increase the total emissions on pollutants on the Island. These include printers, dry cleaners and the storage and handling of organic chemicals at the port. In the food industry there are a number of bakeries, and a brewery which will give rise to emissions of pollutants to air. In addition, the three boilers at the general hospital in St Helier gave rise to sulphur emissions from the burning of 765,450 litres of fuel oil during 2001. There is an EC directive requirement that the sulphur content in fuel oil must not exceed 1% by January 2003. Currently, these boilers use Ultra Low Sulphur fuel oil which meets this requirement.

f) Aviation - Shipping

Other major sources of pollution to air on Jersey are aircraft and shipping. In 1999 there were about 80,000 aircraft movements on the Island and there were over 45,000 passengers who arrived in Jersey by sea. (This equates to approximately 549 tonnes NOx, and 47 tonnes of VOCs per year).

g) Agriculture

Although agriculture is an important activity on the island, provisional estimates show that the ammonia (NH_3) emissions arising from the agricultural sector are in fact small when compared with the UK on a per capita basis. This is because emissions of NH_3 are dominated by livestock farming, in particular emissions from cattle. Although the dairy herd on Jersey is expected to be the largest source of NH_3 emissions to air, the animal numbers are relatively small (on a per capita basis). This is presumably due to the restricted amount of land that is available in Jersey for livestock. Although there is extensive arable farming, emissions to air from these activities (e.g. from fertiliser application) are considerably smaller than from livestock.

3 LOCAL AIR QUALITY IN JERSEY

3.1 Targeting Specific Source Sectors

As indicated above, with respect to air emissions, it is considered that "local air quality" is the most immediate environmental issue to address. In effect this relates to the air quality in urban areas. Therefore the following pollutants are considered to be of primary importance: NO_x, SO_2, NMVOC (incorporating benzene and 1,3-butadiene), CO, PM_{10} and Lead (Pb). The most sensible approach to reducing emissions to air first considers which sectors are the primary source of these pollutants.

3.2 Nitrogen Oxides (NOx)

Nitrogen oxides are formed during high temperature combustion processes from the oxidation of nitrogen in the air or fuel. The principal source of nitrogen oxides, nitric oxide (NO) and nitrogen dioxide (NO_2), collectively known as NO_x , is road traffic, which is responsible for approximately half the emissions in Europe. NO and NO_2 concentrations are therefore greatest in urban areas where traffic is heaviest. Other important sources are power stations, heating plant and industrial processes.

Nitrogen oxides are released into the atmosphere mainly in the form of NO, which is then readily oxidised to NO_2 by reaction with ozone. Elevated levels of NO_x occur in urban environments under stable meteorological conditions, when the air mass is unable to disperse.

3.2.1 Health Impact of Nitrogen Oxides

Nitrogen dioxide has a variety of environmental and health impacts. It is a respiratory irritant, may exacerbate asthma and possibly increase susceptibility to infections. In the presence of sunlight, it reacts with hydrocarbons to produce photochemical pollutants such as ozone. In addition, nitrogen oxides have a lifetime of approximately 1 day with respect to conversion to nitric acid. This nitric acid is in turn removed from the atmosphere by direct deposition to the ground, or transfer to aqueous droplets (e.g. cloud or rainwater), thereby contributing to acid deposition. (See also Appendix A)

3.2.2 Asthma Incidents in Jersey

The UK Department of Health hosts the Committee on the Medical Effects of Air Pollutants (Comeap), and it has produced a number of reports, the latest of which asserts that there is no firm evidence that air pollution initiates asthma. It says that the effect of air pollution is 'small' and a 'relatively unimportant' factor in triggering attacks in existing sufferers.

However evidence is available that air pollution and traffic derived pollution in particular, is responsible for triggering attacks in existing sufferers. In 1996 the National Asthma Campaign asked 50,000 of its members about their triggers and 80% of them said traffic pollution affected them. How important that trigger is, relative to other westernised lifestyle factors has yet to be determined.

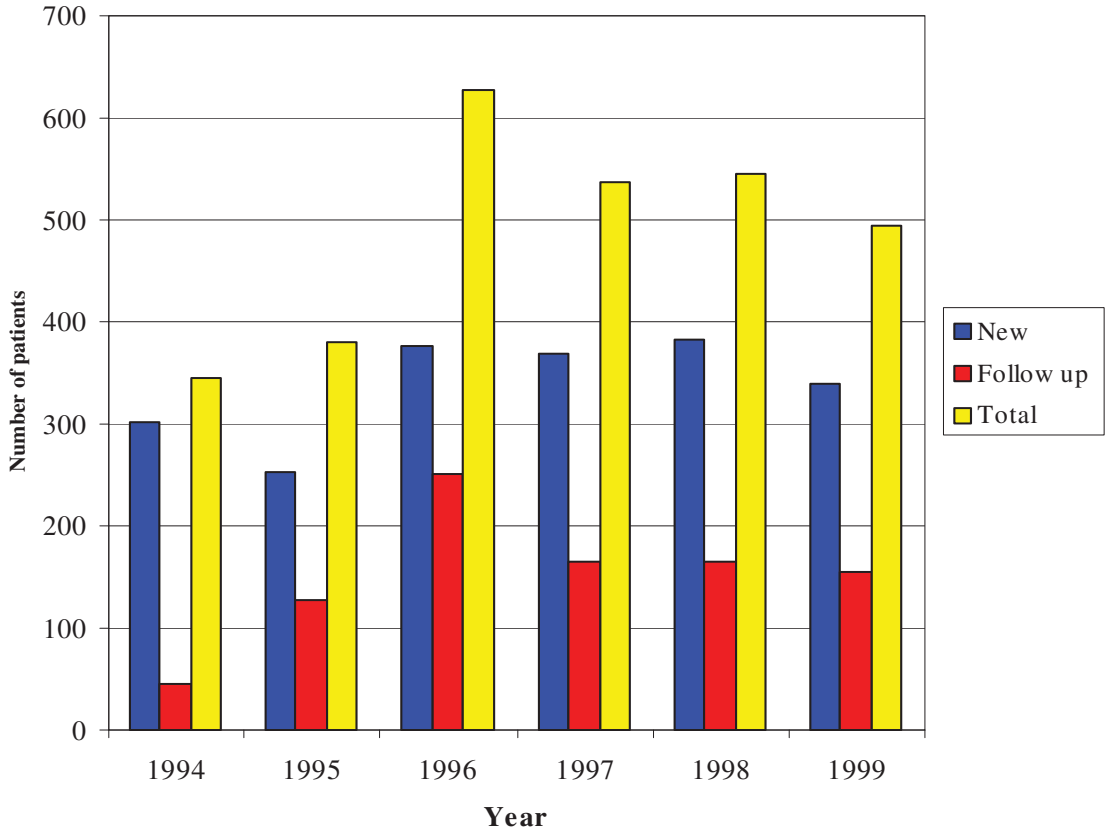
The situation in Jersey is interesting as asthmatics moving to the Island to live often complain attacks are more regular and more severe. It is unclear why this is but it maybe due to the mix of

agricultural, industrial and vehicular sources in such a condensed area of 45 square miles. There is also a significant amount of poor quality housing in Jersey, which results in problems of condensation dampness and associated mould growth, which is a possible factor. Jersey also has a moist maritime climate with periods of high rainfall through the winter period. Figure 3.1 shows the number of asthmatics attending information mornings at Jersey's general hospital. The numbers attending have increased from 1994 – 1996, and then decreases but the significance of air pollution to this increase is uncertain.

Asthma is also very individual with asthmatics often having different triggers and different threshold levels. A recent study found that levels of self reported asthma in children living in the Channel Islands was almost twice as high as those for similar aged children in France only 16 miles from Jersey. It seems that lifestyle factors between the two cultures may contribute towards this. However levels of asthma were broadly similar to the South West of England.

Further information on asthma can be gained through the Asthma Information Mornings at the Clinical Investigation Department, General Hospital on Saturdays 9am – 12 noon. Telephone: 01534 622554.

Figure 3.1: Number of Asthmatics attending the Asthma Information mornings at Jersey's General Hospital 1994-1999



3.2.3 Emissions of Nitrogen Oxides in Jersey

In Jersey emissions of nitrogen oxides are considerably higher per capita from road transport than in the UK (Figure 3.2). This is principally due to the high dependency on the private car. The following plot shows the emissions per capita for NO_x for Jersey and the UK. The data is expressed in this way to allow a direct comparison of the relative contribution from the different sources. It is evident that road transport is the sector which dominates for Jersey, giving considerably larger emissions per capita than observed in the UK for NO_x. However, total emissions of NO_x on Jersey were similar to those estimated for other similarly sized 'islands'.

Figure 3.2 NOx Emissions Per Capita - Jersey and the UK

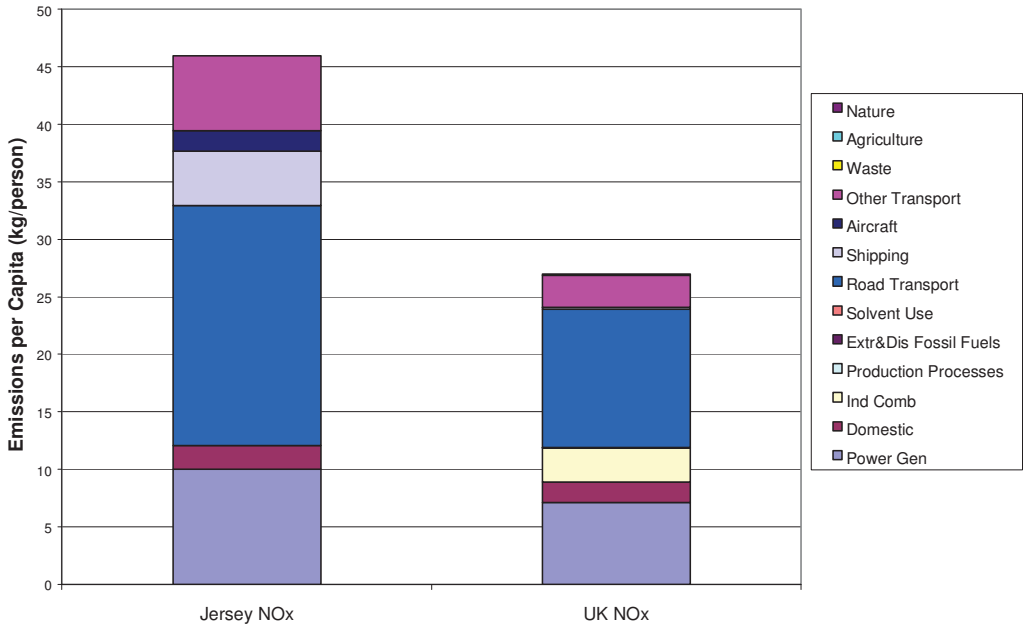


Table 3.1 Emissions of NO_x per capita (kg/person)

Jersey	46
UK	27
Guersney	29
Isle of Man	62
Gibraltar	47

It is clear from the above that the contribution to the total emission per capita from road transport is considerably higher in Jersey than in the UK. NO_x emissions from other transport are also larger indicating the impact from the relatively large number of agricultural vehicles. Emissions from these vehicles are not generally as well controlled as those from road transport vehicles. About 10% of NO_x emissions are from the power station. This will have further decreased as the second power link to France has meant the power station has reduced its operations by over 50%.

3.2.4 Ambient air pollution monitoring

Ambient air pollution monitoring has been carried out by the Environmental Health Department since 1993/4 for Nitrogen Dioxide and in conjunction with the Environmental Services Section of Planning and Building Services this was expanded in 1995/6 to include Sulphur Dioxide and Volatile Organic Compounds (VOCs). Supplementing these were two two-month long studies in February to March 1997 and February to March 2000 to assess levels of air pollution in Halkett Place, St Helier and determine whether there has been any improvement. These surveys were undertaken by AEA Technology.

The February to March 2000 survey in Halkett Place St Helier indicated that vehicle related pollutant concentrations (NOx, CO, PM_{10}) were found to be directly related to traffic density; highest during rush hours and lowest during the night. Concentrations of sulphur dioxide SO_2 which is not emitted from vehicles in large quantities were found to be very low. The results were found to be broadly comparable or slightly lower than those recorded during the 1997 Halkett Place survey.

The data from the Halkett Pace surveys was compared with a number of representative sites in the UK. Average concentrations of CO, SO_2, and PM_{10} at Halkett Place were higher than any of the comparison sites, while levels of NO_2 at the UK roadside sites were higher than at Halkett Place. (Ref: Air Quality Monitoring, St Helier, Jersey, January to February 1997 and Air Quality Monitoring, St Helier, Jersey, February to March 2000, AEA Technology)

The objective of these surveys was to monitor at sites where pollutant concentrations were expected to be highest, and to compliment the ongoing passive diffusion tube surveys for NO_2, VOCs and SO_2.

The dominant source of nitrogen dioxide is road traffic and consequently this pollutant has been measured at 19 sites since 1997 using passive diffusion tubes. There are six areas (mainly road junctions), which currently exceed the annual EU Daughter Directive limit value of 21 ppb (40 $\mu g\ m^{-3}$) as an annual mean, for protection of human health, which is to be achieved by 1 January 2010.

Photograph 4: Diffusion tubes placed on the building façade on the corner of Beresford Street, St Helier

These are the Georgetown road junction in St Saviour, Beaumont filter in turn roundabout in St Peter and First Tower, the Weighbridge area (Bus station), Broad Street and at the junction of

Rouge Bouillon and La Pouquelaye in St Helier. An additional four sites exceed the Lower Assessment Threshold including Le Bas Centre, Mont Felard, Robin Place, Savile Street and the Rouge Bouillon junction and a further site at Bereford Street exceeded the Upper Assessment Threshold. Further information on the monitoring programme is available in Appendix B. The results for the diffusion tube surveys 1999 - 2001 are available to download at www.health.gov.je

Photograph 5: Examples of SO_2, VOC (eg Benzene), and NO_2 diffusion tubes.

The diffusion tube methodologies provide data that are accurate to $\pm$ 20% for SO_2, $\pm$ 25% for NO_2, and $\pm$ 20% for BTEX(ie VOCs). BTEX includes benzene, toluene, ethyl benzene, m+p xylene and o-xylene.

Photograph 6: The site of the automatic monitoring trailer at Halkett Place in 2000.

In addition to these measurements of air pollutants an assessment of air quality can be made from sources of emission. In particular the number of vehicles on various roads will provide an indication of the level of pollution. From an initial assessment the following roads have a level of traffic greater than the trigger level (10,000 vehicles per day) as set in the UK for further review and assessment work to be carried out.

- Beaumont
- Weighbridge at Bus Station, St Helier

The air quality impact from road traffic at these junctions was further assessed using a screening model as recommended in UK Government Guidance the Design Manual for Roads and Bridges. Concentrations on annual average nitrogen dioxide were predicted at the roadside for 2005 (Table 3.2).

Table 3.2. Predicted annual average concentrations of nitrogen dioxide for 2005 ($\mu g\ m^{-3}$).

Road Junction	Annual average NO_2 for 2005
Beaumont	34 (18ppb)
Weighbridge at Bus Station, St Helier	43 (23 ppb)

Predicted concentrations are higher than the limit value of 40 μg m^{-3} (21 ppb) at the Weighbridge at the Bus station in St Helier. Emissions from the buses in this vicinity are likely to be giving rise to the elevated concentrations. These estimates are for 2005 and measures need to be introduced to more accurately assess the likely concentrations of NO_2 in 2010 which is the date when the Air Quality daughter directive limit value is to be achieved. These high concentrations of nitrogen dioxide at the bus station is likely to improve upon the upgrade of the bus fleet provided by Connex where 30 new buses and 15 existing buses will meet the Euro III engine emission limits. Also the move to garage of buses at La Collette will help to improve air quality at the Weighbridge.

3.3 NMVOCs (Non Methane Volatile Organic Compounds)

NMVOCs are organic compounds which differ widely in their chemical composition. These organic compounds are often grouped under the NMVOC label as the majority display similar behaviour in the atmosphere. NMVOCs are emitted to air as combustion products, as vapour arising from petrol and solvent use and several other sources. Interest in NMVOC emissions has grown as their role in the photochemical production of ozone has been appreciated. The diversity of processes which emit NMVOCs is huge, covering not only many branches of industry, but also transport, agriculture and natural sources such as for eg certain trees.

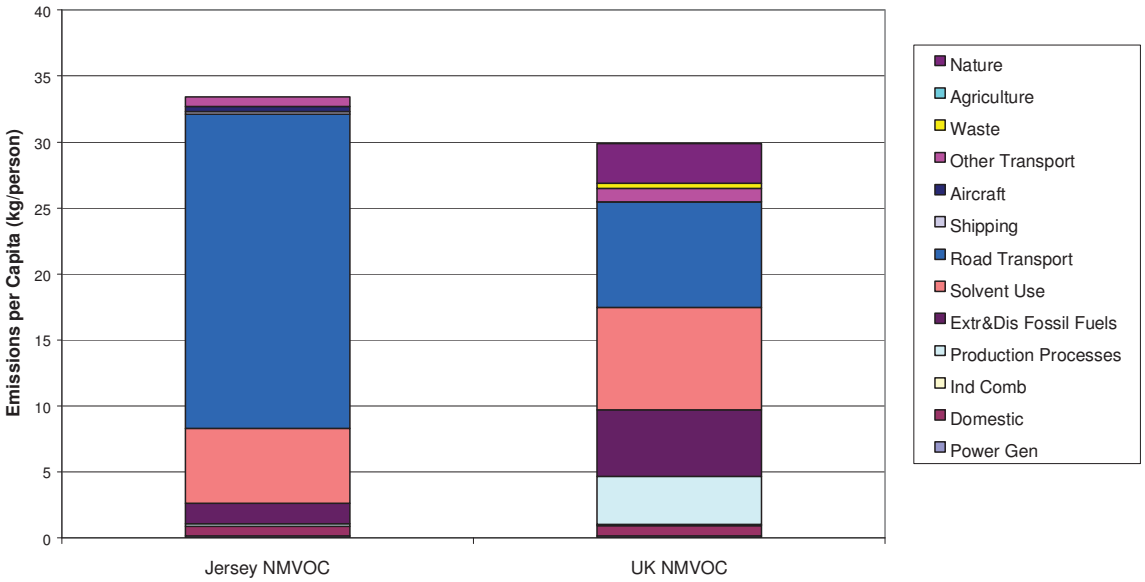
3.3.1 Health Impact of NMVOCs

Some VOCs are quite harmful, including benzene, polycyclic aromatic hydrocarbons (PAHs) and 1,3- butadiene. Benzene may increase susceptibility to leukaemia, if exposure is maintained over a period of time. There are several hundred different forms of PAH, and sources can be both natural and man-made. PAHs can cause cancer. Sources of 1,3- butadiene include the manufacturing of synthetic rubbers, petrol driven vehicles and cigarette smoke. There is an apparent correlation between butadiene exposure and a higher risk of cancer. Environmental tobacco smoke is a significant source of benzene exposure - a UK survey in 1995 indicated that 47% of children between 2 and 15 years of age live in households where at least one person smokes.

3.3.2 Emissions of NMVOCs in Jersey

Emissions of Non-methane Volatile Organic Compounds for both Jersey and the UK are shown below on a per capita basis. Emissions for Jersey are slightly higher than in the UK with a large proportion (69%) resulting from road transport compared to 26% in the UK.

Figure 3.3 NMVOC Emissions Per Capita - Jersey and UK



A comparison of emissions of NMVOC in Jersey with other 'islands' are shown in Table 3.3 which shows lower emissions in Guersney and highest in Gibraltar.

Table 3.3 Emissions of NMVOC per capita (kg/person)

Jersey	33
UK	30
Guersney	21
Isle of Man	27
Gibraltar	40

Some of the emissions of NMVOC on Jersey are derived from loss of volatiles from the petrol storage facility at La Collette and local petrol stations. It has been estimated that up to £11,000 per year has been lost in these evaporative emissions which should decrease with the possible provision of vapour recovery systems.

One of the most important NMVOC is benzene. Road transport is the major source of benzene. It is a known human carcinogen and long-term exposure can cause leukaemia. It is found in petrol and other liquid fuels, in small concentrations. In urban areas, the major source is vehicle emissions. Benzene concentrations in ambient air are generally between 1 and 5 ppb.

Concentrations of benzene have been reducing at all sites since 1997 with the associated reductions in petrol. (ie Benzene has reduced from 5% to 1% by volume in petrol up to 2000). Currently there are 97 underground fuel storage facilities in Jersey, which will be the main source of benzene on the

island (including La Collette and the Airport storage facilities). Most of these will be petrol stations. There are two possible major sources of benzene from evaporative emissions at petrol stations. The first when petrol vapour is displaced when filling underground storage tanks termed stage 1 emissions. The second when petrol vapour is displaced from vehicle petrol tanks during refuelling termed stage 2 emissions.

EU legislation requires all petrol stations with a petrol throughput of greater than 1000m^3/annum were required to fit Stage 1 vapour recovery before 1 January 2000. Petrol stations with a throughput of less than 1000 m^3/annum are very unlikely to have any significant effect on the local concentrations of benzene. Stage 1 emissions are therefore, unlikely to have any significant influence on concentrations of benzene in the vicinity of petrol stations. Stage 2 of the directive requires recovery of volatiles at the pumps/nozzles to reduce exposure to the public filling up their vehicles. This is to come into force by 2009. It may be that in the future new petrol stations in Jersey will have to comply with Stage 2 as manufacturers of equipment etc will cease producing pre-stage 2 equipment in the next 5 - 10 years.

Concentrations of ambient benzene recorded in 2000 were above the Upper Assessment Threshold (3.5 $\mu g\ m^{-3}$) at two sites Springfields Garage and Stopford Road. Concentrations were above the Lower Assessment Threshold (2 $\mu g\ m^{-3}$) at 3 other sites Beresford Street, Le Bas Centre and Elizabeth Lane. However, there were no exceedences currently of the limit value (5 $\mu g\ m^{-3}$ or 1.5 ppb) and it therefore can be assumed that the limit value should be achieved by the target year of 2010. It is interesting to note that while benzene levels have been reducing m+p xylene levels have increased. This may be due to an increase in the use of m+p xylene as a constituent in petrol.

3.4 Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless, poisonous gas produced when fuels containing carbon are burned where there is too little oxygen. It also forms as a result of burning fuels at too high a temperature. It burns in air or oxygen with a blue flame and is slightly lighter than air. In the presence of an adequate supply of O_2 most carbon monoxide produced during combustion is immediately oxidised to carbon dioxide (CO_2). However, this is not the case in spark ignition engines in motor cars, especially under idling and deceleration conditions. Thus, the major source of atmospheric carbon monoxide is road transport. In particular, carbon monoxide is usually significant in enclosed trafficked areas such as road tunnels or multi-storey car parks. Smaller contributions come from processes involving the combustion of organic matter, for example in power stations such as at operated by the JEC and waste incineration. Indoor concentrations of carbon monoxide may also be high when there is inefficient combustion of fuels such as coal, wood, oil and gas with limited ventilation. Tobacco smoke is also a significant source indoors.

3.4.1 Health Impact of Carbon Monoxide

Carbon monoxide CO is poisonous when inhaled because it combines with haemoglobin, the oxygen-carrying substance in red blood cells. The haemoglobin then cannot take up oxygen from the air. Lack of oxygen causes cells and tissues to die.

3.4.2 Emissions of Carbon Monoxide in Jersey

Carbon monoxide emissions in the UK are dominated by road transport activities (nearly 70% of the total), and it is expected to be similar in Jersey, with the remaining contribution arising from domestic heating and several other small sources.

Automatic monitoring of carbon monoxide was undertaken in February to March 2000 at Halkett Place, St Helier. During this time no exceedences of the Upper or Lower Assessment Threshold for carbon monoxide were recorded.

Monitoring of Jersey's road tunnel, which runs under the Fort Regent from the 31st October to the 4th November 1994 indicated particularly high levels of carbon monoxide (CO) which exceeded the World Health Organisation standard.

The Public Services Committee recommended (as part of the Sustainable Island Transport Policy) that ventilation be provided for reducing air pollution levels in the tunnel. Although the exposure time is short (eg maximum 5 minutes), the tunnel is used regularly by pedestrians and cyclists. At rush hour periods the public walking or cycling through will be exposed to a cocktail of pollutants. Signage has been provided notifying the public that air quality is 'poor' during rush hour periods.

3.5 Lead

Lead is the most widely used non-ferrous metal and has a large number of industrial applications. Its single largest industrial use world-wide is in the manufacture of batteries (60-70% of total consumption of some 4 million tonnes) and it is also used in paints, glazes, alloys, radiation shielding, tank lining and piping.

As tetraethyl lead, it has been used for many years as an additive in petrol; most airborne emissions of lead in Europe therefore originate from petrol-engined motor vehicles. With the decline in the use of unleaded petrol, however, emissions and concentrations in air have reduced steadily in recent years.

3.5.1 Health Impacts of Lead

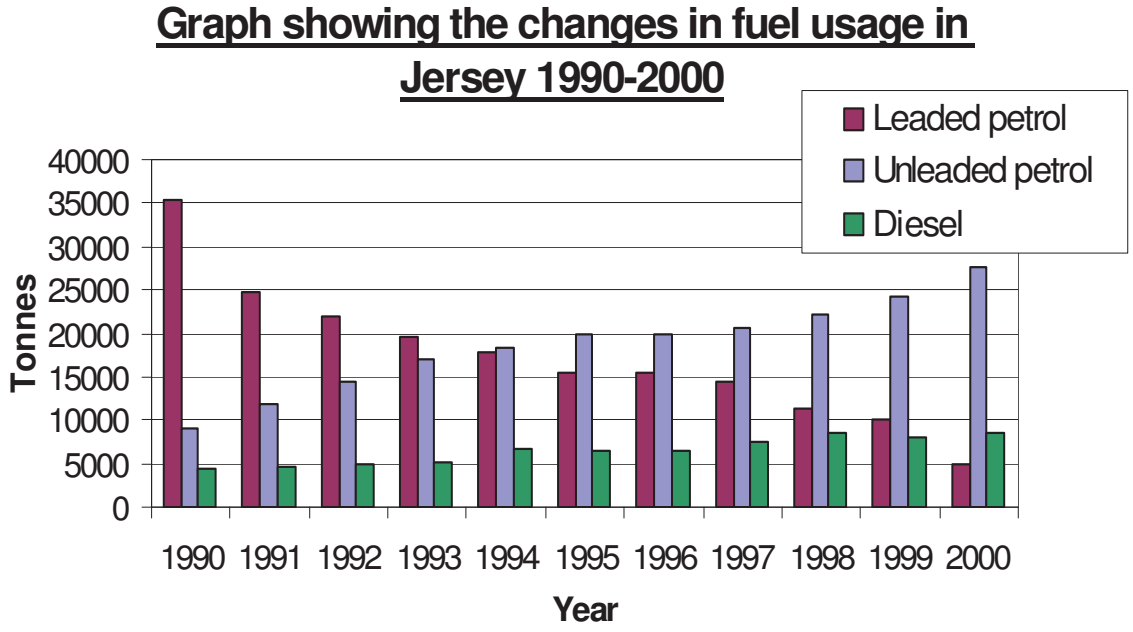
Lead is a cumulative poison to the Central Nervous System, particularly detrimental to the mental development of children.

3.5.2 Emissions of Lead in Jersey

Emissions of lead in Jersey are likely to be dominated by road transport, although emissions have been falling considerably with the gradual phasing out of leaded petrol. From 2000 the sale of leaded petrol was greatly restricted in Jersey. There are no other industrial sector sources of lead, which exist in the UK and therefore in Jersey it is unlikely that emissions of lead will a significant issue. Figure 3.4 shows the changes in vehicle fuel usage in Jersey since 1990 with the associated knock on effects of reduced lead in the environment.

No monitoring has been undertaken of this pollutant in Jersey. However, UK data indicates that concentrations are significantly below the Limit Values. It is likely that this is the case in Jersey as well.

Figure 3.4:



3.6 Sulphur Dioxide (SO_2)

Sulphur dioxide (SO_2) is a colourless, non flammable gas with a penetrating odour that irritates the eyes and air passages. It reacts on the surface of a variety of airborne solid particles, is soluble in water and can be oxidised within airborne water droplets. The most common sources of sulphur dioxide include fossil fuels combustion, smelting, manufacture of sulphuric acid, conversion of wood pulp to paper, incineration of refuse and production of elemental sulphur. Coal burning is the single largest man-made source of sulphur dioxide accounting for about 50% of annual global emissions, with oil burning accounting for a further 25-30%. The most common natural source of sulphur dioxide is volcanoes.

3.6.1 Health Impact of Sulphur Dioxide

The health effects of sulphur dioxide pollution in the UK were exposed graphically during the "Great Smog" of London in 1952. This resulted in approximately 4000 premature deaths through heart disease and bronchitis. Since then, however, emissions have been significantly reduced through legislative controls and the introduction of clean fuel technology. Research has shown that exposure for asthmatics is significantly more damaging than for normal subjects. Even moderate concentrations 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. This is known as the "cocktail effect."

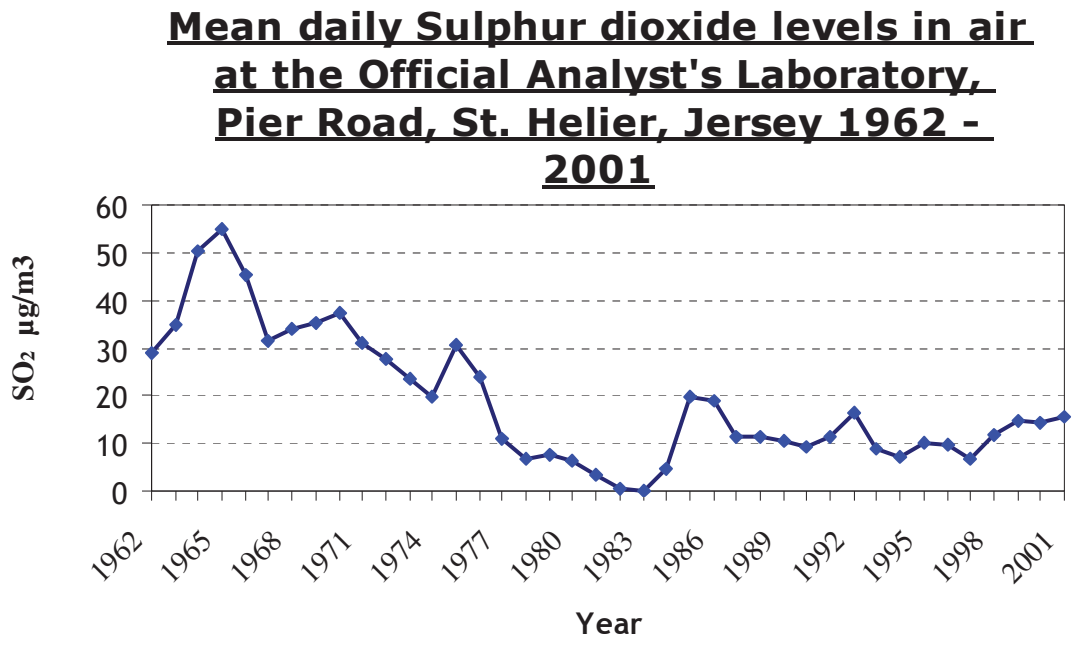
3.6.2 Emissions of Sulphur Dioxide in Jersey

In Jersey SO_2 emissions arise almost exclusively from fuel combustion, and are dependent on the sulphur content of the fuel. Emissions of SO_2 are expected to be dominated by emissions from the power station and domestic heating. Whilst the use of the under sea link with France will reduce the emissions from power generation on the island, the relatively small use of gas on the island for domestic heating is expected to give rise to higher emissions per capita than for the UK.

The amount of domestic coal burned has reduced from 11,033 tonnes in 1990 to 4,774 tonnes in 2000. However the burning of ultra low sulphur (50ppm) oil (ie kerosene) in domestic heating systems has increased from approximately 22,000 in 1990 to approximately 32,000 tonnes in 2000. This is because of the relative cost of oil being less than gas and electricity on the Island.

Levels of SO_2 measured at the States Official Analyst's Laboratory at Pier Road St Helier have been reducing generally since 1965 and are shown in the graph below.

Figure 3.5:



Results from the diffusion tube studies since 1997 have indicated that concentrations of sulphur dioxide measured using diffusion tubes at Clos St Andre, Le Bas Centre, Langley Park and St Brelade (Quennevais School) are all significantly below the annual average Upper and Lower Assessment Thresholds for the protection of vegetation. Levels are either constant or are decreasing from 1997 to 2000. Since 2000, SO_2 monitoring has been carried out at single site, Clos St Andre.

Ambient SO_2 concentrations at Clos St Andre were low during 2001, less than 3ppb during all months except December, when concentrations rose to over 8ppb. The annual mean SO_2 concentration at Clos St Andre was 2.6ppb.

Most of the limits for SO_2 are based on short averaging periods, such as 15-minute or 24-hour means. It is only possible to compare diffusion tube results with limits relating to longer periods, such as the annual mean

The WHO'S 1995 revised guidelines contain a guideline of 17ppb for the annual mean. The 2001 annual mean SO_2 result for Clos St Andre was well within this value.

EC Directive 1999/30/EEC (the first Daughter Directive) contains a limit of 8ppb for the annual (calendar year) and winter (October to March) mean SO_2 concentration, for the protection of ecosystems. This is only applicable in rural areas, and therefore strictly does not apply to Clos St Andre. However, the annual mean of 2.6ppb was well below this limit.

Further automatic monitoring during February to March 2000 in St Helier indicated that for this limited period there were no exceedences of the Upper or Lower Assessment Thresholds for the daily averaging period for the protection of human health. Occasionally there were high concentrations recorded which may have resulted from emissions from the JEC power station during periods of southerly winds.

With the reduction of sulphur in fuel oil and reduced usage of the Jersey Electricity's oil fired power station it is likely that emissions of sulphur dioxide are not significant.

3.7 Particulates

Airborne particulate matter is another important pollutant for the UK as high concentrations are measured. Particles are often classed as either primary (those emitted directly into the atmosphere) or secondary (those formed or modified in the atmosphere from condensation and growth or chemical reactions).

A major source of fine primary particles is combustion processes, in particular diesel combustion, where transport of hot exhaust vapour into a cooler tailpipe or stack can lead to spontaneous nucleation of "carbon" particles before emission.

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Secondary particles are typically formed when low volatility products are generated in the atmosphere, for example the oxidation of sulphur dioxide to sulphuric acid. The atmospheric lifetime of particulate matter is strongly related to particle size, but may be as long as 10 days for particles of about 1 μm in diameter. A particle with a mean aerodynamic diameter of 10μm is referred to as $\mathbf{PM_{10}}$ and likewise a particle with an aerodynamic diameter of 2.5μm is $\mathbf{PM_{2.5}}$.

Other sources of particulates include agricultural dust, construction sites, incinerators, power generation quarrying, tyre abrasion, pollen, spores, sea salt, domestic coal and oil burning.

3.7.1 Health impacts of Particulates

Particles are associated with a range of health effects. These include effects on the respiratory and cardiovascular systems, asthma and mortality. There is emerging evidence to suggest that the health effects of particles are due principally to fine particles $PM_{2.5}$ and the smaller $PM_{1.0}$ & $PM_{0.1}$.

A percentage of particles below 10 μm will penetrate the upper bronchial tract as far as the trachea and primary bronchi of the lungs. These become attached to the mucus which coats the trachea and bronchi and are removed by the beating cilia (hairs), which move the particles upward and are eventually swallowed. Particles below 2.5 μm will penetrate into the deep lung secondary and terminal bronchi. To penetrate into the alveoli, a particle of less than 1μm is necessary (See Appendix A).

3.7.2 Emissions of Particulates in Jersey

Emissions from mainland Europe may make a significant contribution to secondary particles in Jersey. The UK Airborne Particles Expert Group's findings suggest that in a typical year with typical meteorology, about 15% of the UK's total annual average PM_{10} concentrations (about 50% of secondary particles) are derived from mainland Europe. In years of higher frequency of easterly winds, with large movements of air from mainland Europe, emissions in mainland Europe account for a considerably higher proportion of PM_{10} concentrations, particularly in south and east England. No work has been carried out to try and establish the contribution of secondary particulates originating from Europe affecting Jersey.

Monitoring carried out in 2000 in Halkett Place by Health Protection found a significant proportion of particulates analysed were from natural sources such as sea salt. The monitoring also showed an increased ratio of smaller $PM_{2.5}$ particles to PM_{10} particles, which confirmed the presence of more harmful smaller particles associated with traffic. Road transport is an important source of primary particles and because of the lack of emission controls in Jersey the levels of particulate matter are likely to be high.

Health Protection purchased in 1999 a Turnkey Osiris for monitoring real time levels of particulates (ie total suspended particulates (TSP) , PM_{10} , $PM_{2.5}$, and $PM_{1.0}$). This unit has been used for a number of surveys to assess PM_{10} levels throughout St Helier mainly driven by complaints about traffic:

1) New Street: Levels of PM_{10} in January 2000 varied between 13 to 27μg/m^3 as a running 24 Hour average. These levels do not exceed the EU Daughter directive objective. (ie 50μg/m^3 as a 24 Hour mean to be achieved by 1/01/05)

2) Savile Street: Levels varied in January-February 2001 from 21μg/m3 to 59μg/m3 as a running 24 Hour average. There was one exceedance in the month's monitoring data of the EU Daughter directive objective. The PM_{10} levels follow a characteristic pattern of increasing during morning and evening rush hours and at lunchtimes.

3) A survey was carried out in July 2000 to assess the levels of particulates exposed to whist driving a petrol engined car in Jersey. Levels of PM_{10} particulates within the cabin of the car increased dramatically behind heavy goods vehicles (eg max 190μg/m^3) and through Jersey's road tunnel (eg max 500μg/m^3). The importance of knowing the source was reinforced as high levels of PM_{10} were found close to Jersey's composting site, however the source was non-toxic wind blown dust.

Other survey sites included Wellington hill, Le Bas Centre and Grand Vaux.

A second Turnkey Osiris particulate monitor was purchased in 2002 and was recently situated at the Weighbridge close to the Bus station. This unit can be accessed remotely via a GSM modem. It is also set up to provide wind direction and speed. The unit is fitted with a filter, which allows analysis of the particulates to determine the exact nature, contribution and possible sources.

It is likely that levels of particulates will fall with the introduction of particulate traps and catalytic traps for diesel vehicles assuming total number vehicles do not increase significantly. However there are concerns that the smaller more hazardous particulates will not be reduced by this technology.

The provision of a new bus operator for Jersey in September 2002 and relocation of the parking of buses to La Collette will assist in reducing PM_{10} levels in this area.

Automatic monitoring of particulate matter was also undertaken in February to March 2000 at Halkett Place, St Helier. The Upper and Lower Assessment Thresholds were exceeded for the daily and annual averaging period for particulate matter. A full year of monitoring would be needed to determine compliance with this limit value.

Further information and the reports for the above surveys can be found at www.health.gov.je

Photograph 7: The real time particulate monitor at Weighbridge close to the bus station.

4 LEGISLATION AND PROTOCOLS

4.1 Protocols And Reporting Requirements

The UK is committed to a number of national and international targets, protocols and reduction strategies. This requires emission estimates for the UK to be generated and submitted to various international bodies- including the United Nations Economic Commission for Europe (UNECE) and the United Nations Framework Convention on Climate Change (UNFCCC).

Under the UNFCCC, the UK is committed to developing, publishing and regularly updating national emission inventories of greenhouse gases using reporting guidelines from the Intergovernmental Panel on Climate Change (IPCC). Likewise, emission estimates for nitrogen oxides, carbon monoxide, ammonia, sulphur dioxide, non methane volatile organic compounds NMVOC, persistent organic pollutants and heavy metals are submitted to UNECE under the Convention on Long-Range Transboundary Air Pollution (CLRTAP). The Bonn Agreement of the Kyoto Protocol of this Convention requires the UK achieve a 12.5% reduction on 1990 levels of greenhouse gases, within the European Union burden sharing mechanism by 2012. The UK aims to move beyond the Kyoto target and reduce CO_2 emissions by 20% below 1990 levels by 2010.

Jersey is signed up to specific NO_x and VOC protocols, which come under the UNECE, and therefore emission inventories for these two pollutants have been generated and are included in the UK emission estimates submitted to the UNECE. However, the emissions are expressed as the UK and “other territories”, and therefore emissions arising from Jersey are not quoted individually. This also means that targets are associated with the UK and other territories, hence there are no targets applied specifically to Jersey alone.

Currently the States of Jersey have obligations under the UNFCCC, and include the reduction targets for greenhouse gases in their international commitments

4.2 European Legislation On Air Quality

Currently there is no air pollution legislation in Jersey. However Jersey’s Parliament, the States of Jersey, has agreed to work towards the limits set out in the European Daughter Directive 99/30/EC which deals with particles, sulphur dioxide, nitrogen dioxide and lead.

The EU Directive 96/62/EC on Ambient Air Quality Assessment and Management (The Air Quality Framework Directive) establishes a framework under which the EU will set limit values or target values for concentrations in ambient air of specified pollutants. These will supersede existing EU air quality legislation. The Directive identifies twelve pollutants for which limit or target values will be set in subsequent daughter directives. These pollutants are sulphur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter, lead, carbon monoxide (CO), benzene, ozone, polyaromatic hydrocarbons (PAHs), cadmium (Cd), arsenic (As), nickel (Ni), and mercury (Hg).

Directive 1999/30/EC (the first Air Quality Daughter Directive) establishes legally binding limit values for SO_2, NO_2, particles and lead (Table 1). These limit values are to be achieved by

1 January 2005 and 2010. The Directive was adopted in April 1999 and entered into force in 1999. Member states were required to implement it by July 2001.

The Daughter Directive also sets, for the first time, European limit values for oxides of nitrogen (NO_x) and SO_2 for the protection of vegetation and ecosystems.

Another Daughter Directive, 2000/69/EC, lays down limits for carbon monoxide and benzene. The EC directive 2002/3/EC sets out a target value for ozone. This is set at 120 $\mu g\ m^{-3}$ as a maximum daily 8 hour average in a calendar year which should not be exceeded more than 25 days per calendar year averaged over 3 years.

Article 5 of the Framework Directive requires the Member States to undertake a preliminary investigation of ambient air quality prior to implementing the daughter directives for NO_2, SO_2 and particulate matter. The objectives of these assessments are to establish estimates for the overall distribution and levels of pollutants and to identify additional monitoring requirements that may be necessary to fulfil obligations under the Framework and Daughter Directives.

Table 4.1 EU Limit Values and target date for achievement.

	Averaging period	Limit value [$\mu g\ m^{-3}$] *)	Maximum number of exceedences allowed	To be met by
SO_2	Hourly	350	24	1/1/05
SO_2	Daily	125	3	
SO_2	Annual, 6-monthly **)	20	-	
NO_2	Hourly	200	18	
NO_2	Annual	40	-	1/01/10
NO_x	Annual	30	-	19/07/01
PM_{10}	Daily	50	35	1/01/05
PM_{10}	Annual	40	-	1/1/05
Pb	Annual	0.5	-	19/07/01
Benzene	Annual	5	-	1/01/10
CO	Maximum daily 8 hour mean	10 [$mg\ m^{-3}$]	-	1/1/05

*) Numerical value of the limit value
**) Calendar year and winter (1 October to 31 March)

In accordance with the Framework Directive on Air Quality Assessment and Management, Member States have to break down their territories into zones. The zones are primary units for the management of air quality. However, the Directive specified requirements concentrating the assessment of individual zones. The Directive 96/62/EC does not stipulate any detailed rules for the definition of such zones and it leaves the decision to the Member States. It is therefore reasonable that Jersey considers itself as one agglomeration and one zone.

The assessment requirements for individual zones, as set out in the directives, are dependent on the levels of pollution encountered in the zones compared with the limit values. The "daughter" directive identified for each pollutant two defined threshold values: the upper assessment threshold (UAT) and the lower assessment threshold (LAT). The assessment threshold values are lower than the limit value and are defined as a percentage of the limit value. The requirements for assessment within the zone depend on whether the assessment limit was exceeded within the zone in the previous years.

Within the first year of effect of the daughter directive, the assessment regime is dependent on the results of the preliminary assessment. In zones where the UAT is exceeded for a specific pollutant very intensive assessment requirement apply. Where the LAT but the UAT is exceeded, less strict requirement apply. This means that the exceedence of limit values does not determine the requirement of the assessment. An exceedence requires that organisation measures are implemented and a reporting process initiated. The Upper and Lower Assessment Thresholds are given in Appendix C.

5 ACTION PLAN FOR JERSEY

5.1 Integration With Other Island Strategies

Many existing initiatives in Jersey which are incorporated within existing Island strategies will have the benefit of improving air quality. To enhance the success of this air quality strategy it is important that these existing initiatives, for example recommendations in the 2002 Jersey Island Plan, are integrated within this Strategy. Such initiatives are included in the *1995 Strategic Policy Review "2000 and Beyond"* which has the following policy statements which relates to traffic pollution:-

1) reduce the detrimental impact of traffic on people's lives;

2) to raise levels of environmental awareness and responsibility.

The *Environmental Charter 1996* has a clear statement with regard to future transport and planning policies:-

"to develop transport and planning policies which encourage the use of public transport and minimise the use of other vehicles. The States will support the provision of facilities for and encourage, cycling and walking, and encourage a policy of fuel efficiency."

The 1995 Strategic Review "2000 and Beyond" and the Environmental Charter committed the States of Jersey's parliament to adopting and developing a sustainable transport policy.

In 1999 the States of Jersey's Public Services Committee produced a *Sustainable Island Transport Strategy* (Ref: www.psd.gov.je). Some of the options presented in this for the improvement of traffic will also result in an improvement in air quality. These, together with additional measures are assessed in terms of how cost effective they are likely to be for the improvement in air quality.

In 2001 the Sustainability strategy report was published "*Jersey into the Millenium: A Sustainable Future*"(Ref: www.planning.gov.je). Consultation during the production of this report identified over 700 policy options for the Island to achieve sustainability. From these over 200 strategic and operational strategic recommendations have been included. The top 10 of these, which includes pollution, provides a focus for strategic development.

In 2002 the *Jersey Island Plan* (Ref: www.planning.gov.je)provided policies for the improvement of traffic and transport on the Island in relation to land use. Its main objective is to achieve sustainable transport for Jersey which minimises the overall need to travel, reduce the use of the private car and encourage more environmental forms of transport such as cycling and walking. This is to be achieved through providing a more efficient use of the existing transport infrastructure including improvements to the existing road network. Improved safety and security for transport users should be made a priority including reducing accidents and increasing priority for pedestrians, cyclists, the mobility impaired and public transport user over the car. In particular the Island Plan recognises the need to improve transport in the centre of St Helier where the air

quality issues are of greatest concern. This should be achieved by measures, which also ensure a town centre which is a vibrant and attractive place for workers, shoppers, residents and visitors.

The 2002 Island Plan sets out a Strategic Travel Policy, which aims to achieve a more energy efficient and environmentally sustainable transport system in Jersey. The principal modes of achieving this is through:

- A land use strategy and development policies that take account of the access to transport provision
- Promotion of a travel awareness campaign
- Improvements of the existing highway especially for pedestrians and cyclists

Improvements of the existing highway at Colomberie, St Helier are now in progress with the implementation of the St Helier Street Life programme.

5.2 Establishment Of Suitable Monitoring Network

Under the EC Air Quality Framework Directive (96/62/EC), all Member States have to assess their existing air quality and implement a programme of monitoring, dependent upon population, population density, emission sources and proximity of the general public to these sources. Under the Framework Directive, a Member State must undertake continuous monitoring (using appropriate instrumentation) at at least ONE site.

The subsequent Daughter Directives (1st for NO_2 and SO_2, 2nd for CO and Benzene, and the newly published 3rd for O_3), all prescribe exactly how and where monitoring should be undertaken. However, the mass of monitoring evidence collected strongly suggests that concentrations of CO and SO_2 are likely to be below the lower assessment threshold, and that there is little benefit in measuring O_3, as emissions from the island will have very little impact on island ozone concentrations.

We would recommend, therefore, that the island undertakes continuous monitoring for NO_2 and PM_{10}. For the first year at least, this should be at the highest known pollution "hotspot" (Weighbridge). Once compliance with the Daughter Directive(s) is confirmed at this location, the site could be relocated to an area more representative of general population exposure (eg residential or urban background).

This approach would best be satisfied by purchasing a mobile (or movable) installation. Depending upon the specification, this would involve a capital cost of between £30-40,000, with ongoing costs of approximately £10k per annum (although a lot of this could be offset with skilled/trained local staff).

A number of locations in St Helier have been identified as being at risk of exceeding the EU limit value. Therefore we recommend that the States of Jersey carry out continuous passive diffusion tube monitoring of nitrogen dioxide at a number of these identified areas of high pollution. Together with co-location of these passive monitors with the automatic site this would provide information on the levels of pollution on a widespread basis. If required, short term automatic monitoring at identified hot spots of high pollution can be used to supplement the surveys.

This monitoring strategy will allow an assessment of the long term effectiveness of local actions put in place to meet the limit values.

5.3 Options For Traffic Emission Abatement In Jersey

The States of Jerseys *Sustainable Island Transport Strategy* (1999) suggested a number of options for the improvement of transport, some of which will also improve air quality. These along with other options to be considered are presented.

A very initial indication of the cost-effectiveness of different schemes is presented overleaf. Care must be taken in interpreting the initial conclusions, as more detailed information on baseline conditions are needed, specifically on the types of trips being taken (i.e. the relative split between tourists and inhabitants), and the levels of island registered traffic and non-island registered traffic.

The overall cost-effectiveness relates to how expensive it is likely to be to achieve the emissions reduction required in the main problem areas, i.e. St.Helier, rather than the wider environmental and transport benefits of introducing such schemes. Consideration for other areas (transport impacts, noise, socio-economic effects) should really be made alongside air quality to establish the overall best measures for Jersey. For example, such socio-economic effects includes consideration of issues such as social equity (e.g. congestion charging limits access to drivers who are on lower incomes and cannot afford the congestion charge) or social exclusion (e.g. the promotion of bus services in an area where the catchment and take up is likely to be high may exclude residents in outlying villages from this service). However any improvements in air quality are likely to benefit lower socio-economic groups.

Option	Indication of Costs	Linkage to other Island Strategy/Policy
Legislative MOT test	Expensive to set up, but potentially attractive because of large number of older vehicles in Jersey (>40% of vehicles >10 years old). Costs for scheme could be recovered through road tax or scheme charges. Main benefit will be improvements to vehicle safety, but should lead to emissions improvements and would provide incentive to remove older, more polluting vehicles from fleet. Will not specifically target the air quality 'hot spots 'in St. Helier and so maybe more expensive than targeted measures. *Cost-effectiveness likely to be low for targeted reductions for AQ in St. Helier but will be good for the whole of Jersey. Important other benefits.*	This measure is promoted within the Sustainable Island Transport Strategy
Roadside emissions testing	Only really applicable if a legislative MOT test is in place, as it works by targeting older, high emitting vehicles that exceed emission limits. *Cost-effectiveness linked to above.*	
Park and Ride	Maybe an attractive option for St. Helier. Costs associated with infrastructure for parking, and with purchase and running of bus service, plus signing and promotion of scheme. However, if existing parking is in place, and bus services can be contracted out (e.g. with a charge to recover costs), then financially may be attractive. Higher take-up rates are usually obtained if accompanied by parking restrictions/higher parking charges in central area. Targeted measure, so likely to have higher success at reasonable cost. *Cost-effectiveness medium.*	This measure is promoted within the Sustainable Island Transport Strategy and the Sustainability Strategy promotes a more effective public transport strategy.

Option	Indication of Costs	Linkage to other Island Strategy/Policy
Parking	Actions to reduce number of parking spaces, or to increase parking charges, to encourage public transport or park and ride. Of little use unless public transport options are available. Increases from parking revenue financially attractive, and can be used to offset costs of accompanying schemes (e.g. park and ride). For St. Helier will depend if car parks public or privately run. Most are privately run and consequently are not affected by a charging policy. *Cost-effectiveness medium* Current on street parking should be limited which would decrease the circling of traffic searching for a space, e.g. with 'red' routes that prohibit parking along certain roads or stretches of road. This on street parking should be displaced with cycle routes and improved pedestrian facilities where appropriate. Parking concessions for low emission vehicles *Cost-effectiveness medium high*	Policy TT25 of the Island Plan (2002) requires the Planning and Environment Committee to develop a new parking standards which will assist in redressing the balance between private and public parking provision in town. Support is given for the development of a parking strategy to be developed by the Public Services Committee which will: • Provide adequate short stay parking • Take account of the need for residential parking in St Helier where off street parking is not practical • Ensure adequate parking for the disabled • Develop a parking charging structure that better reflects the real cost of provision • Considers options for improving the efficiency of enforcement The Sustainability Strategy supports these parking policies.
Vehicle scrapage subsidies	Vehicle scrapage schemes have been very effective in a number of European cities. They work by encouraging the replacement of the oldest, and most polluting vehicles, by offering a financial incentive to take these vehicles off the road. In an island like Jersey, such a scheme may be particularly effective by targeting the existing registered vehicle stock. Relatively low subsidy levels are needed to get good take-up. May be most appropriate if targeted at the heavier goods fleet. *Cost-effectiveness medium – medium*	

Option	Indication of Costs	Linkage to other Island Strategy/Policy
Bus Schemes	Island public transport. The success of bus schemes will depend on the level of existing services on the island and the potential level of patronage. Likely to be expensive to provide level of service needed to see modal switch across the island, and even a good service may not have high take-up as private car use very prevalent. Would require very large subsidies to be able to deliver attractive enough service at low cost. Finally, island wide public transport schemes will not target the main pollution areas in St. Helier, with exception of specific Bus Priority Corridors . *Cost-effectiveness low – medium.* Urban schemes. In addition to park and ride schemes, it would be possible to improve public transport services in St. Helier, servicing the town centre. Need to introduce with measures to try and discourage car transport into city to make effective. This could build upon the Sustainable Island Transport Strategy objective of improving bus services particularly for the School provision and creating a bus priority corridor. Increasing bus provision is likely to have a detrimental impact on air quality at the Weighbridge bus station area, which is already poor. Consequently it is important that any increase in bus schemes is accompanied with existing proposals in the Jersey Island Plan (2001) to provide a new Transport Centre at the island site. *Cost-effectiveness medium.*	Bus Priority Corridors were identified in the Island Plan (2002) as being required to promote public transport in key radial routes. However, it was recognised that radial routes offer few opportunities for bus priority, there may be opportunities in the town for bus only streets or priority turns are allowed while general traffic is prohibited. Support was given to the investigation of a bus 'showcase' corridor initiative, which would provide an improved frequency and quality of bus service. It was also recognised in the Island Plan that facilities for bus passengers were extremely poor. While a programme of bus shelter provision has been instigated by the Planning and Environment Committee, this needs expansion. This is to be targeted at the pollution hot spot in St Helier, for example by ensuring bus stop provision within 400 m of new residential development outside the St Helier Ring Road. The most effective policy of the Island Plan to have an improve air quality is likely to be the promotion of a new Transport Centre. The highest pollution concentrations are found at the Weighbridge close to the bus station. With the proposal to relocate the bus station and overnight depot to the Island site emissions should be significantly reduced at the Weighbridge. The Island site should be able to cater for a range of improved transport services such as Town Hopper buses, cycle hire, road train and an evening taxi rank. In the transfer of buses from the Weighbridge an assessment should be made to determine the likely air pollution concentrations at the proposed

		Transport Centre Island site.
Option	**Indication of Costs**	**Linkage to other Island Strategy/Policy**
Car sharing schemes/Green Travel Plans	Main costs associated with information programmes to encourage car sharing. Usually implemented with high occupancy lanes, to provide an incentive, which may require some infrastructure costs, plus enforcement. However, take-up is often low and the improvement in emissions is small. Effectiveness will depend on the existing commuting level for St. Helier, and attractiveness of relevant organisations. This measure is promoted within the Sustainable Island Transport Strategy and the Island Plan. *Cost-effectiveness low – medium for existing problem, though very important for future developments.*	Policy TT2 of the Island Plan states that the Planning and Environment Committee will require a Travel Plan to be submitted with major planning applications for new development. Where any submitted Travel Plans are not acceptable, permissions will not normally be granted.
Vehicle access limits	Examples include Low Emission Zones, where vehicles are prohibited entering a zone unless they comply with modern emissions standards are being considered in a number of cities in the UK. However, for a small city such as St. Helier would be costly to implement and enforce. Usually targeted at freight distribution (heavy fleet). *Cost-effectiveness low - medium.*	
Congestion charging	Not suitable for St. Helier.	
Variable tax on engine size and age	Introducing road tax differentials for vehicles, such as to encourage smaller vehicles and also to penalise older, more polluting vehicles. Both approaches have effectively been introduced in the UK. Smaller cars now pay a lower annual road tax. There are also reduced annual road taxes for heavier vehicles which retro-fit older vehicles with new abatement technology. Similar system would be worth considering, and should be low cost provided an existing	A vehicle registration tax is to be introduced on the 1st January 2003.

	vehicle registration and road tax scheme is in place. *Cost-effectiveness medium*	

Option	Indication of Costs	Linkage to other Island Strategy/Policy
Alternative fuels	Alternative fuels are very effective in reducing emissions from any individual vehicle. The main two fuels being implemented are CNG and LPG. The use of alternative fuels may be attractive in Jersey, as normally the take-up of these fuels is restricted by lack of fuelling depots, and the limited range of these vehicles. Currently there are 2 autogas filling stations (Jersey Gas in St. Helier and Freelance in Trinity). On an island the size of Jersey, both of these constraints would not be so relevant for an island specific fleet. The infrastructure costs of installing new alternative fuel depots would be high, but there should be benefits to operators from lower fuel costs, depending on the relative tax levels on different fuels. For example, with LPG a motorist can achieve 80% of the travelling distance with a litre of LPG compared to that of petrol. However, the costs of 1 litre of LPG is currently 31 pence compared to 63 pence for a litre of petrol. The reductions in emissions from use of LPG compared to Ultra Low Sulphur (ULS) Petrol and ULS diesel are shown below: LPG compared to ULS petrol 11-13% less CO_2 15-80% less NO_x 20-40% less Hydrocarbons 30-50% less CO LPG compared to ULS diesel 80-95% less particulates 99-99.8% less ultra fine particulates 90-99% less NO_x *Cost-effectiveness: medium.*	This measure is promoted within the Sustainable Island Transport Strategy The UK Energy Saving's Trust offer to pay 70% of the costs of converting to LPG. It is recommended the States offer a similar type of incentive to promote the uptake of LPG (eg free or reduced parking charges).

Option	Indication of Costs	Linkage to other Island Strategy/Policy
Pedestrianisation	Obviously effective in reducing road traffic, but can lead to overall problems from displaced/diverted traffic (that routes around an area). Any larger projects such as this have high costs, as they usually require construction work. There may be additional benefits from such schemes in St. Helier by increasing attractiveness of areas for tourism. Within the Jersey Island Plan six areas have been identified as pedestrian priority areas where full pedestrianisation, reduction in circulating traffic and removal of on street parking would result in improved air quality. *Cost-effectiveness low – high*	This measure is promoted in the Island Plan, the Island Sustainable Transport Policy and Jersey into the Millennium: A Sustainable Future. They recommend that a number of minor lanes are designated as green lanes. However, as many of the main roads on the Island do not have any footpaths which raises an issue of safety to widen this option to an Island –whole viable alternative. However, in St Helier, 8 pedestrian improvement areas have been identified – see Island Plan. Within the Island plan support is given for a central area which is dedicated to the pedestrian. The Sustainability Strategy notes that the pedestrianisation of King Street in St Helier has been very successful for residents, shoppers, retailers and tourists
Walk to School Plans	This could reduce the impact of peak hour congestion during term times especially around school locations. The effectiveness does depend on the uptake which needs to be encouraged through the Education Services and Health Services to improve children's physical fitness. Needs to be implemented in conjunction with road safety measures. *Cost-effectiveness medium*	Safe Routes to School is promoted in the 2002 Island Plan and also in the Island Sustainable Transport Strategy.

Option	Indication of Costs	Linkage to other Island Strategy/Policy
Cycling and walking provision	Improves overall visual amenity in St Helier. However cycling facilities are needed which may be limited in the physical space available in some of the narrow street canyons in St Helier. However in the other parts of Jersey the existing Green Lanes (for the promotion of cycling and walking) and cycle routes needs to be integrated into a route network. May not be desirable in the rural parts of the Island where distances are perceived to be too far. In terms of improvement in air quality the impact is likely to be minimal unless many of the short journeys made by car in St Helier switch mode. *Cost-effectiveness low but important other benefits.*	Currently on the Island there are 8 cycle routes covering 96 miles but most of these are not integrated. However, in the Island Plan (2002) there is support that residential streets are promoted to ensure that pedestrians and cyclists have equal priority to the car. In these streets vehicle speed is not to exceed 20 mph. Appropriate land use planning and road design can ensure that these speeds are adhered to. However with this option lower speeds are likely to increase emissions of air pollutants and therefore to make a positive impact on air quality it must be integrated with a mode switch from car to walking or cycling. However, taking the Island as a whole, most journeys are less than 5 miles therefore making Jersey ideal for cycling. Is it clear that cycling on Jersey and in St Helier in particular, is restricted because of safety issues and congestion on the main road
Planning Strategy	Looking at future planning policy to ensure developments have adequate public transport provision and will not exacerbate transport and air quality problems. *Cost-effectiveness. Low for current problem, but important for future.*	Island Plan 2002

Option	Indication of Costs	Linkage to other Island Strategy/Policy
Traffic management	Such as one way systems to restrict the flow of traffic into certain areas (e.g. central areas) or improve the flow of traffic along others (e.g. increasing speeds along main roads). Costs will depend on the levels of infrastructure required. Most effective measures can be in relation to speeds. Given the speed restrictions on Jersey – emissions could actually be reduced along major roads by increasing allowable speeds. Other changes to traffic flows in the centre of St. Helier will be very site-specific. The effectiveness of a Ring Road around St. Helier will also be site specific to the proportion of the total traffic which is through traffic. *Cost-effectiveness low – high*	Policy TT7 of the Island Plan (2002) states that the Planning and Environment Committee will support the development of a Town Centre Movement Strategy. This will aim to give priority to pedestrians, mobility impaired, service requirements, public transport, taxis and cyclists. Currently one of the major problems identified in St Helier is that caused by motorists looking for on-street parking. This leads to increased traffic flow, usually at low speed and results in elevated air pollution concentrations. This measure is promoted within the Sustainable Island Transport Strategy
Raising awareness	To enable all sections of the community to fully participate in the process to improve air quality information in Jersey it is essential that people are provided with accurate and meaningful information in a form that is easily understood. Use of the media, leaflets and the internet etc. *Cost-effectiveness low – high*	

5.3.1 Improving Industrial Sources of Air Pollution

The principal source of industrial emissions in Jersey is the incinerator in Bellozanne. This incinerator is of dated technological design and has little pollution abatement technology. However, recently proposals to decommission this incinerator and construct a new one will reduce significantly the pollution issues arising from incineration in Jersey. It is recommended that the States of Jersey ensure the new plant employs Best Available Techniques of abatement. There is now an urgent need for a financial and policy commitment to be made as presently Jersey is in breach of the EC Directive. There is also the related issue to consider of fugitive emission from ash handling and disposal.

The European Community Directive (96/61/EC) on Integrated Pollution Prevention and Control (the "IPPC Directive") controls releases from industrial plant to all environmental media. The aim of the IPPC regime is to introduce a more integrated approach to achieve a high level of protection of the environment taken as a whole by, in particular preventing, or where that is not practicable, reducing emissions into the air, water and land. Under IPPC plant operators should show that they have applied the Best Available Techniques to ensure emissions are at a minimum.

Currently, the IPPC regime does not apply to Jersey but it does represent good practice and such legislation would assist the States of Jersey to create a more co-ordinated and integrated approach to pollution issues. For example, currently in Jersey there is concern about the effect of the policy decision to charge for the disposal of waste oil. Traditionally waste oil has been used by some growers to heat greenhouses via waste oil burners and approximately 120,000 litres of waste oil per year had been disposed of at the Bellozanne incinerator or shipped off Island. As a result of the new charge for disposal it is likely that there may be an increase in illegal dumping or burning via waste oil burners which may result in increased nuisance type complaints and associated emissions to air. The IPPC regime would encourage a more integrated approach to such pollution issues.

Best Available Techniques is defined as "the most effective and advanced stage in the development of activities and their methods of operation which indicates the practical suitability of particular techniques for providing in principle the basis for emission limits values designed to prevent and, where that is not practicable, generally to reduce emissions and the impact on the environmental as a whole."

The Best Available Technique (BAT) approach ensures that the cost of applying techniques is not excessive in relation to the environmental protection they provide. It follows that the more environmental damage BAT can prevent, the more the regulator can justify telling the operator to spend on it before the costs are considered excessive.

Jersey has one power station, which is oil fired. The following improvements have been carried out:-

- £7 million has been spent on updating the distribution control system to increase fuel efficiency by closely following demand. This helps reduce emissions including particles from the stack.

- Low Oxides of Nitrogen (NO_x) burners have now been fitted to the largest boiler. The combustion takes place at lower temperatures so reducing formation of NO_x.

- Sulphur in heavy fuel oil has reduced from 3.5% to 2.0% and has reduced further to approximately 1%.

- Cyclonic dust separators have been installed to catch greater than 95% of particles.

A second 80 MW cable link with France has been laid in 2000 (the first was laid in 1985). This may result in local generation being reduced from 12 to 4 months of the year with the subsequent reduction in air pollution including carbon dioxide (CO_2). Consequently the emissions from the power station as a percentage of the total have decreased.

Other fuels available on Jersey include, liquefied petroleum gas (LPG), which is brought into the island by ship and is relatively expensive, generated electricity and coal both standard and smokeless. Since 1990 the use of oil has increased by approximately 50%, while the use of coal has reduced by 42%. LPG and electricity usage has increased by 20% and 8% respectively up to 2000.

Other options available to improve air quality on Jersey include:

1. Improving best practice in industrial paint spray operations which includes the increased use of water based paints; high volume, low pressure spray guns; high efficiency filters to be used in spray booths to aid removal of contaminants and compliance with Policy Guidance note PG6/34(96).

2. Energy efficiency improvements particularly in domestic housing with the wider installation of cavity and loft insulation. Since April 1st 2002 in the UK the revised Building regulation document L (J in Scotland and N Ireland) has been in force. This document focuses on energy savings in all new buildings, the fabric of the building, heating boilers, controls, lighting equipment and ventilation along with energy ratings or SAP ratings (Standard assessment procedure). This is to aid the UK government achieve a reduction in CO_2 emissions by 12.5% below 1990 levels by 2012. (eg certain UK ventilation companies now provide; low watt ventilation units which use 50% - 80% less power, these utilise a DC motor which is quieter and doubles the product motor life, plus; low watt whole-house recovery units which are up to 90% efficient) It is hoped that the Planning and Building Services Department will update the Building byelaws to incorporate Document Part L. It is recommended the States offer an incentive(s) to upgrade and improve thermal insulation in all new premises.

The use of for example gas condensing boilers for heating or hot water which can be up to 90% efficient and result in lower NO_x emissions are recommended. These energy efficiency programmes can often save individuals money on fuel costs and therefore the uptake of these should be encouraged. It is recommended that this is partially achieved through the introduction of a legislative requirement for new proposed commercial building development to include an energy audit as part of the planning application.

3. Within the industrial and commercial sectors the use of combined heat and power boilers (CHP)can result in approximately 35% reduction in primary energy usage compared to that in power stations. Currently there are five CHP boilers in Jersey, which results in a 30 – 50% reduction in carbon dioxide emissions compared to that of coal/oil fired power units.

4. The planned new incinerator would result in improved emissions and provide a continued source of electricity.

5. The cost of oil per litre in Jersey could be aligned with that of gas charges, which would result in decreased pollutant emissions from the domestic sector and encourage the take up of gas. The feasibility of the providing a gas pipeline to France should be investigated to allow access to cleaner cheaper natural gas. The promotion of smokeless fuels should also be encouraged.

5.4 Roles And Responsibilities

The success of improving air quality to meet European limit values hinges on successful implementation in an integrated approach in Jersey. The principal aim of improving air quality is to improve human health and consequently this air quality strategy and action plans needs to be strongly linked to environmental and health impact assessments on the Island. The co-ordinating role to link the implementation of an air quality strategy together with the Island strategy, Transport Strategy and Planning Strategies should lie in the Environmental Health Department now Health Protection.

Indicators to measure the success of the air quality strategy, and in particular, the success of the options adopted to improve air quality should be made at the outset. These should include continuous monitoring of the pollutant concentrations, vehicle flows on specific streets, passenger numbers on public transport. Other indicator s should be considered including the noise levels, socio-economic factors to ensure social exclusion does not develop as a result of measures implemented. Again the co-ordinating role for the measurement of these indicators should lie with the Environmental Health Department now Health Protection who should provide a comprehensive knowledge on air quality across all States Departments. This would include the health impact assessment of air quality.

The mechanism for the implementation of this air quality strategy should be made clear from the outset. It is recommended that the States of Jersey carry out a feasibility study into each of the options to determine the cost effectiveness of achieving a measured air quality improvement, and to quantify other potential, socio-economic benefits and impacts. Following which, adequate resources should be made available to refine the most cost-effective options for reduction of emission and for their successful implementation and monitoring for indication of success. Consideration of the drafting of local legislation setting out limit values for pollutants and a pollution reporting system, based on EU requirements, should be made.

5.5 Raising Awareness And Involving The Whole Community

To enable all sections of the community to fully participate in the process to improve air quality information in Jersey it is essential that people are provided with accurate and meaningful information in a form that is easily understood. Informing the public is an important element of compliance with the EC Framework Directive.

The EC Framework Directive requires Member States to make information publicly available when alert thresholds are levels of pollutant concentrations are exceeded. For example when the alert thresholds for nitrogen dioxide and sulphur dioxide have been exceeded the following information package is required, as a minimum:

- date, hour and location where the limits were exceeded and reasons for the exceedence if available;
- any forecast of any change of the concentration (improvement, stabilisation, worsening), together with any information on the reasons for such changes, geographical areas affected and duration of the occurrence;
- the type of population potentially sensitive to the occurrence;
- recommend precautions to be taken by the sensitive population

Member States are also responsible for the notification of respective organisations (e.g. environment agencies, consumer organisations, health care organisations) using the media, leaflets, internet etc. The requirements are as follows:

- Information on the concentration of sulphur dioxide, nitrogen dioxide and particulate matter is to be updated at least once a day, in the case of the hourly concentrations of sulphur dioxide and nitrogen dioxide, if possible, based on a 1 hour interval

- Information on the concentration of lead in the air is to be updated every three months
- Information on the concentration of benzene in the form of average values for the last 12 months is to be updated at least once in three months and, if possible, once a month
- Information on the concentration of carbon monoxide expressed as maximum 8 hours sliding average values is to be updated at least once a day and, if possible, every hour
- Such information is to be clear, understandable and available.

After the date of attainment Member States need:

- to have taken the necessary measures to ensure compliance with the limit values;
- to continue reporting in accordance with the above Directive requirements.

The Commission is in the process of preparing a Commission Decision, which will provide a common format (in the form of a questionnaire) for Member States to fulfill their annual reporting requirements under the Air Quality Directives.

5.5.1 Health and Environmental Impact Assessment

In Jersey it is important that air quality information should be provided to the public on a regular basis. Various mechanisms can be used to deliver this information including the internet, posters

giving daily pollution levels for the previous month, leaflets and information packs that will be regularly updated. Such information packs should be designed specifically for the various Key Stage education levels as well as for general library suitability. Another important element is an “Alert System” which provides information for alerting people whose health may be affected when air pollution levels rise. This should be addressed through press releases via radio, TV, Ceefax/Teletext and newspapers. An information telephone helpline could be operated providing appropriate health information for concerned and sensitive individuals.

Communication of measurements of air pollution should be in a easily understandable format such as the banding system in the UK which is shown in Table 5.1 overleaf. Air pollution levels are publicised as low, moderate, high or very high with a 1-10 numerical index. This type of public information and education programme is vitally important over the longer term

(20-30 years) to change people's behaviour and attitude towards various transport modes. To ensure that any attempt by the States of Jersey to improve air quality is met with success the social acceptability of these pollution reduction measures must be attainable.

Table 5.1 Air Pollution Bandings and Index and the Impact on the Health of People who are Sensitive to Air Pollution

Banding	Index	Health Descriptor
Low	**1**	Effects are unlikely to be noticed even by individuals who know they are sensitive to air pollutants
	2	
	3	
Moderate	**4**	Mild effects, unlikely to require action, may be noticed amongst sensitive individuals.
	5	
	6	
High	**7**	Significant effects may be noticed by sensitive individuals and action to avoid or reduce these effects may be needed (e.g. reducing exposure by spending less time in polluted areas outdoors). Asthmatics will find that their 'reliever' inhaler is likely to reverse the effects on the lung.
	8	
	9	
Very High	**10**	The effects on sensitive individuals described for 'High' levels of pollution may worsen.

An Island Air Quality Forum should be established which would provide a working group of all concerned and interested stakeholders including relevant Jersey politicians and States civil servants to bring forward issues and ideas for the improvement of air quality. Such a group or forum should be led by the Environmental Health Department now Health Protection who have a wide understanding of pollution and health issues.

Most improvement in air quality on the longer term is typically achieved through the planning process. The consideration of mitigation measures to reduce emissions should be an integral part of the environmental impact of any planning application. Current and future polices for the improvement of sustainability on the Island should be accompanied with a Health Impact Assessment which provides a focus on the air quality impact of any proposed planning and transport scheme. The existing requirement for Environmental Impact Assessments should incorporate Health Impact Assessments. It is important that air quality issues are included in decision-making criteria for any proposed planning development.

6 SUMMARY

The States of Jersey are committed to attaining European Environmental Legislation. In 1996 the EU set out an Air Quality Framework Directive which set out an approach for each Member State to assess air quality within their national area. In 1999 and 2000 daughter directives were brought into force which set limit values for the protection of human health for a number of air pollutants. These limit values are to be achieved by each Member State by 2010 at the latest. In addition to these limit values the daughter directives set out Upper Assessment Thresholds and Lower Assessment Thresholds which are both lower than the limit values for each pollutant. Should these assessment thresholds be exceeded in any Member State then there is a requirement on that State to carry out further investigation into the causes of the pollution and report to the Commission.

For a number of years the Environmental Health Department now Health Protection of the States of Jersey has been undertaking routine and short term specialised air pollution monitoring. The routine monitoring has been enabled by use of simple passive diffusion tubes for the measurement of nitrogen dioxide and benzene. These have been placed at 28 sites across the Island including 14 in St Helier. In addition several campaigns of monitoring have been made in St Helier using sophisticated monitoring equipment which is more accurate than diffusion tubes. More recently the Environmental Health Department have purchased automatic particulate monitors which have enabled more accurate monitoring of this pollutant as a matter of routine. This monitoring has given a good understanding as to which pollutants are important and enabled a comparison with the EU limit values.

In Jersey the principal pollutant of concern is nitrogen oxides where about 68% of the total emissions in Jersey are from road transport sources. Jersey is a very car orientated society and has a significantly higher car ownership level than in the UK. This has led to high concentrations of nitrogen dioxide particularly in St Helier, which is prone to congestion. Emissions of pollutants from road vehicles are particularly high during low speeds. The congestion problem in St Helier is compounded by narrow streets inhibiting the effective dispersal of the pollution by the wind. The current parking problems also exacerbate the pollution levels, in particular, when motorists circle around seeking on-street parking which is limited in availability. Emissions of pollutants are also comparatively high from Heavy Goods Vehicles including buses. Therefore areas which suffer from a high proportion of slow moving or idling Heavy Goods Vehicles will also show elevated pollution concentrations. Consequently, in Jersey the pollution hot-spots found during monitoring campaigns were Georgetown in St Saviour, Beaumont in St Peter and within St Helier are at First Tower, the Bus Station. Other sites also show elevated levels of nitrogen dioxide include Le Bas Centre. Measurements at some of these sites indicate that the European limit value or the Upper or lower assessment thresholds are currently being exceeded. It is therefore recommended that the States of Jersey implement an action plan to ensure emissions are reduced in these locations.

There are other sources of pollution in Jersey which have been considered. While, there is virtually no heavy industry in Jersey, and little light industrial activity there are still particular plant in Jersey which causes concern in terms of emission to air.

In Jersey the main emitters of high level SO_2 and NO_2 are the JEC oil fired power station and the States of Jersey's municipal waste incinerator. The JEC power station as mentioned earlier shut down for 6/7 months from March 2002 and when running uses reduced sulphur heavy fuel oil (1%). Low NO_x burners have also been fitted to the largest boiler thereby reducing levels of NO_2 . The States of Jersey's municipal waste incinerator does not comply with EC Directive 89/369/EC and is to be replaced in the next 5 years with a new facility meeting the latest emission standards.

Also, the Health and Social Services Crematorium is 30+ years old and does not comply with current UK Environmental Protection Acts 1990 process guidance note PG5/2(91). Pollutants produced from crematoria could include:- dioxins and furans, mercury, particulates, hydrogen chloride and carbon monoxide. There is a proposal to replace the existing cremators in the next 12 months with 2 new units. The new cremators will meet the current UK process guidance notes standards.

There are a number of light industrial operations which combined increase the total emissions on pollutants on the Island. These include printers, dry cleaners and the storage and handling of organic chemicals at the port. In the food industry there are a number of bakeries, a brewery and the manufacture of alcohol spirits which will give rise to emissions of pollutants to air.

Other major sources of pollution to air on Jersey is aircraft and shipping. In 1999 there were about 80,000 aircraft movements on the Island and there were over 45,000 passengers who arrived in Jersey by sea.

To assist the States of Jersey improve air quality to protect human health fifteen options have been provisionally assessed in terms of their cost effectiveness at reducing the emissions in the required geographical area. The most cost effectiveness options are the following and it is recommended that the States of Jersey carry out a feasibility study into these options which includes the cost effectiveness of air quality improvement, and other potential, socio-economic benefits and impacts, of each to a higher precision than the current data enabled:

- MOT test
- Park and Ride schemes in St Helier
- Parking (charging and on street parking restrictions)
- Urban bus schemes
- Vehicle scrapage subsidies
- Vehicle access limits
- Variable tax on engine size and age
- Pedestrianisation
- Alternative fuels
- Walk to school plans
- Traffic management

The implementation of an action plan and air quality strategy should be co-ordinated by the Environmental Health Department (now Health Protection) who would be responsible for communication and integration with other important Island strategies including the Traffic

Strategy, Planning and Environment Island Plan and the Sustainable Strategy. Indicators to measure the success of the air quality strategy, and the options chosen to decrease emissions, should be clear from the onset of the implementation. These should include monitoring of air quality, traffic flow reductions, traffic speed increase where there is current congestion, passenger numbers using public transport. Indicators to determine the impact on other environmental and socio-economic issues should be considered.

Currently there is no automatic monitoring of nitrogen dioxide, which complies with the EU directive requirements for accuracy. As the limit value for nitrogen dioxide is over an annual period, monitoring is required for the whole calender year. It is therefore recommended that the island undertakes continuous monitoring for NO_2. For the first year at least, this should be at the highest known pollution "hotspot" (Weighbridge). Once compliance with the Daughter Directive(s) is confirmed at this location, the site could be relocated to an area more representative of general population exposure (eg residential or urban background). These monitors will also indicate the effectiveness of any traffic improvement measures in pollution reduction.

The improvement needed in air quality in Jersey relies on a multi-agency approach and commitment from all stakeholders to keep working on the issues. The problems of local air quality are directly linked to the local transport strategy and the community's attitude towards the use of the private car. Local policies need to target car users in a fair way to ensure acceptability of the approaches to improve air quality.

Good communication between the stakeholders is important. Campaigns to deliver the messages particularly in relation to the choice of transport mode will be necessary to ensure uptake of policies to deliver air quality targets. To enable all sections of the community to fully participate in the process to improve air quality information in Jersey it is essential that people are provided with accurate and meaningful information in a form that is easily understood. Informing the public is an important element of compliance with the EC Framework Directive. Indeed the EC Framework Directive requires Member States to make information publicly available when alert thresholds are levels of pollutant concentrations are exceeded. To enable good communication an Island Air Quality Forum should be established which would provide a working group of all concerned and interested stakeholders.

Most improvement in air quality on the longer term is typically achieved through the planning process. The existing requirement for Environmental Impact Assessments should incorporate Health Impact Assessments which assesses the air quality impact of a proposed development on the health of local residents and visitors. It is important that air quality issues are a stipulated criteria for decision-making on any proposed planning development. The consideration of mitigation measures to reduce emissions should be an integral part of the environmental impact of any planning application.

Appendix A
Sources and Health Effects of Pollutants

CONTENTS

Sources and Health Effects of Particulates (PM_{10}) and NO_2

The pollutants of most concern in Jersey are particulates PM_{10} and nitrogen dioxide NO_2. Further details on the sources and health effects of these are given here:

1. Particles

Particles are also sub divided into several size ranges whose limits reflect the ability of the particles to penetrate into the lungs. The human upper respiratory tract is an efficient filter for PM_{10}, (particles of 10µm or below) but as with all filter systems, it loses its filtering efficiency quite quickly with a decrease in particle diameter. As particles generally have a random shape the term used is its' 'aerodynamic diameter' which measures its effective diameter as being equivalent to a sphere. In reality particles come in all shapes. The emphasis on sub dividing the particle size range is to measure the 'respirable' that is below 10µm or PM_{10} and 'non-respirable' particle that is above 10µm.

Particulates are produced from both petrol and diesel engines. Exhaust emissions are not necessarily higher from diesel vehicles but are more visible than from petrol engines. Diesel is also a more dense fuel containing more carbon/hydrogen bonds resulting in greater carbon particles compared to petrol. For petrol vehicles, mass emissions are undoubtedly lower but their size distribution is unclear. The greatest proportion of particles is in the smaller range of less than PM_{10}, which are less visible than diesel emissions but are potentially more harmful. In ambient air ultra fine particles account for just 1% of the total mass of $PM_{2.5}$, however they constitute almost 75% of the total particle number.

Table A1: Comparison of the emissions from diesel, uncontrolled petrol engines and vehicles fitted with 3 way catalysts.

Pollutant	Uncontrolled Petrol engine	3 way catalyst	Diesel
NOx	Highest	Low	Intermediate
CO	Highest	Intermediate	Lowest
HC	Highest	Low	Intermediate
Particulates	Low	Lowest	Highest

Diesel engines have a tendency to emit smoke/particles when either worked hard or when not properly maintained, or both. They operate at a significantly higher air/fuel ratio than a petrol engine therefore combustion is more efficient. However diesel fuel is less volatile than petrol and must be dispersed effectively and at the right time for it to burn properly. The major particle emissions occur when starting, when the engine is cold, or when fuel injectors are worn.

European diesel contains 10 - 35% by volume of hydrocarbons with aromatic rings. There is believed to be a relationship between the level of aromatics in fuel, and the emission level of particles and polcyclic aromatic hydrocarbons (PAHs). The term polcyclic aromatic

hydrocarbon covers a large group of organic compounds whose molecular structures contain two or more aromatic rings fused together. Some PAHs are present in the atmosphere as gases and are associated with particles because of their low vapour pressures. PAHs are formed in all processes involving combustion of carbon-based fuel.

PAHs are usually emitted in low concentrations in the vapour phase, condensed on to particles. Analysis of diesel exhaust particle emissions has shown that the major PAH components are:

- napthalene
- fluorene
- phenanthrene and their alkyl derivatives
- carbazole and
- dibenzothiophene

Concerns relate to the carcinogenic risk associated with such compounds The International Agency for Research on Cancer has classified diesel engine exhaust as a probable human carcinogen. Evidence suggests that the main source of PAHs is unburnt fuel, although some high molecular weight PAH is formed during combustion of the fuel in the engine. It is also interesting to note that evidence suggests a strong link between air/fuel ratio and PAH emission; higher emissions occur at lower air/fuel ratios when the engine is not working efficiently.

2. Nitrogen dioxide

Nitrogen dioxide is a gas produced by reaction of nitrogen and oxygen in combustion processes. The reaction usually takes place in two stages, the first resulting in the combination of one atom of each of the gases to form nitric oxide, this compound then being oxidised over time to produce nitrogen dioxide. Wherever nitrogen dioxide occurs, nitric oxide is also found, and these oxides of nitrogen are collectively known as NOx. There are several natural sources of oxides of nitrogen in the atmosphere, including lightning and forest fires. Bacterial activity in soils and possibly plant metabolism are responsible for a proportion of the oxides of nitrogen found in the air in the United Kingdom, but by far the largest amount is formed as a consequence of combustion of the fossil fuels petrol, oil, coal and gas, especially by motor transport and non-nuclear power stations.

Once formed, nitrogen dioxide takes part in chemical reactions in the atmosphere that convert it to nitric acid and nitrates, both of which can be removed by rain. However, nitrates can also remain in the air as very small particles, for example as ammonium nitrate, which can be dispersed widely in the atmosphere, contributing to the airborne concentrations of small particles known as PM_{10}. Nitric oxide is a gas that is produced naturally by cells in the lung and respiratory tract, and has no harmful consequences when inhaled by man at the concentrations likely to occur in the ambient atmosphere. Nitrogen dioxide is an irritant gas which has been known for many years to have serious and sometimes fatal effects on health when inhaled in the very high concentrations associated with accidental exposures, for instance in farm silos and in mines. There is now evidence that it has more subtle effects on health at the much lower concentrations that may occur in the ambient atmosphere, both outdoors and indoors

In very high concentrations, such as have occurred in certain industrial accidents, nitrogen dioxide can cause very severe and sometimes fatal lung damage. However most concern is

with the health effects that may be observed at the much lower concentrations that occur during pollution episodes in our towns and cities. It has been suggested that the gas may have both acute, short-term, and chronic, longer-term, effects on health, particularly in people with asthma.

The mechanism by which nitrogen dioxide acts is most probably related to its properties as an oxidising agent which can damage cell membranes and proteins. At relatively high concentrations nitrogen dioxide causes acute inflammation of the airways. In addition, short-term exposure can affect the immune cells of the airways in a manner that might predispose people to an increased risk of respiratory infections.

The health effects of nitrogen dioxide have been assessed in four main ways:

(i) by experimental exposure of volunteers with and without asthma to the gas;
(ii) by assessment of the effects on groups of people of variations in ambient concentrations of nitrogen dioxide, using daily symptoms or lung function measurements;
(iii) by assessing changes in hospital admissions or mortality in a population in relation to changes in ambient concentrations; and
(iv) by comparing the health of groups of people who have had different long-term exposures.

People with healthy lungs, whether at rest or exercising, show little response to experimental inhalation of nitrogen dioxide at concentrations well above those occurring in the ambient air, even during extreme pollution episodes. Very small changes in sensitive tests of lung function have been recorded at exposures between 2500 and 7500 ppb. However, in people with asthma, some studies have shown changes in these tests of lung function to have occurred at exposures of around 300 ppb when the subjects have been exercising, though other studies have shown no changes at higher concentrations. Measurements of the responsiveness of the lung to inhalation of irritant chemicals have shown that the airways of some people with asthma may become more sensitive to such stimuli after exposure to nitrogen dioxide at concentrations down to about 200 ppb. It should be noted that this concentration is only reached in occasional episodes of outdoor air pollution in the United Kingdom.

Other studies have investigated the possibility that inhalation of nitrogen dioxide at moderate concentrations may cause an inflammatory reaction in the lungs or may increase the susceptibility of individuals to subsequent inhalation of allergens, such as those from house dust mite or grass pollen. The inflammatory reaction, if repeated frequently, might act to decrease the resistance of individuals to infection, and is more relevant to repeated exposures to elevated indoor levels than to exposure to the outdoor concentrations typically occurring in the United Kingdom. At present, the evidence from both human and animal studies is equivocal. However, there is some evidence that exposure to nitrogen dioxide can enhance the response of someone with asthma to inhalation of allergen. After exposure of volunteers with asthma to 400 ppb for one hour, inhalation of house dust mite extract has been shown to cause a significantly greater fall in lung function than occurred in a control experiment, suggesting that the gas may have primed the airways to react more readily to the allergen. A

similar finding has been reported following ozone exposure and grass pollen inhalation and it may be that this subtle effect is a more important consequence of irritant gas exposure than the more direct effects on lung function. Nevertheless, to date all these effects have only been demonstrated at concentrations of nitrogen dioxide that occur in the ambient air of the United Kingdom only in the most exceptional circumstances.

The question as to whether exposure to nitrogen dioxide causes long-term damage to the lungs is less well studied and the information is more difficult to interpret. There is less information, what there is contradictory, and the evidence tends to be indirect, relying on surrogate measures of exposure rather than direct measurements. Studies from Switzerland and the United States have suggested that those living in areas with higher exposures to nitrogen dioxide have poorer lung function, but other similar studies have failed to find such an association. The contrast between the former East and West Germany, with higher levels of nitrogen dioxide from traffic pollution and higher levels of hay fever and asthma in the West, led to some speculation that the two might be causally connected. However, although there is, as mentioned above, some experimental evidence that nitrogen dioxide may enhance susceptibility to allergens and some studies have suggested that those living near to busy roads or in areas with heavy traffic pollution may be at greater risk of asthma, a recent study in East London failed to find such an association.

Appendix B
Air Pollution Monitoring Locations

CONTENTS

Nitrogen Dioxide

Monitoring of NO_2 was started in 1993/4 with just 4 sites. This number increased up to a total of 19 sites by 2000. These are shown in Table B1 and Figure B1.

Table B1. NO_2 Monitoring sites

Site number	Site Name	Grid Reference	Description
N1	Le Bas Centre	658 489	Urban Background
N2	Mont Felard	629 501	Residential background, to SW of waste incinerator and 20m from busy road
N3	Les Quennevais	579 496	Residential Background
N4	Rue des Raisies	689 529	Rural Background
N5	First Tower	636 497	Kerbside on major road
N6	Weighbridge	651 483	Roadside at bus station near centre of St Helier
N7	Langley Park	660 501	Residential background
N8	Georgetown	661480	Kerbside on major road
N9	Clos St Andre	638 499	Residential area near Bellozanne Valley refuse Incinerator. Background
N10	L'Avenue et Dolmen	656 490	Urban background close to ring road
N11	Robin Place	656 489	Urban background
N12	Beaumont	597 516	Kerbside
N13	The Parade *	648 489	Roadside site at General Hospital
N14	Maufant	683 512	Background site in Maufant village
N15	Jane Sandeman	652 494	Urban background on housing estate
N16	Saville Street	648 492	Background
N17	Broad Street	652 486	Urban background
N18	Beresford Street	653 486	Urban background
N19	La Pouquelaye	654 496	Kerbside on St Helier ring road.

*The Parade has been moved is now a roadside site.
Kerbside: less than 1m from kerb of a busy road.
Roadside: 1-5m from kerb of a busy road.
Background: > 50m from the kerb of any major road. *Note: all grid references are from OS 1:25000 Leisure Map of Jersey and are given to the nearest 100m.*

Figure B1 - Site Locations – see also next page

Key:

1. Le Bas Centre
2. Mont Felard
3. Les Quennevais
4. Rue Des Raisies
5. First Tower
6. Weighbridge
7. Langley Park
8. Georgetown
9. Clos St Andre
10. L'Avenue et Dolmen
11. Robin Place
12. Beaumont
13. The Parade
14. Maufant
15. Jane Sandeman
16. Saville Street
17. Broad Street
18. Beresford Street
19. La Pouquelaye
20. Elizabeth Lane
21. Springfields Garage
22. Stopford Road

Figure B1 Continued

Sulphur Dioxide

SO_2 monitoring was carried out at just one site during 2000 and 2001. Results from 1999 and earlier years, based on a total of 13 sites, indicated that SO_2 levels in Jersey were not likely to be high enough to constitute a problem. The single site at Clos St Andre was retained because it is in a residential area near the Bellozanne Valley waste incinerator (a potential source of SO_2).

Table B2 SO_2 Monitoring site

Site number	Site Name	Grid Reference	Description
S13	Clos St Andre	638 499	Residential area near Bellozanne Valley refuse incinerator.

BTEX (VOCs)

The 2001 survey monitored BTEX at six of the same seven BTEX sites used in 1999. These are shown in Table B3. The aim was to investigate sites likely to be affected by different emission sources, and compare these with background sites. The sites at Beresford Street and Le Bas Centre are intended to monitor hydrocarbon concentrations at an urban roadside and urban background location respectively. The Elizabeth Lane site is close to a paint spraying process, and the Springfields Garage site is located by a fuel filling station, both possible sources of hydrocarbon emissions. The Stopford Road site is located at a house between two petrol stations. (During the 1999 survey, this site was actually located inside the house to investigate reports of odours by residents; it has since been moved outside). The Clos St Andre site is located near the Bellozanne Valley waste incinerator.

Table B3. BTEX Monitoring sites

Site number	Site Name	Description
BTEX 1	Beresford Street	Urban roadside
BTEX 2	Le Bas Centre	Urban background
BTEX 3	Elizabeth Lane	Urban background near paint spraying process
BTEX 4	Springfields Garage	Urban background near fuel filling station
BTEX 6*	Stopford Road (outdoors)	Outdoor urban background site, at house between two petrol stations.
BTEX 7	Clos St Andre	Residential area near Bellozanne Valley refuse incinerator.

* This BTEX tube has been moved to Jersey airport.

Appendix C
Upper and Lower Assessment Thresholds

CONTENTS

Table C1: Upper and lower assessment thresholds as laid out in the EC directives 1999/30 and 2000/69.for the protection of human health

		24 hour limit value	Annual average limit value
SO_2	Upper Assessment Threshold	60% of the limit value (75 μg m^{-3}) not to be exceeded more than 3 times in any calender year	N/A
	Lower Assessment Threshold	40% of the limit value (50 μg m^{-3}) not to be exceeded more than 3 times in any calender year	N/A
NO_2	Upper Assessment Threshold	70% of the limit value (140 μg m^{-3}) not to be exceeded more than 18 times in any calender year	80% of the limit value (32 μg m^{-3}).
	Lower Assessment Threshold	50% of the limit value (100 μg m^{-3}) not to be exceeded more than 18 times in any calender year	65% of the limit value (26 μg m^{-3})
PM_{10}	Upper Assessment Threshold	60% of the limit value (30 μg m^{-3}) not to be exceeded more than 7 times in any calender year	70% of the limit value (14 μg m^{-3})
	Lower Assessment Threshold	40% of the limit value (20 μg m^{-3}) not to be exceeded more than 7 times in any calender year	50% of the limit value (10 μg m^{-3})
Pb	Upper Assessment Threshold	N/A	70% of the limit value (0.35 μg m^{-3})
	Lower Assessment Threshold	N/A	50% of the limit value (0.25 μg m^{-3})
CO	Upper Assessment Threshold	N/A	70% of the limit value (7 mg m^{-3})
	Lower Assessment Threshold	N/A	50% of the limit value (5 mg m^{-3})
Benzene	Upper Assessment Threshold	N/A	70% of the limit value (3.5 μg m^{-3})
	Lower Assessment Threshold	N/A	50% of the limit value (2 μg m^{-3})

Appendix D
Emissions Estimates for Jersey

CONTENTS

Table D1: Emission Estimates for Jersey by "SNAP" Code

The emission estimates presented below are disaggregated by SNAP code. This is a standard classification used to allow comparison of emissions from different countries across Europe under the CORINAIR framework.

SNAP	CATEGORY NAME	Tonnes per annum **NOx**	Tonnes per annum **VOC**	Tonnes per annum **Benzene**	Tonnes per annum **NH_3**
1	**Combustion in Energy Production &Transformation**	849	13	0.6	NE
2	**Comb. in Commercial Residential & Agriculture**	176	61	3.1	0
3	**Combustion in Industry**[1]				
4	**Production Processes**	0	19	0.0	az
5	**Extraction/Distribution of Fossil Fuels**	0	130	0.7	0
6	**Solvent Use**	0	485	0	1
7	**Road Transport**	1777	2022	118.9	16
8	**Other Transport & Machinery**				
	8.1 Shipping	401	15	0.7	0
	8.2 Aircraft	148	32	0.7	0
	8.3 Other Transport	557	62	3.1	0
9	**Waste Treatment & Disposal**	1	1	0	NE
10	**Agriculture, Forestry & Land Use Change**	0	0	0	113
11	**Nature**[2]	0	0	0	NE
	TOTAL	**3909**	**2840**	**128**	**130**

0 This indicates that emissions are less than 0.5 tonnes (or less than 0.05 for Benzene)
NE "Not Estimated" It has not been possible to make emission estimates for this pollutant & category
az "Assumed Zero" Emissions are assumed to be negligible, but this has not been confirmed

1. Emissions are included in SNAP2- "Combustion. in Commercial Residential & Agriculture"
2. Emissions from "Nature" are not included under emission protocols.

Appendix E
Useful Website addresses

CONTENTS

General Websites:

Jersey's Department of Health and Social Services www.health.gov.je
Cabinet Office "regulatory impact" site www.cabinet-office.gov.uk/regulation
Chartered Institute of Environmental Health www.cieh.org.uk
Department of Health's air pollution site www.doh.gov.uk/hef/airpol/airpolh.htm
DEFRA site www.defra.gov.uk
DGXI – Environment, Nuclear Safety & Civil Protection
www.europa.eu.int/comm/dg11/index_en.htm
Don't Choke Britain Campaign www.dcb.org.uk
European Environment Agency www.eea.eu.int
International Institute for Applied Systems Analysis www.iiasa.ac.at
Local Government Association www.lga.gov.uk
National Asthma Campaign www.asthma.org.uk
National Environmental Technology Centre (AEA Technology)
www.aeat.co.uk/netcen/airqual
National Society for Clean Air and Environmental Protection www.nsca.org.uk
Natural Environmental Research Council www.nmw.ac.uk
Scottish Environment Protection Agency www.sepa.org.uk
Scottish Natural Heritage www.snh.org.uk
United Nations Environment Programme www.unep.org
Air Quality Encyclopaedia www.doc.mmu.ac.uk/aric/eae
Health Effects Institute www.healtheffects.org
British Thoracic Society www.brit-thoracic.org.uk
Committee on the Medical Effects of Air Pollutants (COMEAP)
www.doh.gov.uk/comeap/index.htm
World Health Organisation www.who.int/peh/air/airqualitygd.htm

Nitrogen Dioxide:
www.defra.gov.uk/environment/airquality/consult/naqs/6e.htm
www.doh.gov.uk/hef/airpol/airpolh.htm
www.defra.gov.uk/environment/airquality/aqs/no2/index.htm
Sulphur Dioxide
www.defra.gov.uk/environment/airquality/strategy/pdf/section9.pdf
Carbon Monoxide:
www.exnet.iastate.edu/Pages/communications/CO/co1.html
www.nlm.nih.gov/medlineplus/carbonmonoxidepoisoning.html
www.phymac.med.wayne.edu/FacultyProfile/penney/COHQ/co1.htm
Tropospheric Ozone:
www.al.noaa.gov/WWWHD/pubdocs/TropoRural.html
www-gte.larc.nasa.gov/trace/tra_fig1.htm
www.ucar.edu/learn/1_7_1.htm
charlotte.med.nyu.edu/outreach/ozonetropo.html
Ozone:
www.epa.gov/docs/ozone
www.atm.ch.cam.ac.uk/tour
sedac.ciesin.org/ozone
ohioline.osu.edu/cd-fact/0182.html
www.int-ozone-assoc.org/
www.greenpeace.org/~ozone
e-net.awi-bremerhaven.de/MET/Neumayer/ozone_his.html
www.geocities.com/RainForest/Vines/4030
Lead:
www.epa.gov/opptintr/lead/
www.epa.gov/lead/nlic.htm
www.lead.org.au/
www.niehs.nih.gov/oc/factsheets/lyh/lyh.htm
www.nsc.org/ehc/nlic/leadlink.htm
VOCs:
www.epa.gov/iaq/voc.html
www.doc.mmu.ac.uk/aric/eae/Air_Quality/Older/VOCs.html
www.ilpi.com/msds/ref/voc.html
Acid Deposition:
www.epa.gov/airmarkt/acidrain/index.html
www.chesapeakebay.net/info/air_pollution.cfm#impacts
www.aeat.co.uk/netcen/airqual/reports/home.html#acid
Global Warming:
www.ukcip.org.uk/climate_change/climate_change.html
www.defra.gov.uk/environment/climatechange/01.htm
www.ukcip.org.uk/
library.thinkquest.org/C0111401/global_warming.htm

Appendix 6

Environmental Scrutiny Panel Air Quality Review 2008

STATES OF JERSEY

Environment Scrutiny Panel
Air Quality Review

FRIDAY, 23rd NOVEMBER 2007

Panel:
Deputy R.C. Duhamel of St. Saviour (Chairman)
Deputy P.V.F. Le Claire of St. Helier
Deputy C.J. Scott Warren of St. Saviour
Connétable K.A. Le Brun of St. Mary
Connétable A. S. Crowcroft of St. Helier
Professor D. Laxen (Advisor)

Witnesses:
Senator F.E Cohen (The Minister for Planning and Environment)
Mr. C. Newton (Director of Environment)

Deputy R.C. Duhamel of St. Saviour (Chairman):

Well, I have got to read out the notice again, at every meeting we have to do it. I should know it by now off by heart but I do not. So it is important that you fully understand the conditions under which you are appearing at this hearing. The panel's proceedings are covered by parliamentary privilege through Article 34 of the States of Jersey Law 2005 and as a result you are protected from being sued or prosecuted for anything said during this hearing, although this privilege should obviously not be abused. Proceedings are being recorded and transcriptions will be made available on the Scrutiny website. That is probably the wrong message but that is the one we have got. Right, questions we have got for you today, Freddie, I mean they are all relatively easy ones and I am sure you will pass with flying colours with your answers. One of the first things we want to look at, we have kind of grouped them into order, is that when the States moved to ministerial government in 2005-ish, the Council of Ministers came forward with a Strategic Plan 2006-11 which was endorsed by the States Assembly in full and under that plan, under 4.4.5 "What we will do" indicated was to debate and implement in 2007 an air quality strategy for Jersey, including proposals for monitoring and publishing levels of local air pollution and

targets, policies and timescales for reductions in air pollution levels that reflect best practice globally. The lead responsibility was given to Planning and Environment. Now since that time in 2006, I think it was early on, April, we have had a number of reviews and it would appear that although you were put down to be the lead department, it would appear that some of the responsibilities have possibly been moved to Environmental Health. So what we would like to ask you first of all to kick off is what action has been and is being taken by the Planning and Environment Department to ensure that the air quality complies with best practice and the aims outlined in the Strategic Plan at 4.4.5?

Senator F. E. Cohen (The Minister for Planning and Environment):

Well, firstly I find it a little curious that the Strategic Plan places responsibility for this area with my department. I suppose I should have spotted it, but had not done so because fairly clearly responsibility for producing the strategy has passed to the Health Protection Department which of course, as you know, is under a different Minister. So effectively the responsibility has now passed to the Health Protection Department and they are assessing our ability to meet the international obligations and it is their responsibility to bring forward the proposals.

Deputy R.C. Duhamel:

Do you see that as a particular problem? Because I would have thought that Planning and Environment are there to give its weight and to flesh out overarching strategic ideals with respect to the environment, and the Environmental Services Department are really acting in an executive or monitoring role by and large and I would have thought that meant the thinking goes on in one place and the action goes on somewhere else.

Senator F. E. Cohen:

Well, I was not around at the time that responsibilities were carved up between the various different new Ministers, but I would have thought it was far more logical that Health Protection for the majority of its working relation to areas like this, should fall under the Environment Department. This work should be the responsibility of the Environment Department. But, having said that, it is not. So perhaps it --

Deputy R.C. Duhamel:

This appears to be the problem; it was at the beginning of 2005 and 2006, but it would appear that as at the beginning of 2007 the responsibilities appear to have shifted.

Senator F. E. Cohen:

I do not think that the responsibilities have shifted, I think they were always, as I understand it, with the Health Protection Department and the Strategic Plan should have been more precise. I think it is probably an error in the Strategic Plan. If not an error, it should have been more carefully explained within the Strategic Plan because, as I understand it, it was always intended that air quality would be the responsibility of the Health Protection Department.

Deputy R.C. Duhamel:

Right. So in terms of the actions that have been undertaken by your Planning and Environment Department over the last 18 months or so, could you perhaps outline to us what has taken place or has the responsibility just been completely devolved?

Senator F. E. Cohen:

There have been some responsibilities undertaken by the Environment Department in that the Environment Department, for example, are conscious that air quality is part of environmental impact assessments. But the main key, as I understand it, and I am far from an expert on air quality, is to have adequate monitoring; the equipment to adequately monitor air quality and again, as I understand it, the equipment currently used is relatively primitive and the cost of acquiring the appropriate equipment is, again as I understand, about £140,000 and the Health Protection Department and Environment Department are looking at ways of trying to encourage the developers of the waterfront to come up with the funds either to purchase the equipment or to rent the equipment so that they will be able to monitor air quality on the waterfront before they start, during the construction and after the waterfront is completed. Whether that will come to anything, I am afraid I do not know.

Deputy R.C. Duhamel:

Right. So are there particular resources, monetary resources, financial resources that have been specifically allocated to this area within your department?

Senator F. E. Cohen:

Not that I am aware of within my department and as I am sure you are aware, my department is pretty stretched resources-wise. Any slack that was within the Environment budget has more than been taken up with our recent decision to proceed with the purchase of equipment and training programmes in relation to foot and mouth, which I think have cost between £60-80,000 and that was unbudgeted, so there certainly is not any slack within my departmental budget. Of course, remember that the monitoring and assessment work is carried out by the Health Protection Unit and that does not come under my budget anyway.

Connétable A.S. Crowcroft of St. Helier:

Before you go on to resources, can I stay a little bit longer on responsibility? You said at the start you thought it was curious that responsibility was given to the P. and E. (Planning and Environment) in the Strategic Plan and that you had not spotted it. I know your officer is not here yet, but if I am in the situation where my officers had not picked up a fairly fundamental responsibility for delivering something to the States as part of an overarching plan, I would be pretty cross with them. I mean, it does seem to me that somebody has not read this document in the Environment Department and has not come to you and said: "Minister, look, we have not discharged our responsibilities."

Senator F. E. Cohen:

Well, I do not think that is really the case and maybe I have been slack in the language I used. The Planning and Environment Department is responsible for reports on compliance. Very clearly the Director of Environment who is an extremely competent person knew what was in the Strategic Plan because he was one of those who was central to the team of crafting the Strategic Plan. But I find it very curious that we are in a position where the Planning and Environment Department effectively seems to be charged with responsibility for delivering something that is carried out by another department being the Health Protection Unit. I do not think that that was something that could not have been predicted and perhaps when Chris Newton arrives we could ask him for the history of that because I have told you all I know about it.

The Connétable of St. Helier:

I would like to know why, given 4.4.5, an amendment was not brought to the Strategic Plan to shift responsibility. I mean I am not sure the responsibility should be shifted because P. and E. have been given air, land, water as their overarching responsibilities and it does seem to me that if you take air out then you could argue: "Well why leave land and water in?" I mean, it seems to me that these are … you know, Planning and Environment does have the strategic responsibility for developing policy and the Environmental Health Protection Unit goes out and deals with bonfires and smoking lorries. I mean they are very much a compliance regulatory body, but the overarching strategic responsibilities is your guys. I am just curious why your guys either have not wanted to divest themselves of that or why they at least have not come along and said: "Well, Minister, we are going to let you down on the Strategic Plan."

Senator F. E. Cohen:

I would agree with you in the first part of your question but I certainly do not think that the Environment Department has done anything other than want to incorporate many of the areas that Health Protection presently are responsible for within the Planning and Environment Department. But I am afraid the decision was taken, as I understand it, by an amendment that Senator Syvret brought, it must have been in 2004 or 2005. It would seem perfectly logical to me that air quality should be within the Planning and Environment Department. I am afraid it is not and it may be worthwhile, if you feel that it should be, one of your recommendations could of course be that it is shifted to Planning and Environment.

Deputy R.C. Duhamel:

I think I am picking up on the Constable's points, I mean one of the difficulties that has been expressed where you do have 2 responsibilities, one responsibility for policy making and one responsibility for carrying out checks according to those policy directives or regulations. The question of poacher and gamekeeper, if both services reside in the same department, has been brought up on other occasions and I would have thought that it goes without saying that the thinking part of the job and the laying down of policy still probably does reside with Planning and Environment. Although

you may feel that it should reside somewhere else. The action part, the testing, resides elsewhere.

Senator F. E. Cohen:

I think you are quite right and that is obviously a similar process that applies with waste. Really what needs to occur is a meeting between Health Protection, the Minister responsible for Health Protection and the Minster responsible for Planning and Environment and ensure that the proper elements are in the proper places. You very clearly do need to have some separation but I still find it surprising that air generally appears now not to be within the remit of Planning and Environment.

Deputy R.C. Duhamel:

So when were those changes implemented? Because if you look at the reports that are produced by the Council of Ministers on a regular 6-monthly basis to report on the progress of the Strategic Plan, it does appear that on the first 2 the Planning and Environment Department are quite clearly down as being in control and on the last one that was produced it does appear that it has shifted to Health and Social Services.

Senator F. E. Cohen:

Well, I think that it should have appeared as shifting to Health and Social Services or the Health Protection Department under Health and Social Services from day one. That is how I understand it.

Deputy P.V.F. Le Claire of St. Helier:

Can I just get this clear? I mean --

Senator F. E. Cohen:

It would be helpful if Chris was here.

Deputy P.V.F. Le Claire:

Yes. I am struggling to understand, did this change occur during the Strategic Plan debate and then just did not make it into the print of this document, or did it occur at the Council of Ministers?

Senator F. E. Cohen:

There has been no discussion of which I am aware - remember I have not been to every Council of Ministers - around shifting responsibility of this from the Environment Department to any other department. So I really am unable to tell you what date it shifted.

Deputy P.V.F. Le Claire:

Did you not say to me earlier that it was an amendment by Senator Syvret?

Senator F. E. Cohen:

No, the amendment by Senator Syvret was an amendment that shifted the Health Protection Department as a whole, as I understand it, from originally an intention to put it within the Environment Department to the Health Department. I understand that there was some tension over that. I do not really know the story because I was not around at the time.

Deputy R.C. Duhamel:

Okay. So would it be your intention then, bearing in mind that there does appear to be a lack of progress against the stated targets, because it does indicate in the Strategic Plan that we were due to debate and indeed implement in 2007 - we have only got another month and a bit to go to the end of the year - an air quality strategy for Jersey which would have presumably included some timeframe for the bringing forward of any legislation to give weight to the target setting or the productions. Do you intend to follow through and ask either for the responsibilities to be reinstated in your department or indeed for some work to be undertaken by the Council of Ministers to ensure that adequate financial monies are provided to Health and Social Services through the Environmental Protection Service in order to discharge the aims of the strategy?

Senator F. E. Cohen:

Well, clearly it is not a satisfactory position that the Strategic Plan gives a clear indication of bringing the matter forward by the end of the year and we are not going to do so. What we need to do now is to get to the bottom of this and come up with a programme, albeit that it is delayed, to ensure that we comply with the undertakings

of the Strategic Plan as early as possible. I would certainly hope that we can bring forward a timescale proposal within the next couple of weeks.

Deputy R.C. Duhamel:

I do find it also curious and perhaps you would like to comment that in the documents reporting the progress on the strategic commitments, this particular area has been given kind of green on target kind of arrows, whereas it would appear that perhaps they should have been given a red kind of going off the scale arrow. There does seem to appear, on first look, that perhaps the truth has not particularly been shown in the progress given for this particular item.

Senator F. E. Cohen:

Well, the smiley face green, red and amber is really an embryonic process. I mean I have not spotted it in relation to this one but there have been other areas in my department where I have looked at the colour and said: "Hang on a minute, that is a bit odd" and we have looked through it and found out that it was wrong. It depends on what targets are being used. You will often find that there is a singular odd measure that is used to determine the performance of an area of the department and one example is within Planning; that the key determinant is the number of applications that are determined within 8 weeks. Well, in my view, if you are trying to, for example, raise the standards of design in a department, it is just inconceivable that you could deliver the majority of decisions within 8 weeks unless you refuse everything. So, you know, that is an area where we always get a red and I cannot see that you could do anything better than that and I would like to change the target. In this area I think it probably just has not been spotted. I do not know what the particular measure that is used to identify whether it is red, green or orange.

Deputy R.C. Duhamel:

Measure of spin clearly, yes? Professor Laxen?

Professor D. Laxen:

If I can just make an observation at this stage? From what I see there seems to be a lack of clarity as to responsibilities, from what has been said so far. Related to that

you then said: “We need to bring forward a programme to make this happen.” I was wondering who the “we” was in that answer?

Senator F. E. Cohen:

Well, the “we” will have to be Environment and Health Protection under Health. Part of the problem with lack of clarity is I am trying to answer questions without my officer and I make no bones about the fact that I know very little about this subject. You know, I cannot deal with every subject within the department and this is one I know very little about. I had a briefing yesterday, so I am sort of trying to struggle through, but I am far from an expert in the area.

Deputy R.C. Duhamel:

Can I just ask then, has the issue of air quality been discussed at the Council of Ministers meetings and if so, on how many occasions and what was the outcome of those discussions?

Senator F. E. Cohen:

To my recollection, it has not been discussed but I have not been at every Council of Ministers’ meeting. But I certainly do not remember it being discussed. It may have been mentioned in passing, but there has certainly never been a proper discussion in relation to air quality of which I am aware on the Council of Ministers’ agenda.

Deputy R.C. Duhamel:

Which multilateral agreements are we signed up to currently in relation to air quality strategy?

The Connétable of St. Helier:

Sorry, before you go on to multilateral agreements, can I just ask a further question about the Strategic Plan since you are about to leave? I am glancing at the other commitments on the same page of the plan in section 4, it does appear that an awful lot of them have either been delayed or slipped. I mean, for example, is there an contaminated land strategy that is supposed to have been consulted on, debated and implemented by the end of 2007? I am not aware of that having come to the States.

Deputy R.C. Duhamel:

I think you are right, but it is probably diverging from the central areas that we are …

The Connétable of St. Helier:

It strikes me that in terms of -- again I go back to, you know, the purpose of an executive in a department, that as Minister with these responsibilities, I mean, it would certainly irk me if I came to a Scrutiny hearing and I was asked about my progress in delivering initiatives and ...

Deputy R.C. Duhamel:

It is the first you have heard of it?

The Connétable of St. Helier:

Yes, and they simply have not been dealt with. I mean, this Scrutiny review has been known about for a couple of months and I am surprised even there was not a last ditch effort to try and knock something together. But it appears as you were only briefed yesterday, that air quality is not very high on the agenda of your officers and, as I say, I am just a bit curious about that.

Senator F. E. Cohen:

Thank you. I do not think it is the case that air quality is not high on the agenda of the officers, it is that air quality is not effectively the responsibility of the department any more. There is no one more conscientious about the areas of his responsibility than Chris Newton and he simply is in a position with this where it is not our responsibility under the current structure. Now whether the result of your report will be that it is brought back under our control or whether Health end up delivering the requirements of the Strategic Plan, I do not know. But clearly something has got to be done because the present situation is not satisfactory. I am not going to say that it is satisfactory because it is not.

Deputy P.V.F. Le Claire:

Can I ask a question? Because we are not into the actual specifics of the air quality yet, we are still into the notional arguments of whether or not a department should be aware and managing issues. Recently Deputy de Faye in the States announced that he

had decided that an in-vessel composting facility would be sited at La Collette, given its proximity, distance being the reason why he had decided to choose La Collette over 11 sites. Now, given the importance of La Collette and given the environmental concerns of residents in that district over a long period of time on this issue in particular, and given that the issue of the compost site is predominantly about airborne particles and smells, et cetera, I found it a little interesting that his only caveat to it being sited there was to run his work past your department for confirmation that it had been carried out in the correct way. Now, if the only caveat to his siting the compost enclosed facility at La Collette is to run it past your department and the reasons for locating it there have been predominantly about distance, surely that must involve an issue of air and why is he coming to discuss that with you unless he feels that the responsibilities rest with you?

Senator F. E. Cohen:

Well, all I understand in relation to air quality in that particular application as far as it applies to other large applications, is that air quality is an element of the environmental impact assessment and the department consults with Health Protection in relation to environmental impact assessments on large applications.

Deputy P.V.F. Le Claire:

But surely the reason for him having identified La Collette and not the other 11 sites that he identified as suitable, was because there must have been some factoring of the suitability of the other sites in relation to their distance and that again goes back to air. So then it would suggest to me that his work is based upon the fact that your department has some sort of oversight in relation to the work that he has been doing for the last 2 years in relation to other sites, other options, distances, airborne particles, et cetera.

Senator F. E. Cohen:

I do not think that is the way it works. I think that the way an application works is the applicant, in this case T.T.S. (Transport and Technical Services) decides on the site and then part of the environmental impact assessment work is the air quality assessments through the Health Protection Unit. It is not the Environment Department that says: “You must produce an environmental impact assessment or an

air quality study on all 11 sites and then produce us an analysis of the various different impacts of all the 11 sites." It is merely on the site that has been chosen by the applicant.

Deputy P.V.F. Le Claire:
So your department was not involved in any environmental impact assessments that were considered?

Senator F. E. Cohen:
For the other sites?

Deputy P.V.F. Le Claire:
The other sites.

Senator F. E. Cohen:
Not that I am aware of. I mean, there may have been but, you know, I am not aware of them.

Deputy P.V.F. Le Claire:
Is that something that would rest with Health? Health has been working with them or would it be --

Senator F. E. Cohen:
Health is consulted on matters including air quality as part of large environmental impact assessments, but that is all.

Deputy R.C. Duhamel:
So would you agree, Minister, just to finish this particular area off, that the overall responsibility for looking at air quality and setting targets and regulations and what not, really needs to be reassessed in terms of whether or not it lies with your department still or is across more than one department or indeed lies with Health and Social Services through the Environment Protection Service?

Senator F. E. Cohen:

I would go further than that and say that the current arrangements from what I have seen appear to be unclear and unsatisfactory. A recommendation from the Scrutiny Panel would be most useful.

Deputy R.C. Duhamel:

Right. Okay, thank you.

Connétable K.A. Le Brun of St. Mary:

Can I just ask just the one question through that because we mentioned about the smiley man with a tick alongside it. Who did you think therefore would have given that tick and suchlike on the progress if it was not yourself? Would it come from the Health and Social Services, or would it have been through the Council of Ministers?

Senator F. E. Cohen:

No, the way these smiley face things are constructed is that the officers prepare the report, which is a one pager, in fact I have got one in my bag. It then goes to the Chief Officer and from the Chief Officer it is then put together with all the others and then given to the Council of Ministers.

The Connétable of St. Mary:

All the others; "others" meaning the reports or the officers?

Senator F. E. Cohen:

All the other departments. So you end up with a pack of smiley faces or sad faces from each different department. It is not a very sophisticated measure. I mean, it is an easy way of assessing a department, but it depends on the quality of the measures you are using and how relevant they are in current context to what the department is trying to deliver. I have given you an example; but the one in relation to planning is, in my view, complete nonsense. It will develop, it is a new system. It has got a bit better. We are now in the third or fourth version. It has got a bit better but it still needs further work. Remember, the whole system of reporting to the Council of Ministers as a government, is new and it will take time to sort out and to get it working efficiently. We are not there yet.

Deputy R.C. Duhamel:

The overall responsibilities of the Island for signing multilateral agreements generally lies with the Chief Minister's Department. But, in any particular regard, how are those responsibilities passed down to the individual departments who would appear to be closer to the coal face in terms of delivering the things that the Island would wish to be signing up to?

Senator F. E. Cohen:

Well, I do not know the answer to the question and I am sure Chris Newton can deliver the answer. But as far as I am aware the obligations on the Island through its relationship with Westminster are delivered through the Chief Minister's Office in consultation with the relevant department. The only one that I have been involved with, and that is only at a peripheral level, is Kyoto where I have asked on a regular basis what is happening with our obligations in relation to Kyoto. I presume that the mechanism is that the Chief Executive, or the person the Chief Executive designates as having responsibility, discusses the relevant elements with the director of the relevant department. Because in many of these international agreements and protocols they are multi-departmental.

Deputy R.C. Duhamel:

Right. So what I was driving at really was to see whether or not there was a simple kind of analysis to determine whether or not these things are led from the top down through the Chief Minister's Department or indeed encouraged from the department up.

Senator F. E. Cohen:

I think it is a combination of both. I think it is the Chief Minister down if it is an international obligation that clearly we have got to do something about and it is from the department up if it is in relation to something that the department would like to deliver. As an example of that, I am very keen to promote higher environmental standards in building construction, so I am looking for conventions we can sign up to and when we can find them I will be encouraging our department signing up to those conventions through the Chief Minister's Office.

Deputy R.C. Duhamel:

It has been stated on more than one occasion that the Island signs first and then maybe quantifies the financial implications afterwards on some occasions and some occasions it does not really look at it at all. Is there any evidence from your particular Ministry to show that the Island is being committed to signing multilateral agreements on particular environmental issues without any regard being paid to the financial implications which your department would have to put into place in order to achieve the aims of the signature?

Senator F. E. Cohen:

I am not aware of anything specific. The only area that I can relate this to is, for example, the disposal of hazardous waste where we are still in a position through signing through the obligations under an international convention, of not being able to export our hazardous waste. We are still a few months away from it. Now I was not around at the time that the obligations came into force as a politician, so I am not aware of whether there was any proper analysis. But what has happened is that we have ended up with an increasing pile of hazardous waste which I understand is now about 50 tonnes which we physically cannot do anything about. The reason we cannot do anything about it is because we did not comply with the terms of the relevant conventions. Now, whether that could have been avoided by looking at things some years ago, I do not know. But that is the position we are in today.

Deputy R.C. Duhamel:

Right. Are you able to say which wastes specifically?

Senator F. E. Cohen:

No. I do not know. I do not know. I know that one of them is battery waste, if that is any help. But I understand there is 50 tonnes of waste that is stored; we are still a few months away being able to export the hazardous waste because there is still a final negotiation being carried out by the U.K. (United Kingdom) on our behalf to ensure that we comply with the conventions to enable us to export hazardous waste.

Deputy P.V.F. Le Claire:

Just very briefly on that. Will, when it has been sorted out, we be able to then shift what we have so far accumulated?

Senator F. E. Cohen:

As I understand it, that is the case. While the general intention internationally is that you should dispose of your own waste yourself, it is accepted that small jurisdictions like Jersey could not afford to put in place the measures to dispose of certain hazardous wastes and therefore the convention allows you to export to other places where - oh, there he is --

Mr. C. Newton:

Apologies.

Senator F. E. Cohen:

-- to other places where they are more able to dispose of hazardous waste. Thank goodness Chris has arrived.

Deputy C.J. Scott Warren of St. Saviour:

Can I just be -- because I believed that we were told when I was a member of the Public Services Committee and the Bar Convention and the Basle Convention. I believe that we were told we had to wait for the Waste Management (Jersey) Law. Was that a factor as well in this?

Senator F. E. Cohen:

The answer is yes.

Mr. C. Newton (Director of Environment):

The Basel Convention requires -- if you remember the Basel Convention will have to have adequate domestic legislation in place before you can enter into the Basel Convention.

Senator F. E. Cohen:

But what I explained, Chris, is that now we are in a position where, hopefully, very shortly we will be able to export our hazardous waste and I was told that we are about 5 months away from that position.

Mr. C. Newton:

Yes, well just to explain a little bit more about that process, there is still no guarantee that you can just export hazardous waste. In each instance you have to make what is called "a duly motivated request". In other words you have to set out a criteria around which you have concluded that you are unable to deal with that waste yourself in your own territory. That might be because is it economically unfeasible for you to set up the appropriate facilities, or simply that somebody somewhere else has got a better process that will deal with the waste in a better way than you can.

Senator F. E. Cohen:

It is not quite the right way round, but can I ask you to ask Chris to clarify the position in relation to how this has ended up being under the Health Protection Department and not under Planning and Environment as it is …

Deputy R.C. Duhamel:

I think we could do, but I think what I prefer to do at this stage is to just hold back any further information on those questions until we have gone through a couple of the other areas.

Senator F. E. Cohen:

We had just better check that what I have said is correct, that is all.

Deputy R.C. Duhamel:

Can we move? We have been drifting a little bit and talking about waste management

Mr. C. Newton:

What time did we start?

Senator F.E. Cohen:

9.00 a.m. we started.

Mr. C. Newton:

It is 9.30 a.m. on the schedule that is sent to me by Scrutiny.

Deputy R.C. Duhamel:

Well, that is agendas for you. Right, so when undertaking environmental impact assessments for large developments, are they undertaken to cover the whole area that has to be developed or just in respect of the individual developments within the area? It has been suggested that in the environmental impact assessments for, in particular, the waterfront proposals have not been extensive enough in covering the problems that would spill over into other areas.

Mr. C. Newton:

Well, to put it simply, the environmental impact assessment process covers individual projects but there is an obligation from the developer to include cumulative impacts within that assessment. On the other hand, it is only reasonable at any point in time, to ask people to deal with what is known about rather than sort of trying to deal with some sort of speculative future development.

Deputy R.C. Duhamel:

Have those cumulative environmental impact assessments been done for the new waterfront development, for example?

Mr. C. Newton:

They are being done now.

Deputy R.C. Duhamel:

They are being done?

Mr. C. Newton:

Yes.

Senator F. E. Cohen:

There has been suggestion of an overall strategic assessment of the waterfront, East of Albert, et cetera. But as we do not know what is going to happen on East of Albert and are a long way off knowing, I think that it is impractical to expect that to take place at the moment. The Esplanade quarter is real; I mean obviously depending on whether the States approve it or endorse it and that is a significant area in terms of land and development. So that will be going ahead on its own.

Deputy P.V.F. Le Claire:

Before we go any further, I think it is only courteous of the process to acknowledge the fact that the Environment Director's notification of this meeting was for 9.30 a.m. from us, so there must have been some issue there that perhaps we can look at after this meeting. But I would not want it to go unnoticed that there is an issue about the meeting time setting in the agendas and I do not think it is right that we should just skip over that. Obviously the officer has given us his apologies and I think that we should note that there has been perhaps some issue there before we continue.

Senator F. E. Cohen:

Well, I can tell you that the notice sent out on the 25th of October said 9.00 a.m. and the email sent out more recently says 9.30 a.m.

Deputy P.V.F. Le Claire:

Right.

The Connétable of St. Helier:

Follow up questions.

Deputy P.V.F. Le Claire:

Yes. So maybe we can go over there and just say --

Senator F.E. Cohen:

So maybe it is 9.15 a.m.

Deputy P.V.F. Le Claire:

Could I just, to clear the air, before we continue, say: "Let us just put that to one side" and let us begin from here, shall we? Otherwise I think we are stepping off in the wrong direction and that would not be helpful.

The Connétable of St. Helier:

Chairman, can I come back or follow on from what you are asking and talk a little bit about the Hopkins scheme? Because we understand that the environmental impact assessment is being done on this scheme and the question we have for the Minister is whether it will incorporate the impact of predicted increases in traffic movements at peak times and the consequential increases in vehicle emissions? I am particularly minded to pursue this, given that the parking provision on the Esplanade car park is going to be, I think, trebled from about 500 at present to 1,420. So it is going to be almost trebled and there is an obvious link between trebling the size of a car park, then placing it underground, on air quality impact. Of course sinking the road is the second point that we know that the tunnel we currently have from the 1970s is a notorious hot spot for air quality and successive reports to the States have highlighted the tunnel as being injurious to health in terms of air quality. There is no surprises or secrets about that. We are now talking about a longer sinking … in effect another tunnel. So the 2 questions really are; how is the scheme going to deal with the travelling of vehicular traffic, the consequent emissions and the fact that this is all going to be an underground experience whereas at least, at the moment, for traffic queuing in the underpass the air is able to circulate and so on?

Senator F. E. Cohen:

Well, the answer is that those questions are fundamental to the environmental impact assessment and the general analysis of the Hopkins proposals in environmental terms. The environmental aspects of this and the response are going to be multilayered, not only is there an environmental impact assessment, but I am also making sure that Chris is central to the waterfront design group and makes sure that all these areas are properly addressed. But remember, we are not dealing with a planning application, we are dealing with a master plan and all we need to say at this stage is that those areas are vital; that they will be addressed; that if they are not addressed satisfactorily the scheme will not progress but we do not have to answer them at the time of tabling a master plan. We just need to say that they are elements to be addressed. In the

same way as we have not got the final solutions to traffic issues yet. We know that it works. We know that we can make it work better. And before we get to the stage of a planning application we will have the better solution. As far as the underground experience is concerned, again the Constable has raised the issue that an underground experience can be deeply depressing. We want to make sure that the underground experience on our waterfront is quite the opposite. I have invited him to take charge of that area within the waterfront design group if he has got the time to do so.

The Connétable of St. Helier:

Yes, so he has not accepted yet?

Senator F. E. Cohen:

I was polite.

The Connétable of St. Helier:

Pursuing the issue of the number of parking spaces, it does seem to me that there is ample research and evidence, certainly in terms of U.K. transport policy, that increasingly - and I think of Oxford - busy city centres that are growing their economies are simply not ratcheting up parking. They accept that you have got to get people to take more sustainable modes. We have got a bus station just completed a block away and I am just curious why this trebling of car parking has been factored in. It must have an economic impact on the scheme. Why are we not looking at simply reproducing the Esplanade with 500 spaces and saying: "Well, that, guys, is all you are having"?

Senator F. E. Cohen:

Well, remember that the majority of the Hopkins master plan offers accommodation which is the central part of the scheme, 620,000 square feet of offices is not new business, it is displacement. So what will be happening is that people who are presently working in other parts of the town will be working and parking in the Esplanade quarter area. You are not suddenly generating another 1,420 cars parking in the town; they are already parking there. But anything we can do to try and encourage more sustainable transport, we should be doing. We have got to be realistic about it. If you say tomorrow to people: "We are not providing you with any

car parking spaces and you have got to find a way of coming in to town," this morning only you and Deputy Duhamel would have got here because you are the only 2 chaps who go on bikes.

The Connétable of St. Helier:

But that is assuming you that you did not make any alternative --

Male Speaker:

I walked.

Senator F. E. Cohen:

Sorry, there is another one.

The Connétable of St. Helier:

That is assuming you did not make any alternative provision. I mean, it just seems to me that the issue of air quality is going to clearly be influenced by the number of cars and not only air quality of the Hopkins area, but the air quality of people living on the routes that come in. It does seem to me that it is something that I would like to know if the environmental impact assessment flags air quality as a problem, do the economics of the scheme permit you to drop the number of car parking spaces?

Senator F. E. Cohen:

I do not think you can drop the number of car parking spaces, but I think what you can do is set long-term objectives to deliver and encourage more sustainable transport to and from the areas and hope that in the longer term, which I think will be a natural process anyway, that people will stop or reduce their car transportation into the town. If you provide -- we are really back to the very basic principles. The reason that people like me do not go into town on the bus is because the bus service from the northern parts is hopeless. I cannot get in at the right time. That is not a criticism of anyone. It is certainly not a criticism of the Minister for Transport and Technical Services doing everything he wants, but if we are serious about providing sustainable transport alternatives for people like me, we have got to put a lot of money into it. Then we are back to the Freyburg example that we have discussed before. You have got to provide bus transport, public transportation that is affordable at the right time

that gets people from where they want to go to where they want to go. Reducing the number of car parking spaces on the waterfront is not going to make that happen. You need to provide the car parking spaces and you need to provide the sustainable options in a convenient way and that naturally will lead people to take the second route.

Deputy R.C. Duhamel:

Can I just ask why are the other alternatives to mass transport systems being considered by the usage of the environmental impact assessments to encourage a different type of transport which does not rely on petrol engines and diesel engines which produce the air emissions which is a problem in the first place?

Senator F. E. Cohen:

There is a piece of work really outside the waterfront, but you do not have to be a rocket scientist to work out that Jersey is probably one of the best places to promote electric car transport. I mean, it is absolutely ideal and the technologies are there, the cars are just about there and what we need is some mechanism to try and encourage people to shift in that direction.

Deputy R.C. Duhamel:

That is what I am driving at here.

Senator F. E. Cohen:

We have talked about, just peripherally - it was the Chief Minister's idea - of setting a target for a certain percentage of electric cars by a certain date and doing something to make it happen. That is really the sort of messages that I was hoping to promote through Eco-Active to make the information available to people and to make them want to do it themselves. There are problems with it. If you buy an electric car you end up really having to own 2 cars or having to have access to a second car, because if you want to go on holiday you are not going to get terribly far with your electric car. So there are consequences that, as a wealthy Island, there are a large number of people who are able to make those choices.

Deputy R.C. Duhamel:

Well this is why, I mean, it goes directly back to 4.4.5 that we were discussing before the officer arrived, in that if indeed there is an overarching interest from the Environment Department in setting particular policies and guidelines for local areas, it might well be that as part of the considerations for the master plan exercise for the waterfront development, or indeed, anywhere else, there might be targets set to achieve a particular level of air emissions without stating how many vehicles would comprise those levels. That would automatically give an incentive for people to switch to electric vehicles. Those emissions would not be part of those calculations. Rather than stating, as the Constable is suggesting, that the other way of achieving a similar aim is to put a squeeze on the number of parking spaces. It is not the parking spaces that is important from the air quality point of view, it is the type of vehicles that are being used and the emissions that they produce individually.

Senator F. E. Cohen:

Well, it would seem logical to me that we should have proper targets for air quality in and around the waterfront. They should be achievable targets, realistic targets, but we are starting from scratch, we are digging a big hole, assuming the States endorses it, and there is opportunity to ensure that we have the best standards. It is just a question of addressing those.

Deputy R.C. Duhamel:

As you say, that comes back in a circular argument to your department really being in the driving seat, no pun intended, in terms of laying down the guidelines and the moves with the targets.

Senator F. E. Cohen:

But it sounds as though, from what I understand, we are in the trailer behind rather than the driving seat.

Mr. C. Newton:

To respond to that, and I do apologise for not being here earlier to catch some of these issues before, to put air quality in perspective, from the limited monitoring that has been done, I would stress it is limited monitoring and it is done with relatively archaic equipment and processes, the understanding is that we do have occasional

exceedences of E.U. (European Union) air quality standards. They are primarily occurring at peak travel times, so it is not an ongoing problem, it is a problem that is probably persisting for an hour or 2 each day in some very localised locations in town. What we do not have in Jersey is any regulatory framework around air quality. We have no legislation that relates to air quality, we have no direct means of controlling emissions from either point sources or mobile sources. We do no have the equivalent of the U.K. local authority plans where they would have action areas and the remit to set standards and to achieve those standards in action areas. So I think we are dealing with something where there is a massive lacuna or gap between what we need to know and what we have got, if we want to address air quality seriously. So there are those 2 points; one is it is a marginal problem in Jersey, air quality is not a constant problem across the whole of the Island, it is a specific localised problem at certain times of day and there are probably tactical ways of dealing with that, even if it was in terms of just looking at how you could spread the traffic load across a longer period or something in that nature. I think the Minister has probably alluded to the fact that, in my opinion, there is also not clear responsibility and accountability for managing air quality in the Island and the Environment Department does have this overview where we look at the Island's performance against the various international obligations we are attached to, partly because there is no regulatory regime, there is no sort of follow through into practical "how we should do things around here" and --

Deputy R.C. Duhamel:

The Minister was telling us, just to interrupt, that he thought that this responsibility was really part and parcel of the Environmental Health Services. Would you agree with that or do you think it is more firmly in your department?

Mr. C. Newton:

Ever since I have been in Jersey, which is 5 and a bit years now, there has been a sort of tacit assumption that air quality issues were dealt with by the Health Department. In reality they have been the group who have set up and managed the limited monitoring that has taken place so far. The logical approach to me and you could say: "He would say this, would he not?" is that the monitoring of any factor that is part of the state of the environment should fall to the Environment Department. Dealing with any problems that occur as a result of that monitoring is probably a job for the

Environment Department in the same way as it is in terms of water or anything else. The role of Health would logically be to advise us on the significance to human health of what we discover about the state of the environment, so that that is sort of how I see it. I mean, it partly has been shaped by the fact that I worked in the U.K. and that is fundamentally how U.K. organisations have distributed the responsibilities in this sort of field. I think it would be logical and it would be a sensible way forward to put some clarity into the roles around air quality for the future.

Deputy R.C. Duhamel:

What methods for leverage have you got in working with the Transport and Technical Services in encouraging that department to take up more modern forms of transport which would cut the emissions completely? Like moving towards electric vehicles, encouraging the creation of car parking with electrical power points to charge their vehicles and things like that?

Mr. C. Newton:

Leverage is quite an interesting word there. We have no direct mechanisms by which we can require that to happen. But leverage can be effected in a range of ways and one of the ways it is being levered is by the way that objectives have been set out in the Strategic Plan, by the way that we will report, have reported and will continue to report on the state of the environment and the factors that cause the environment to be in that state which will create a sort of picture or a very clear position of what needs to be fixed. Also by the fact that we work very closely with the T.T.S. in creating policies and plans such as the integrated travel and transport plan which has as one of its 3 objectives to look after and improve air quality.

Senator F. E. Cohen:

Could I just make point there? Bear in mind, Deputy, that mechanisms to encourage things like electric vehicles depend on 2 things; firstly the presence of education, that is quite easy to do, we are doing that through Eco-Active and secondly, some form of incentive, somehow or other. It usually costs some cash, somehow or other. The only way we are going to deliver the cash is through environmental taxes and as you know, environmental taxes were postponed because the perception within the Council of Ministers was that the Island can only cope with one new tax at a time. The current

proposal is that I will be bringing back environmental taxes to the Council of Ministers in the first quarter of next year and that we will then be bringing forward a proposition to the States to introduce environmental taxes. This is one of the areas we can use them for because the core of the report and proposition is going to be that the tax is hypothecated.

Deputy P.V.F. Le Claire:

We have got limited time so we will not get into specifics of the air qualities --

Senator F. E. Cohen:

Well, depending on which area do you want to look at? You may have until 11.00am.

Deputy P.V.F. Le Claire:

Well, there we are. Can I just ask, around that, just before we skip over it, it is an interesting notion that the States of Jersey would spend so much time deliberating over an unpopular set of taxes and yet, something that the people probably do have support for, environmental taxes, has been postponed. How much money is it envisaged that the environmental taxes that you are talking about would possibly raise in total for the first 5 years?

Senator F. E. Cohen:

Can I answer that question? That is because I may not have given Chris my precise views on this. I think that Islanders are enthusiastic about the concept of environmental taxes with the proviso they have to be hypothecated and it has to be genuine and not a trick to fund things that you were intending to fund through other means anyway. I think that the key to it is to start small and build up. I think you need to address what areas you want to deliver right at the beginning and in my view we should pick a couple of areas such as Schools' Education Officer, other education and home insulation because that is where you get the biggest bang for your buck. We should start, if we are going to go, for example, with a fuel duty, we should start relatively low. Get people used to it, make sure they understand what the money is being spent on. So, for example, use measures like if it is a fuel duty at the petrol pumps you have a sticker that says that 1p per litre of your purchase price is going towards environmental taxes and they are delivering bang, bang, bang, bang, bang and

then the following year you increase it. How much does 1p per litre deliver, I cannot remember?

Mr. C. Newton:
About £500,000.

Senator F. E. Cohen:
Yes. So in the first year you may even only go for 1p or 2p and then you gradually build up to perhaps 12p to deliver the £6 million.

Deputy P.V.F. Le Claire:
I mean, it would be interesting if there was a hypothecation of money to apply taxes that were collected for environmental purposes to be put towards environmental solutions to areas where people had concerns. I would like to just perhaps throw a couple of ideas at you; one is Chris says that there has been limited monitoring yet he believes that Jersey does not have an air quality problem. I think that really depends where you are living, because some people have a perception the air quality in Jersey is not what it used to be and it certainly is not as good in some parts of Jersey as it is in others. Admittedly it gets worse but it does not necessarily ever get great for any serious length of time when one lives in town. So I would personally have trouble going along with the fact that Jersey has greater air quality. I have some issues around emissions from boats when they leave the harbour and looking back at Jersey from a trip to France when you see a big smoggy cloud hanging over it, like I used to see over Houston. Is it not possibly throwing at you, you know, a solution to take those kinds of taxes and implement proper monitoring systems to find out scientifically if there is a problem? Also implementing schemes such as investor composting facilities that contain core practices that have a detrimental impact at the moment upon some large numbers of residents where the process is occurring, where no tax at all, no user pays charges whatsoever are being employed in the States running a facility that is costing over £700,000 a year to produce less than £55,000 worth of product.

Senator F.E. Cohen:

As far as using environmental taxes to produce better data in relation to air quality is concerned Chris explained to me yesterday that the way we -- I have already said this -- the way we monitor air at the moment is relatively primitive. You need to buy a piece of kit that will cost £140,000 to do it properly. It has been suggested that the waterfront developers may be asked to purchase the kit. It may be more sensible for it to come out of environmental taxes. But I think you will probably get it faster out of the waterfront developers than you will get it out of environmental taxes. But the points you make are, yes, very valid.

Mr. C. Newton:

I just have 2 comments on environmental taxes. Firstly, yes, we clearly do need to have clear purpose for the money that is raised through them and the consultation we had earlier this year spelt out what those purposes were, which were fundamentally about encouraging greater recycling; supporting public transport; and working on energy efficiency. It is also worth remembering that in raising environmental taxes, the way you raise environmental taxes can and will send signals to people and can and will change behaviour. So, for instance, the proposals that we had and the proposals that we will probably continue to come forward with will undoubtedly offer incentives for people - thinking about motoring, in particular - who choose to run either electric vehicles, hybrid vehicles or very small engine vehicles. You will have a very straightforward fiscal incentive at the time you buy a car, so if I buy this car it is zero rated for tax, if I buy that car it is punitively rated for tax. That, at the time, can help shift behaviours. As well as then taking the money and re-applying it to good causes.

The Connétable of St. Mary:

Can I just come in there being as that you know, one has to always appreciate the difference and I living out at the sticks at St. Mary appreciate that there is the difference between living in the north of the Island and living within St. Helier, shall we say. The only thing -- and I was just thinking about it when you were saying about the fairness of the environmental taxes -- would be ... because Paul incidentally raised about the, you know, for the air quality and such like, the existent people and money could go towards that. I think it has to be a fair one for everybody which you said it would be because -- therefore the aim would be so at least the people out into

the north of the country would know that their environmental taxes are going, as you said, to electric cars and such like for them to have the advantage as well. I think the rest or the other people would feel it a rather unfair situation if it was not just going because **[Interruption]** it is only just recently but it was polluted and it is going to be polluted again, so the air does change because of varying circumstances that arise. So I think it is got to be an overall environmental tax to please everybody, as such.

Senator F.E. Cohen:

Remember that firstly a lot of your St. Mary's residents would work in town anyway, so -- and they will be the long-distance commuters, the residents of St. Mary.

The Connétable of St. Mary:

This is the point that I am saying, is that yes, an environmental tax would be for, you know, an electric car rather than aimed at that, then everybody would be happy rather than say, well, we are putting that money, monitoring the air pollution in the tunnels sort of thing.

Senator F.E. Cohen:

Can I just make a comment on environmental taxes? Progress on environmental taxes has been quite depressing. I would have expected that by now we would have brought a report and proposition to the States. There have been concerns over implementing too many taxes at once. Chris and I are determined that we are going to bring them forward and we are going to keep bashing away at it until we get a report and proposition to the States. My view is that while people do not like taxes of any sort, that providing you hypothecate and providing you give the benefit back to Islanders people are prepared to accept their environmental responsibilities. I am not saying they want the tax but they accept the tax and accept it with a positive mind.

Deputy R. C. Duhamel:

A question from Professor Laxen and then Deputy Scott Warren.

Professor D. Laxen:

Turning to your role as a planning department I was just wondering whether the planning system here - and I am only really familiar with what happens in the rest of

the U.K. - has a system such as section 106 agreements which can be applied to developers of new large developments; which is a mechanism whereby they can offer or you can require them to do various things, such as implement green travel plans such as, for instance, free parking for electric vehicles. Is that a system that can be operated and is operated?

Senator F.E. Cohen:

Yes, planning obligation agreements are relatively new to Jersey - I think they were introduced by my predecessor. We are using them actively. They can be used for a variety of benefits but bear in mind I am already loading developers. I have introduced percentage for art. I am hopefully about to increase planning fees. We are really loading up developers. It is fine, I am quite happy to do it, but there comes a point where you suppress the economy and we have to be careful -- we are nowhere near it yet, and I just think we have to be a little cautious. What would be useful, particularly in relation to the waterfront, are some quick suggestions from the panel on what you think we should be suggesting as section 106 planning obligations for the waterfront development as a whole. It is a very good idea.

Deputy C. J. Scott Warren:

I believe many States' Members received a letter a few months ago suggesting that we operated an even/odd number plate system for certain days of the week. I wondered if the environmental taxes could also be - also the encouragement of car sharing initiatives, but whether the taxation could go further to restriction of car use by those methods?

Senator F.E. Cohen:

I am not a fan of hitting people around with a cricket bat to try and make them do positive things from an environmental perspective. I am absolutely 100 per cent convinced that Islanders understand their environmental obligations. They want to do things and all we have to do is to provide them with information and a little bit of encouragement and they will do it. You only have to look at the responses to recycling, kerbside recycling, within a couple of weeks St. John had 70 per cent and the town had 76 per cent. Although some people are questioning the 76 per cent, I think it is probably right. We are just not doing enough in terms of providing

information and providing people with encouragement. I do not think you need to go to odd/even car running schemes. I think if you provide the information and a little encouragement people will end up very quickly reducing the impact of their everyday activities. You can already see people are becoming very conscious of environmental improvements in buildings they put up. They are prepared to pay a bit more for it. We are also fortunate that we are in an environment where we can enforce stricter requirements in relation to new buildings, because we have high property prices. When you are selling properties at £400 a foot a developer can hardly argue about requiring another £5 per foot of the construction cost to produce a more environmental friendly building. I think there are lots of opportunities. We just have to take them. I do not think the way to start is by stopping people using their motor cars, because you will just de-motivate them, in my view.

Deputy R. C. Duhamel:

A general question. Do you think that the aims of the Planning and Environment Department would be helped or hindered by taking over the responsibilities of transport planning within your organisation?

Senator F.E. Cohen:

It is a different skill. We do not have the skills within the department. My only knowledge of transport planning is seeing what is happening with the traffic planning and transport planning for the waterfront. It is all done by people with completely different skill sets. We do not have a John Richardson in our department any more. We do not have a Dave St. George. We do not have the day-to-day relationships with the consultants they use. We do not have the traffic model. We do not have the people who would know where to get the latest traffic model from. So I cannot see that it is practical to even consider moving transport policy to the Planning Department. I think what is more important to the Planning Department is that we increase the relevance of the Environment Department within Planning. It is something we have started talking about - we have this curious position where we have the Environment Department in Trinity, we have the Planning Department in town, there is hardly any interconnection between the 2 and yet the public requirement is now to integrate environmental issues within every area and even in our own department we are not able to do it because of the physical separation.

Deputy P. V. F. Le Claire:

Can I ask then, because it has been something of a pet political point of mine, there really is a bit of a conflict with Planning and Environment sitting under the one ministry, do you not believe or do you believe that it is not possibly time to rationalise the arguments and say: "Look, it is time to separate the 2"?

Senator F.E. Cohen:

I have been through this; I have been around and around and around. I have had a view at one time that they should be separated. I am now absolutely firm that they should be together but not as they are at the moment. They should be together but completely integrated. When any planning application comes in the application should be tested from an environmental perspective in a variety of ways. I think if you move towards that you will more likely achieve better buildings and a better environment for the Island. One of the things I want to do - Chris is just starting putting it together - is to have organised regular environment brainstorming sessions where we set these long term objectives. What we want to do is integrate the Environment Department literally within every department of the States but starting with our own. Because however much we talk about Planning and Environment we have 2 departments, a planning department and an environment department. The first start would be to get them in one place.

Deputy P. V. F. Le Claire:

One of the things that the panel has been discussing is whether or not we could encourage departments or the States and other non-government organisations to conduct environmental audits upon themselves. I wondered whether or not you have given any thought to those sorts of things?

Senator F.E. Cohen:

Yes, absolutely. Chris, you can talk about that.

Mr. C. Newton:

Except to say that we are doing it at the moment. We are running a trial programme literally within my department now. So we have commissioned somebody who has

come in and done an environmental audit for the department. The intention is to use that as a demonstration project and then roll it out across the States. It is one of the issues that is being considered at the moment by the corporate management board, the collective of chief officers as a potential money saving opportunity as well as delivering environmental goods. It potentially could make savings across the utility bills in all departments. So it is something that is being actively pursued.

Deputy P. V. F. Le Claire:

It is something that I raised with the panel because of my concerns about the vehicles the States use and the access to those vehicles. Would it not be great - if it is possible - to have access to electric vehicles for States' departments that were shared? Rather than leased and then arguably being --

Senator F.E. Cohen:

There are 3 levels of our work. There is information being provided to Islanders generally through Eco-active and other mechanisms. There is encouraging the corporate sector. We are about to launch Eco-active Corporate which is a business accreditation scheme. We have sponsorship from Standard Chartered. It is kicking off very soon and hopefully that will result in local companies wanting to demonstrate their environmentally conscious decision making. The third strand is what are we doing to put our own house in order? Look at the Planning Department, we are the most inefficient building you can find in the Island where the walls - my wall is less than an inch thick. Where some of the time the air-conditioning and the heating is on at the same time. We are the people who are responsible for setting the example. So we have to do something about it. Environmental audits need to start with our department then they need to be run out quickly through other departments. But it is a costly and time-consuming process.

Professor D. Laxen:

You said earlier, Minister, that clearly it is important to integrate environmental issues into the planning process at an early stage. Can you run through the current approach? This relates to question 11 on our series of questions which seems to be that you request input from the Health Protection Unit on environmental issues. How do you determine on which developments you would go to them and ask questions of

and do you believe it would be more straightforward if those responsibilities were within the Environment Department rather than Health Protection Department?

Senator F.E. Cohen:

I think that every application whether it is a replacement window or whether it is the waterfront should have some input from the Environment Department. We are a long way from that. That is one of the things I am hoping that we are going to be able to look at very soon. Coincidentally I was discussing it with Chris yesterday.

Mr. C. Newton:

I think the situation now is 100 per cent better than it was 5 years ago when I arrived. There was a real tension between Planning and Environment Departments in terms of what each one would consult each other on. In fact the Environment Department was something of a vestige of the Planning Department; it certainly did not get much airtime at all. That has moved on a lot. We do have good processes that allow it to screen all planning applications; there is some automatic screening that filters out things that we probably would not have an opinion on. It allows us to put together a collective view of the Environment Department because the Environment Department is sort of multifarious in the way it might respond to Planning. So there are some regulatory issues, there are some policy issues. There are agricultural countryside issues. All of which within my department have different service heads and they are all collectively put together into a formal response to Planning. We do have processes now that automatically call in health protection advice on bigger schemes. But to answer your question directly, yes, it would clearly be more straightforward that those ... if the advice we were calling in was already within the department.

Senator F.E. Cohen:

Let me give you a specific example that I have mentioned to Deputy Duhamel before. We are -- I know it does not apply to every planning application but we are still approving houses in the countryside, whether they be refurbishments or redevelopments of an existing house, where there is plenty of land around them and we are still allowing people to put in central heating run by oil. Why are we not saying: "If you want to build your new house there, you have to use geothermal heating systems?" It is not very difficult, it does not add hugely to the cost of the

house. The house is expensive anyway. That is the sort of thing that I want to see the Environment Department saying … well, this is what you should be looking to introduce within 12 months. I think there are some quick wins and we are missing them.

Deputy R. C. Duhamel:

I think you are right. Just moving on a little bit in a similar area. Within the Ring Road of St. Helier there are some areas that have been identified by the Health Protection Unit as being hot spots and the level of emissions in terms of some substances is over the recommended levels. How can you, through the Planning Department rules and regulations, guarantee that these areas do not become worse in terms of the emission levels when the contributors to the problem are really pretty much down to through traffic passing through a residential area? It really goes back almost to the point I was trying to get to about the transport planning element on the global scale being a planning issue rather than a road building issue. That if there is an environmental idea and if there are environmental issues in terms of trying to clean up emissions and things, there does appear to be a cross-over between departments. If we suggest, as the Minister is suggesting, that the transportation policy is only the remit of the Transportation Department then I cannot really see what policy mechanism we have to apply through the Planning Department to make improvements?

Mr. C. Newton:

There are several levels of potential reply to that one, I will try and remember all of them. At a very basic level clearly where we know there are already air quality issues then any development in those areas will be required to produce an environment statement and if it looks like they are going to contribute to worsening that problem they will be required to mitigate against it. That is at the local development level. On the wider scale of things the Island Plan itself, the Island Plan process is the location at which these sort of more macro micro issues will be looked at. So if for instance, as we are doing now, looking at possible creation of new settlements in Jersey, one of the things you would be anticipating - and if necessary modelling - is what do you generate in terms of servicing of those new settlements in terms of traffic. Where is that traffic going to be? Where is it going to pass? Is it going to contribute to an

existing problem? In that sense Planning does have an input to transport policy. But what I was going to say earlier in response to when you raised this question the first time around, is I do think there are some probably political level issues frankly, around the setting of policy within an operational department. It is a debate that I have had many times with the Chief Officer of Transport and Technical Services to the extent to which we should in some way be able to divorce the: "What do we need to do?" from the: "What have we got resources to do?" question. Because in many cases I think the policy thinking of an operational department is necessarily - and probably ought to be - constrained by: "What resources have I got to deliver it?" So you sometimes get a less than optimal outcome simply because you do not ever contemplate really: "What should we really be doing here?" as opposed to limiting it to: "What can we actually afford to do here?" Sometimes they are quite different things. If you think there is still a bit of a gap there in terms of doing the actual strategic thinking about what should transport policy look like, what should waste policy look like for that matter. It is not fettered by the practicalities of having to validate their operations with a budget you know you have.

Deputy R. C. Duhamel:

In terms of the suggestion that has been made by the Minister about extending the environmental thinking into areas that it would not necessarily occur, have you got the means and the wherewithal to bring that about with departments who might not necessarily wish to open the door and allow the environment to come in?

Mr. C. Newton:

I think we have made good progress. I think we have spread our coverage quite a lot through cross-cutting policy work, like working on the Strategic Plan, as I did, working on energy policy which cuts across all departments. Our resources are limited. We have a very small policy team in environment and we can really tackle one big subject at a time.

Senator F.E. Cohen:

I think that that is a relevant point. The quality of material that comes out of the Environment Department is absolutely fantastic. Whether it is the energy policy document or briefing notes for me they are always absolutely fantastic. That is the

function of people not having to do 25 different things at once, they only have to do 20 things at once. Resources within the Environment Department will be strained if we start loading more and more and more. They already are. Imposing Eco-active on the Environment Department caused quite a lot of strain, a lot of resources were taken up by delivering information for the website. With regard to your question - and there is one thing that seems pretty clear to me from my discussions with Chris yesterday - the hot spots may have been identified but we are not monitoring with the latest equipment. I think the first thing we should be looking to do is to somehow or other obtain some modern equipment to enable us to identify what the air quality situation is in all sorts of areas of the Island.

Mr. C. Newton:

In a timeframe as well. We probably are getting localised exceedences in real time that are averaged because of the way we monitor them.

Deputy P. V. F. Le Claire:

What concerns, if any, do you have about the expansion to the air routes in Jersey?

Mr. C. Newton:

Air routes? In terms of air quality?

Deputy P. V. F. Le Claire:

Environmentally, how does it ... has it crossed your mind at all that there is going to be the jettison of the new ones coming, that they could be running some large planes?

Senator F.E. Cohen:

The total output ... the total percentage of carbon emitted in the world from aviation transport is 1.6 per cent. Stand by is 1 per cent. So that gives you an area ... some comparative figures. I got those from Sir David King at my meeting a couple of weeks ago. They are my 2 current favourite statistics. Jersey is dependent, to some extent, on our tourism industry. Our finance industry is dependent on air transportation. The more links we have, the more flights we have, the greater opportunity we have for tourism, the greater opportunity we have for our finance

industry. The negative is there are environmental consequences. But you have to strike a balance. It is not for me to say where the balance is. I do not know.

Deputy P. V. F. Le Claire:

Is it not really ... I mean I think it is all wonderful, we are all politicians and we have to take a realistic approach to what happens in Jersey, it is all wonderful news. We can go on easyJet and finance can get backwards and forwards and everything else, but this is an area of your ministerial responsibility and from an environment perspective has any ... this is what I am asking, I do not say it is a bad thing, I am just asking. Has any thought gone into the announcements? Has any thought or consideration gone into considerations about the types of planes that are flying? Or any negotiations about the age of the planes that are flying?

Senator F.E. Cohen:

As far as I am aware that when Economic Development or Harbours and Airports are negotiating they are always conscious to ensure that planes used are the latest. I noticed that the EasyJet planes are - hope I have this right - 737 700s which is the latest version and they are not encouraging new route operators to put their knackered old inefficient aeroplanes on the routes. But clearly from an environmental perspective the more aeroplane traffic you have, the greater the environmental impact but there is a balance.

Deputy P. V. F. Le Claire:

What about emissions from La Collette, has that been given any environmental consideration? Because I know that the policy options have not been identified as to whose responsibility they are, but from an environment perspective it just hits me that surely there should be some - I know you are stretched and I know you are doing the best work you can do when you get to do that work - cognisance. Maybe we could hear from Chris as to what does the department do in terms of analysing, acknowledging, addressing or even raising issues with you on the emissions of things such as La Collette and those aeroplanes?

Mr. C. Newton:

Can you just be clear on what you mean about La Collette?

Deputy P. V. F. Le Claire:

The J.E.C. (Jersey Electricity Company) emissions, for example. Which recently --

Deputy R. C. Duhamel:

I think it is clear the testing programme is down to a different department. Any overarching kind of policy initiatives in terms of improving the environment probably rest with Planning and Environment and they are chalk and cheese, really.

Deputy P. V. F. Le Claire:

I am just wondering … maybe it is just me struggling, but I am just struggling to come to grips with the fact that we have an Environment Minister and we have environmental emissions. We have a lot of work that we have done in relation to the incinerator, which must have had the environment's input. We have some difficulty recently since the changeover as to who is addressing and who belongs where on these issues and whose budgets they are. Surely there must be some discussion or thoughts or opinions as to the types of emissions and factors entering the actual natural environment, the human environment. These are the environmental experts and even if they do not have direct identified responsibility or the budgets to handle them, there must be some thoughts and opinions on these issues.

Mr. C. Newton:

Clearly we have thoughts and opinions and we do publish a quinquennial report on the state of the environment and the factors that cause it to be in that state which includes an overview of air quality. As I had said before, in the absence of any regime to manage air quality and the like then it is a slightly sort of ... a process without a real end point. Clearly these things are taken into account, so in looking at the New Energy for Waste Plan it has been a working assumption, despite the fact that there is no legislative framework to require it, but it has been a working assumption that the plant will perform to the highest possible standards and will definitely meet any directive that might be in place within the E.U.

Deputy R. C. Duhamel:

We do not want to go off on a side issue, that may well be true but it could equally be countered that there has been a lack of interest in ensuring that the existing plant is run to the highest standards possible. It goes without saying it is not the plant that is at fault, it is how it is being run that is at fault. If there is no requirement, for example, to be burning the prodigious quantities of the plastic that we have been putting through our incinerator and there are other closed recycling loops which would derive value from the recycling of that material, it begs a question as to whether or not we are still allowing an aging plant to be burning these materials knowing full-well that they are aging facilities and they do not have the same bells and whistles in terms of emission standards that modern equipment to great expense would provide.

Mr. C. Newton:

I agree entirely with the point you are making. I would say as an environmental professional the outputs from the Bellozane plant are unacceptable in this modern time. I would also say there is no regulatory regime whatsoever for anybody to intervene in that process, other than the slightly tenuous route that health protection have through the nuisance law effectively, whereby they could, if they could demonstrate that there was exposure to people or unacceptable levels of toxins or whatever, they could intervene and probably put some sort of notice to the plant.

The Connétable of St. Helier:

They only have to prove a nuisance though not exposure to toxins. Under the nuisance law they only have to prove a nuisance which is what the --

Deputy R. C. Duhamel:

But the nuisance has to be detrimental to health, and that is the difficult part to prove.

Deputy P. V. F. Le Claire:

I thought the interesting thing - just try and tie up this logic for a second - is that environmental taxes earlier were mentioned as a means of raising monies to perhaps identify expenditure. One of the areas that was interesting that you raised was recycling. I am just wondering how a hypothecated tax from States of Jersey managed under the Environment Department can be attributed to any kind of

recycling programme. That is out of your remit. Also interestingly where there are mechanisms for introducing user pays, for example, to businesses that are depositing compost at La Collette, we could charge people for dumping their ... or putting their green waste through a process that is costing the Islanders £750,000 a year. That would perhaps free up some other capital whereby we could address solutions to these issues; such as better recycling facilities that would give the ... for example, if we had a user pays process for the compost facility we would have another large recycling facility in Jersey. But the interesting thing I think that needs to be asked at this stage is, all of that seems to be unconnected, which is obviously an issue that we would have to put in our report. I am just wondering, some of the disconnect between charging for these services from gardening companies, for example, where there is an ability, we are talking about lack of abilities, where there is an ability at the moment, has been dismissed by the offices of T.T.S. and the Minister because of the fact that they believe it would lead to a lot of fly-tipping and the Constable was concerned about fly-tipping of green waste in Jersey. I am wondering from an environmental professional's perspective, what views you have on what damage do these do in the countryside?

Mr. C. Newton:

Taking your points in order, if I can remember them. Environmental taxes are not the sole remit of the Environment Department. Environmental taxes are a States-wide initiative. The definition of environmental taxes is simply a tax that is raised to pursue an environmental objective. So it is entirely legitimate that T.T.S. or any other department that had an environmental objective would be involved in and benefit from environmental taxes. I am responsible for developing them because that is my area of expertise. But the beneficiaries will be States-wide. Certainly the working assumption at the moment is that a good chunk of whatever money we raise will go to T.T.S. to support the Integrated Travel and Transport Plan and greater recycling, and that is right way to go.

Deputy P. V. F. Le Claire:

Could I help then by ... sorry to interrupt you, Chris, but could I help then by being exactly specific about what I am asking. Is that while we are waiting for all of these hypothecated laws to work their way through the Law Officers Department and where

your expertise lies is in setting up these systems where people can benefit ... and as the Minister says, this is something that I think is, at the very least, accepted. I am quite keen, personally, for environmental taxes, not at all keen for G.S.T. (Goods and Services Tax). Is it not possible - because it is within the remit of the States now - for us to be working on things such as introducing user pays charges to these processes. We do not have to wait for taxes, we can introduce user pays charge for now on the gardening centres, for example, the gardening companies, then use that money to address some of the issues?

Deputy R. C. Duhamel:

I think the point though is that it is not for the Planning and Environment Department to be introducing taxes, it is the responsibility of Transport and Technical Services who are running the operation in a sub-optimal way to be doing the things that you are asking for.

Deputy P. V. F. Le Claire:

My point in specifics is that the T.T.S. Department has said that it would not want to introduce a charging mechanism because it is fearful that it would lead to fly-tipping in the countryside.

Deputy R. C. Duhamel:

I am not sure that that is the case. If you speak to the officers, the officers would dearly love to have a lot more money in their budgets to be spending on the type of equipment that they are not able to --

Deputy P. V. F. Le Claire:

It is the last box that I cannot tick in the whole argument. I am just asking …

Deputy C. J. Scott Warren:

User pay charges have to go via the States though.

Mr. C. Newton:

A comment that I think would be helpful which is simply that as far as environmental taxes are concerned ... I am sure some of you, many of you will have read the

consultation document. User pays charges are caught within the entire gambit of what we call environmental tax. So any mechanism, fiscal mechanism that has an impact on people, be it a tax, be it a charge, be it a levy is wrapped up in what we are calling environmental taxes. So it is entirely legitimate to call a user pays charge an environmental tax. Some of the thinking that we went through in looking at environmental tax includes charging for waste arising. It includes charging parishes, potentially, for the mixed waste they turn up with for disposal. It includes charging householders at a household level. It will include turning up at a tip face with solid waste. It could include turning up at a green waste composting site with green waste. All of those are legitimate charges you could levy if you thought it was going to have the right impact.

Deputy P. V. F. Le Claire:

I know we want to get off this, but I just want to just ask you this - this is the one question that I needed to answer for me and I have really dragged this aside but I would like to know, I mean, are there any concerns about tipping of green waste in the countryside from an environmental perspective? In relation to the introduction of user pays charges from an environmental tax perspective. If you introduced an environmental tax, user pays system for green waste, are you fearful of the consequences of fly-tipping in Jersey?

Senator F.E. Cohen:

I can answer that from personal experience. Our wood which runs down from the top of Bonne Nuit Hill halfway down and part of it is accessed from the road is a top spot for fly-tipping. I have no idea why. But we regularly get loads of green waste dumped in our wood. I do not know why.

Deputy P.V.F. Le Claire:

That is illegal though, is it not?

Senator F.E. Cohen:

I am sure it is.

Mr. C. Newton:

I think people will do it sometimes, not because they are unconcerned about the damage, just simply because they do not recognise the damage they are causing. They do not understand that the impact of tipping nutrients effectively into some habitats is going to have a detrimental effect. They just think it will rot and go away and that is it.

Deputy R. C. Duhamel:

We are drifting slightly. I am conscious of the time. I had one final question. Then we will go around the table and for final questions from the other members. Bearing in mind that there is evidence to show that the greening of urban areas is a useful mechanism for cleaning up and bringing about investment in air quality within the urban district. Are there any plans on behalf of the Minister or the department to encourage by whatever means are available at your disposal to bring forward plans to green up areas of the town as a way of bringing about investment in air quality within the district?

Senator F.E. Cohen:

Yes. The first thing is if you have a look at the Hopkins Master plan you will see how much that is green. One of the objectives of the Hopkins Master plan is to deliver this £50 to £75 million cash the majority of which -- all of which should go into the regeneration of the town, particularly including regeneration projects of areas of town that incorporate improving public space and greening up the public space. It is an area we do not seem to be getting to the bottom of, that everyone is trying to get their hands on this cash but if you look at areas like Broad Street, you do not have to put very much money in to an area to significantly improve it. That is about improving the public space by using high quality locally relevant materials and grooming them. It works, it works everywhere else and we should be doing it. We need a clear commitment that we are going to do it. So far we do not seem to have the clear commitment, we just have: "Yes, we are going to do it." But we need to know how much and when.

Deputy R. C. Duhamel:

Any final brief questions?

Deputy C. J. Scott Warren:

Can I just ask, we did obviously hear that equipment for monitoring air traffic is ... when traffic is monitored in hot spots in town, is inadequate. Can I just ask you on the sharing of the data between your department and Health Protection. Obviously one has to assume they are equally unhappy about the state of the equipment.

Mr. C. Newton:

I am not sure of the question?

Deputy C. J. Scott Warren:

Sorry, the question is, the data, the sharing of it, and really the relevance of it under this situation?

Mr. C. Newton:

Absolutely, the data is shared across any government department who needs to have it. My comment was essentially on the policy of the data that has been collected. It is shared and I do know that Health Protection have long harboured a desire to improve their monitoring capability but attempts to scrape together sufficient money to buy approved equipment but has never achieved sufficient funding to go the next step. We are talking about essentially buying a small mobile laboratory that you tow around on a trailer to place-to-place, park it and move on when you need to move on. It is a bog standard kit , to use that expression, it is easy to buy in, you just need the money to do it. Then you need the staff time to analyse and make sense of the information.

The Connétable of St. Mary:

Yes, if I could ask the Minister, at this very moment in time we have the consultation going on from 9 parishes who are wishing their sheltered homes and first time buyer units and such like coming on stream. To what extent are you going to recommend, enforce, as much of the modernised eco-friendly within that? Will you be having control over the developers and the people and such like? I think this is an opportunity at this moment in time because it is not a haphazard one, it is all-in-one. We have the 9 parishes with all their different ones and I think this could be an opportunity for Planning and everybody else to make a stance and a stand as they will.

This is what we aim; this is our future. Will you be incorporating the whole new regime and that within these developments?

Senator F.E. Cohen:

Absolutely, and the Assistant Minister, Deputy Pryke - who has responsibility for social housing - already has a list prepared of all the requirements that will be imposed upon the parishes in these developments. The retirement houses will be of the very latest design incorporating the latest energy efficient measures and particularly things like geo-thermal heating. She has already got a specification for it. I am sure that will be circulated.

Deputy R. C. Duhamel:

I think on that note we would like to thank you for staying on longer than we had anticipated, and answering the questions that we put in a helpful fashion. We will be in touch, thank you.

States of Jersey
States Assembly

États de Jersey
Assemblée des États

Environment Scrutiny Panel

Air Quality Review

Presented to the States on 10th June 2008

S.R.8 /2008

Contents

1. Executive Summary

This report is the culmination of a review into the progress made in the development of an Air Quality Strategy which forms a clear commitment in the Strategic Plan 2006-2011 (item 4.4.5). It states: “Debate and implement in 2007 an Air Quality Strategy for Jersey, including proposals for monitoring and publishing levels of local air pollution, and targets, policies and timescales for reduction on air pollution that reflect best practice globally. (P&E)”

Main Recommendation

The Panel has identified that this work has not yet been undertaken and that there is a clear and urgent need for responsibility of this to be clarified and the matter progressed.

2. Recommendations

1. There is an urgent need to take forward the Air Quality Strategy that forms a clear commitment (item 4.4.5) of the Strategic Plan 2006-2011.
   The Air Quality Strategy should:
   - identify the key pollutants and their sources;
   - clearly identify the responsibilities of the various departments to implement elements of the Strategy;
   - and set out the framework for determining measures to improve air quality and how they are to be introduced

2. The Panel recommends that responsibility for Air Quality policy matters would best lie with Planning and Environment. To enable the Air Quality Strategy to be taken forward there needs to be clear ownership of the process and sufficient resources made available, both of which are currently lacking.

3. Health Protection Services within the Health and Social Services Department should provide technical support to Planning and Environment. This should include identifying appropriate health protection standards, developing an appropriate monitoring programme, and carrying out the necessary enforcement activities.

4. Both the Transport and Technical Services Department and Economic Development Department have an important role to play in implementing measures identified by the Planning and Environment Department to improve air quality. Planning and Environment must therefore be supported by Transport and Technical Services and Economic Development, as well as by Health and Social Services, when developing the Air Quality Strategy and other air quality policy initiatives and legislation by way of an Inter-Departmental Panel on Air Quality.

5. Planning and Environment should be given the necessary financial and technical resources to take forward the Air Quality Strategy. In the interim it would be appropriate to buy-in the necessary technical resources until such time as they are developed locally.

6. A clear timetable should be set for the introduction of the Air Quality Strategy and associated legislation. The aim should be to have the Strategy finalised within 6 months of P&E being given the responsibilities for taking forward air quality policy, with the Enabling Legislation finalised within 12 months.

7. The Panel recommends that consideration be given to international agreements when the Air Quality Strategy is being developed. The Air Quality Strategy should be supported by enabling legislation, which will subsequently allow Orders to be made as and when necessary. Such Orders could include requirements for burning

smokeless fuels within St Helier and a requirement for emissions testing of all commercial vehicles over 5 years old.

8. Considerable development of the Waterfront in St Helier is taking place or planned, yet the air quality impacts are being assessed in a piece-meal way. A Strategic Environmental Assessment should be carried out for this area to address the cumulative impacts of the various developments.

9. Monitoring of air quality forms an integral part of the Air Quality Strategy. There needs to be a long-term commitment to a programme of air quality monitoring. This should include use of equipment that meets EU standards, supported by other indicative methods where appropriate.

10. Although the Panel has not formed a strong view on the type of monitoring site to select, this should be subject to further consideration, by the relevant departments.

11. The Panel also recommends that consideration be given to acquiring a second automatic monitoring station that could be used to monitor nitrogen dioxide concentrations at hotspot locations.

12. Finally, the Panel recommends that the automatic monitoring programme should be supplemented by the continued use of nitrogen dioxide diffusion tubes and the Osiris PM monitors. It would be appropriate to carry out a review of all the monitoring locations, changing them and adding to them as necessary, and of Quality Assurance / Quality Control procedures. The Panel sees no value in continuing the monitoring programme for benzene, toluene and xylene, as the results have been shown to be well below the standards.

3. Panel Membership

Deputy R. C. Duhamel, Chairman
Connétable K. A. Le Brun, Vice Chairman
Connétable A. S. Crowcroft
Deputy P.V.F. Le Claire
Deputy C. J. Scott Warren

The Panel made well publicised calls for evidence during October and November 2007. A bibliography of documents considered by the Panel can be found in Appendix 1. The Panel held hearings on 3 days at the end of November. Those attending are listed in Appendix 2 whilst those submitting written evidence are listed in Appendix 3. The Panel appointed an independent air quality expert to advise it during its deliberations. Prof. Duncan Laxen undertook this task. His credentials are set out in Appendix 4.

4. Terms of Reference

- To investigate the range of substances that may be emitted in Jersey and assess if they are likely to pose a risk to health or the environment. Both gases and airborne particles will be assessed (both of which may be of chemical or biological origin).

- To investigate the potential of hazardous emissions from:

    - Transport (Air, land and sea)
    - Industry (e.g. JEC, Jersey Steel, General Hospital, dry cleaners, construction industry, etc.)
    - Waste management (Incinerator, crematoriums, composting facilities, fly ash and landfill)
    - Domestic burning (e.g. garden fires, solid fuel fires.)

- To assess if sufficient funds are available to provide an appropriate level of air quality monitoring of the substances most likely to pose environmental and health problems and that the appropriate legislation is in place.

- To assess if the current air quality monitoring is in line with accepted best practice and encompasses a sufficient range of substances.

- To investigate what actions have been taken in response to levels recorded above internationally agreed exposure limits.

- To investigate what progress has been made in reducing transport pollution levels following the recommendations in the Air Quality Strategy Report for the States of Jersey produced in April 2003 and other relevant strategies adopted by the States.

- To respond to any other issues that may arise as a result of this review.

The Panel decided at the beginning of the review that it would not include any assessment of radioactive emissions e.g. radon from ground sources. The focus of the review would be on the local environmental impact. The Panel considered global warming gas emissions would require consideration as a separate review and that aspect would form part of the energy policy review.

5. Air Quality Strategy

The Air Quality Strategy forms a clear commitment (item 4.4.5) of the Strategic Plan 2006-2011.

Panel recommendation 1

There is an urgent need to take forward the Air Quality Strategy that forms a clear commitment (item 4.4.5) of the Strategic Plan 2006-2011.
It should

- **identify the key pollutants and their sources;**
- **clearly identify the responsibilities of the various departments to implement elements of the Strategy; and**
- **set out the framework for determining measures to improve air quality and how they are to be introduced.**

6. Responsibilities for Air Quality in Jersey

Responsibilities

In 2003, the States of Jersey published a report setting out a draft ***'Air Quality Strategy'***. This covered all the issues relevant to the development of a Strategy:

- it identified the key sources and air pollution issues relevant to Jersey;
- it defined the need for improved monitoring; and
- it set out measures to improve air quality.

The Strategy itself was not, however, developed further, although some of the issues identified have since been acted upon, including the replacement of the crematorium furnace. Further discussion on improving air quality in Jersey is provided later in this report.

The ***'States Strategy for 2006 to 2011'***, published in July 2006, put an Air Quality Strategy firmly back on the agenda, with a commitment to:

> *"Debate and implement in 2007 an Air Quality Strategy for Jersey, including proposals for monitoring and publishing levels of local air pollution, and targets, policies and timescales for reductions in air pollution levels that reflect best practice globally (P&E)"*
> (Paragraph 4.4.5)

The ***'Strategic Plan initiatives – progress report as at June 2006'*** reported that the item was *"On track"*, with *"no change since the last reporting period."*

The ***'Strategic Plan initiatives – progress report as at December 2006'*** reported that the item was *"Slightly behind schedule/off track - not critical - progress/improvement on last reporting period*". Adding that *"Health re-starting project for report in Q1 2007 - N.B. P&E are not the lead department."*

The ***'Strategic Plan initiatives – progress report as at June 2007'*** reported that the item had been "*Transferred to Health & Social Services"* and no other progress was reported.

The Scrutiny Panel focussed its attention during its hearings with Ministers on the lack of progress with the Air Quality Strategy and in particular the confusion as to which Department was responsible for taking it forward.

Senator Cohen, the Minister for Planning and Environment was unaware that the Air Quality Strategy had been initially identified as his Department's responsibility or that it had been transferred to Health and Social Services, as the following quotes show:

> *"… I find it a little curious that the Strategic Plan places responsibility for this area (is) with my department."…..*

> *"I do not think that the responsibilities have shifted. I think they were always, as I understand it, with the Health Protection Department and the Strategic Plan should have been more precise."….*
>
> *"… I find it very curious that we are in a position where the Planning and Environment Department effectively seems to be charged with responsibility for delivering something that is carried out by another department being the Health Protection Unit"….*
>
> *"… clearly something has got to be done because the present situation is not satisfactory."….*
>
> *"… the current arrangements from what I have seen appear to be unclear and unsatisfactory. A recommendation from the Scrutiny Panel would be most useful."*
> (Senator Cohen, The Minister for Planning and Environment, Scrutiny Panel Hearings, 23 November 2007)

Mr Newton, Director of Environment also recognised the lack of clarity as to current responsibilities for air quality:

> *"… in my opinion, there is also not clear responsibility and accountability for managing air quality in the Island."*
> (Mr Newton, Director of Environment, Scrutiny Panel Hearings, 23 November 2007).

Deputy de Faye, the Minister for Transport and Technical Services, was also unaware of where responsibility for air quality lay:

> *"I would assume the role of regulator lies with Planning and Environment. I am interested to hear you say that your latest information is that they are not aware of their control or dispute their control in this manner."*
> (Deputy de Faye, The Minister for Transport and Technical Services, Scrutiny Panel Hearings, 23 November 2007).

Senator Ozouf, the Minister for Economic Development was likewise under the impression that the Air Quality Strategy was the responsibility of Planning and Environment:

> *"… I am clear that the extent to which there is an air quality strategy for Jersey, the lead department is Planning and the Environment."*
> (Senator Ozouf, Minister for Economic Development, Scrutiny Panel Hearings, 27 November 2007).

Senator Shenton, Minister for Health and Social Services and Mr Smith, Head of Health Protection Services were, on the other hand, aware that responsibility for the Air Quality Strategy had been transferred to the Health and Social Services Department:

> *"… in terms of air quality strategy and writing the strategy, that is down to me and a team leader, …*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

They were though aware that there is confusion about responsibilities:

> *"Part of the difficulty has been that with the appearance of the then new Director of Environment in 2002 there was a perception that all environmental matters would fall within his remit, and clearly what we have seen here reflected in the States' Strategic Plan is a continued expectation that he would have overall responsibility. Practically, that has never happened."….*and

> *"This issue has been chopping back and forwards between ourselves and Planning and Environment for some time."*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

It also became clear during the Panel Hearings that the Air Quality Strategy would not be prepared according to the timetable set:

> *"… we do not have a strategy as set out in the Strategic Plan. … we are not going to have one by the end of 2007 either."*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

7. Way Forward: who should have responsibility for Air Quality?

Given the confusing position over which Department was responsible for taking forward the Air Quality Strategy and the lack of progress, both matters of considerable concern to the Panel, the Panel turned its attention to the best way to ensure that an Air Quality Strategy was taken forward. Three options were considered:

1. Whether responsibility for all Air Quality matters should be transferred to Planning and Environment;
2. Whether responsibility for Air Quality policy matters should be transferred to Planning and Environment, with Health and Social Services providing expert input on health matters and on compliance monitoring (which would be independent of the policy setting, i.e. the control would be at arms length from the policy setting)
3. Whether responsibility for all Air Quality matters should be transferred to Health and Social Services.

These areas were explored with the Ministers.

Senator Cohen, Minister for Planning and Environment, believed that the responsibility should be within his department:

> *"It would seem perfectly logical to me that air quality should be within the Planning and Environment Department."*
>
> *"… I still find it surprising that air generally appears now not to be within the remit of Planning and Environment."*
> (Senator Cohen, the Minister for Planning and Environment, Scrutiny Panel Hearings, 23 November 2007).

Mr Newton, Director of Environment felt the same:

> *"The logical approach to me … is that the monitoring of any factor that is part of the state of the environment should fall to the Environment Department. Dealing with any problems that occur as a result of that monitoring is probably a job for the Environment Department … The role of Health would logically be to advise us on the significance to human health of what we discover about he state of the environment."*
> *"(This) would be a sensible way forward to put some clarity into the roles around air quality for the future."*
> (Mr Newton, Director of Environment, Scrutiny Panel Hearings, 23 November 2007).

Mr Smith, Head of Health Protection Services, however believed that it should rest with them stating:

> *"I think we are happy to deal with it, and we are happy to get on with it. We have the expertise for it. The difficulty we do have is some of the resources that we need to put into that…"*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

Panel recommendation 2

The Panel recommends that responsibility for Air Quality policy matters should lie with Planning and Environment. To enable the Air Quality Strategy to be taken forward there needs to be clear ownership of the process and sufficient resources made available, both of which are currently lacking.

Panel recommendation 3

Health Protection Services within the Health and Social Services Department should provide technical support to Planning and Environment. This should include identifying appropriate health protection standards, developing an appropriate monitoring programme, and carrying out the necessary. enforcement activities.

Panel recommendation 4

Both the Transport and Technical Services Department and Economic Development Department have an important role to play in implementing measures identified by the Planning and Environment Department to improve air quality. Planning and Environment must therefore be supported by Transport and Technical Services and Economic Development, as well as by Health and Social Services, when developing the Air Quality Strategy and other air quality policy initiatives and legislation by way of an Inter-Departmental Panel on Air Quality.

Under recommendation 2 and 3 above, Health and Social Services would provide expert advice on health matters associated with exposure to air pollution. It would also provide an independent role in compliance monitoring and enforcement activities. Health and Social Services, Transport and Technical Services and Economic Development would be responsible for implementation of appropriate parts of the air quality strategy

developed by Planning and Environment. Planning and Environment would be expected to liaise closely with Health and Social Services, Transport and Technical Services and Economic Development during the preparation of the Air Quality Strategy, in particular over the measures to improve air quality, as well as in the preparation of the enabling legislation and, as appropriate, the subsequent Orders.

This is not without its difficulties, one being the concern expressed by Senator Cohen that the Environment Department was not properly integrated with the Planning Department:

> *"… what is more important to the Planning Department is that we increase the relevance of the Environment Department within Planning."….*
>
> *"… however much we talk about Planning and Environment we have two departments , a planning department and an environmental department. The first start would be to get them in one place."*
> (Senator Cohen, the Minister for Planning and Environment, Scrutiny Panel Hearings, 23 November 2007).

Panel recommendation 5

Planning and Environment should be given the necessary financial and technical resources to take forward the Air Quality Strategy. In the interim it would be appropriate to buy-in the necessary technical resources until such time as they are developed locally.

It will also be necessary to provide the necessary resources. This will include providing the Environment Department with the resources to ensure that the necessary expertise is available to take forward the Air Quality Strategy and the enabling legislation. Whilst this expertise is being developed in-house, it would clearly be appropriate to buy-in outside support, to ensure that the Air Quality Strategy and enabling legislation are taken forward as a matter of some urgency, as the deadline within the Strategic Plan has not been met.

Panel recommendation 6

A clear timetable should be set for the introduction of the Air Quality Strategy and associated legislation. The aim should be to have the Strategy finalised within 6 months of P&E being given the responsibilities for taking forward air quality policy, with the Enabling Legislation finalised within 12 months.

8. Improving Air Quality in Jersey

Legal Background

The submission by the Planning and Environment Department set out a number of international agreements that the States of Jersey has signed up to. It is not clear how these agreements were selected or whether or not they are being adhered to. As part of the Panels work, consideration has been given to other international agreements that the States of Jersey has not signed up to. The agreements signed up to and those not signed up to are set out in Table 1.

Table 1 International Agreements that the States of Jersey has and has not signed-up-to.

Agreements Signed-up-to	**Agreements not Signed-up-to**
1979 Convention on Long Range Transboundary Air Pollution and • Protocol 3 (Sofia) Control of Emissions of Nitrogen Oxides on their Transboundary Fluxes (NOx Protocol) • Protocol 4 (Geneva) Control of Emissions of Volatiles Organic Compounds of their Transboundary Fluxes (VOCs Protocol)	Protocols under the Convention on Long Range Transboundary Air Pollution • The 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone • The 1998 Aarhus Protocol on Persistent Organic Pollutants (POPs) • The 1994 Oslo Protocol on Further Reduction of Sulphur Emissions • The 1998 Aarhus Protocol on Heavy Metals
United Nations Framework Convention on Climate Change	International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78) Annex VI: Prevention of Air Pollution from Ships, 1997
Kyoto Protocol to the United Nations Framework on Climate Change	Stockholm Convention on Persistent Organic Pollutants, 2001.
Vienna Convention for the Protection of the Ozone Layer and Subsequent Montreal Protocol	

It is not the contention of the Panel that the States of Jersey should necessarily sign up to these agreements. The Panel does though hold the view that any agreements signed up to should be relevant to the Island and that measures should be put in place to ensure that any agreements signed-up-to are met.

It considers that it may well be more appropriate to develop a Strategy that commits the States of Jersey to meeting certain (not necessarily all) air quality standards and other obligations established by the UK Government and/or by the European Union.

Evidence gathered shows that the States of Jersey has very limited legislation in place to ensure that air quality is adequately controlled:

> *"… quite simply … the only legislation we have at present that covers air quality is the Statutory Nuisance Law, which is really around point sources."*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

> *"I would also say there is no regulatory regime whatsoever for anybody to intervene in that process (Bellozanne), other than the slightly tenuous route that health protection have through the nuisance law …"*
> (Mr Newton, Director of Environment, Scrutiny Panel Hearings, 23 November 2007).

The Panel received evidence that basic legislation should be put in place as a matter of some priority to underpin measures to deal with air quality:

> *"The Control of Pollution Law … is the law we were looking to introduce which would bring in many of the other controls that you would expect to see in the jurisdiction around providing for compliance with E.U. directives or Daughter directives around particular pollutants."*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

The Panel is strongly of the view that enabling legislation should be put in place setting out the approach to dealing with air quality in Jersey. It is suggested that the Environment Act 1995 in the UK could provide a model for the legislation required. Once in place, the legislation can be supplemented by Orders dealing with specific matters. Examples of areas in which Orders could be made include:

- Annual vehicle emission tests on commercial vehicles over 5 years old.
- The setting of air quality standards not to be exceeded.
- The requirement to review air quality annually.
- Restriction of coal burning to smokeless fuels, within St Helier.

Panel recommendation 7

The Panel recommends that consideration be given to these international agreements when the Air Quality Strategy is being developed. The Air Quality Strategy should be supported by enabling legislation, which will subsequently allow Orders to be made as and when necessary. Such Orders could include requirements for burning smokeless fuels within St Helier and a requirement for emissions testing of all commercial vehicles over 5 years old.

9. Measures Implemented to Improve Air Quality

In this section, the improvements in air quality in Jersey are examined. The pollutant sources identified in the 2003 report setting out the basis of an Air Quality Strategy for Jersey provide the starting point. This report identified nitrogen oxides, coming mainly from motor vehicles, as the principal pollutant of concern. These emissions give rise to high concentrations of nitrogen dioxide found near to busy roads, especially in the narrow congested streets in St Helier. Other sources identified were the power station at La Collette, the municipal waste incinerator at Bellozanne, the crematorium, small industrial sources, aviation, shipping and agriculture.

Road Traffic

Monitoring is carried out for nitrogen dioxide at a number of sites around the Island using diffusion tubes. These are indicative samplers that do not meet the strict standard required for checking compliance with the EU Directive limit values. The results over the period 2000-2006 are summarised in Table 2.

Table 2 Annual Mean Nitrogen Dioxide Concentrations 2000-2006. Units microgrammes per cubic metre ($\mu g/m^3$)

	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**
Beaumont (kerbside)	35	36	35	42	34	37	30
All Kerbside & Roadside	34	34	36	38	33	33	28
All Urban Background	21	21	23	26	22	22	20
All Residential Background	13	12	14	17	13	14	12

The values are taken from the report Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2006. They have been adjusted for diffusion tube bias using the national database of bias adjustment factors (v09/07) available at www.uwe.ac.uk/aqm/review/. (This differs from the adjustment applied in the 2006 Report but is considered to be the most appropriate basis for adjusting diffusion tubes in Jersey.)

These results show that background air quality is good, but concentrations are much higher close to roads. Concentrations were highest in 2003, which was a common feature across the UK, due to the weather conditions in that year. There is no apparent trend at the background sites, but some evidence of a downward trend at the roadside sites over the full period. Concentrations at kerbside and roadside sites are close to the

standard of 40 μg/m^3, with the evidence from these indicative monitors being that it was exceeded at the Beaumont site in 2003.

The 2003 report recommended that continuous monitoring be carried out for nitrogen dioxide and PM_{10} using instrumentation complying with EU standards. The Minister for Health and Social Security reported to the Panel that no progress had been made on obtaining funding for such monitoring equipment:

> *"… there was a proposal for monies from the environment vote back in 2002 towards providing an air quality monitoring station. That never materialised. We have tried to address resources through growth bids within Health and Social Services but clearly because of the nature of the organisation (we) work within, care and repair of individuals have to take priority over some of the stuff that we do. So there is a conflict of interest for the organisation in trying to assist us."*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

The Panel notes that the Transport and Technical Services Minister does not see it as the rôle of his Department to propose any measures specifically to deal with air quality. The Panel is of the view that air quality policy, including the Air Quality Strategy, should be the responsibility of the Planning and Environment Department. This would include the development of measures to improve air quality within the transport sector.

The Panel received evidence from Mr. P. Chapman from 'Soltron', a company who produced a product brand named 'X-Mile':

> *"The enzyme seems to help the fuel to ignite properly, giving a better fuel economy and lower emissions."*
>
> *"…. we had one pump with X-Mile in and we did a back-to-back before and after emission testing and in every single vehicle we were reducing hydro carbons on the metre, averaging 50%."*
>
> *"… most of our test drivers were taxi drivers. They were reporting back between 7% and 10% fuel economy and, now that they have used it longer, they are coming in and saying it is over 10%."*

The Panel notes that the stocking and provision of this product would assist the Island in reducing emissions from private and public motor vehicles. Consideration would also be worthwhile for its use in all States vehicles.

Waterfront

Considerable development is planned for the Waterfront. This has proved a challenge for the system to ensure that environmental issues, including air quality, are addressed properly. The Panel has been concerned that the system is only designed to deal with

developments in a piecemeal way, as and when they arise. Mr Smith, Head of Health Protection considered that one way to achieve the necessary holistic approach would be to carry out a Strategic Environmental Assessment:

.

> *"… there does need to be a strategic environmental assessment for the whole of the waterfront."*
> (Mr Smith, Head of Health Protection Services, Scrutiny Panel Hearings, 23 November 2007).

Senator Shenton noted that:

> *"… this has been brought to the attention of the Planning Minister."*
> (Senator Shenton, the Minister for Health and Social Services, Scrutiny Panel Hearings, 23 November 2007).

Strategic Environmental Assessments of plans and policies are now a requirement of Member States within the European Union. The Panel supports the need for a Strategic Environmental Assessment for the development of the Waterfront.

Panel recommendation 8

Considerable development of the Waterfront in St Helier is taking place or planned, yet the air quality impacts are being assessed in a piece-meal way. A Strategic Environmental Assessment should be carried out for this area to address the cumulative impacts of the various developments.

Power Station

The power station at La Collette is now a minor source of pollution. The Jersey Electricity Company (JEC) reported that the station is only run for around 1000 hours a year, i.e. less than 20% of the year. This is because electricity is now supplied mainly by cable from France. This capacity is soon to be extended with the addition of a third cable. The power station, when operational, burns heavy fuel oil, but with a sulphur content restricted to less than 1.5%. There is no evidence that concentrations of sulphur dioxide exceed the short-term standards – 15-minutes in the UK and 1-hour in the EU.

Bellozanne Incinerator

The Municipal Waste Incinerator at Bellozanne has long been known to be operating outside EU standards. This incinerator would not be allowed to operate in the UK. This was clearly identified in the 2003 Strategy report and is recognised by Mr Newton, Head of the Environment Department:

> *"… the outputs from the Bellozanne plant are unacceptable in this modern time."*

(Mr Newton, Director of Environment, Scrutiny Panel Hearings, 23 November 2007).

Investigations have taken place to replace the incinerator, with a proposal under consideration for a plant to be built at La Collette, with the emissions being discharged via spare flues within the JEC chimney. This would not be in place until 2010 at the earliest. No consideration appears to have been given to cleaning up the feed to the existing plant to minimise emissions meanwhile.

Crematorium

The 2003 report identified that the crematorium on the Island was not operating to standards that would be expected elsewhere in the UK in terms of its emissions. Since then new plant has been installed such that the crematorium now meets current standards.

Shipping

The Economic Development Department is responsible for the harbour. It reported to the Panel that nothing direct has been done to reduce emissions from the shipping using Jersey Harbour. However, it was reported to the Panel that the ferries using the harbour burn gas-oil, which has a low sulphur content and not heavy fuel oil that has a very high sulphur content. It was also reported to the Panel that the EU standard for the sulphur content of gas-oil was being tightened and thus emissions should reduce further. No exceedences of UK and EU air quality standards have been identified as being associated with shipping activities.

The Panel noted an article in the New Scientist magazine on 17 November 2007 headed "Death on the Ocean Waves" discussing emissions from the shipping industry in an article by James Corbett of the University of Delaware. The article makes a connection between deaths from heart or lung failure to fuel quality used in the shipping industry. The Panel noted that 'Soltron' had been involved with tests with Stena Line, a company which is running Dutch deep sea fishing boats, on a six month trial, where the company were interested in achieving a 1% fuel economy and, in view of the possibility of prosecutions for excessive emissions in Holland, they were also interested in a 1% cut in emissions.

After six months, fuel economies of 8% to12% had been achieved, with a proportionate cut in emissions.

Aviation

The Economic Development Department is also responsible for the airport. The Panel was supplied with a report setting out measures that have been introduced at the airport to help reduce emissions.

Other Sources

The Panel gave some consideration to the use of domestic coal. It was reported to the panel that imports had steadily declined. Currently around 2,500 tonnes of coal are imported each year. It is not known what proportion, if any, is smokeless fuel. The evidence from the UK is that except at a few locations where domestic coal burning is widespread, there are no exceedences of air quality standards. This includes the UK's 15-minute objective for sulphur dioxide, which is more stringent than EU limit values. Coal burning on the Island is thus not considered to give rise to air quality problems in relation to health protection standards, although it could give rise to local concerns about nuisance.

Since the 2003 report, composting of green waste has been introduced into the Island at La Collette. This is open windrow composting that gives rise to emissions of odours and bioaerosols when the material is turned. The UK Government recommends a 250 m standoff distance in order to protect against potential health effects of bioaerosols. Odours can extend further than this, and complaints have been received from residents within 1 km of the facility. Open composting is being replaced in the UK with in-vessel composting, which allows the gasses to be treated before they are emitted. Deputy de Faye reported to the Panel that:

> *"It is the intention of the Transport and Technical Services Department to discontinue the open windrow facility and replace it with an enclosed composting facility as soon as possible."*
>
> Although he also reported that:
> *"… due to unfortunate set of political circumstances the department is being prevented from pursuing that particular course of action"*
> and that:
>
> *"… all I can do is only so much and within all I can do I have to do things within the level of priorities. … but I have to make it clear that it is highly likely that other things will receive a higher priority."*
> (Deputy de Faye, The Minister for Transport and Technical Services, Scrutiny Panel Hearings, 23 November 2007).

The issue of bonfire smoke was raised in several of the submissions to the Panel. Bonfires are principally an issue of nuisance, although the smoke from bonfires should not be considered as benign. Measures should be included in the Air Quality Strategy to minimise the use of bonfires. This should include banning the use of burning on construction sites.

The issue of odours from the sewage treatment plant was also raised in one of the submissions to the Panel. This is considered to be an issue of nuisance, which is

covered under the Statutory Nuisances (Jersey) Law 1999. Deputy de Faye informed the Panel that:

> *"… I have fast tracked the work on Bellozanne sewerage works so that it will commence next year in terms of attenuation of the aroma problem."*
> (Deputy de Faye, The Minister for Transport and Technical Services, Scrutiny Panel Hearings, 23 November 2007).

10. UK and EU Approach to Delivery of Good Air Quality

This section summarises the key aspects of the approaches adopted by the UK and the EU to assess, manage and improve air quality. Its aim is to provide a context within which the States of Jersey can develop and implement its own approach to air quality management. It is not designed to provide a comprehensive review. For further details it is recommended that the following three documents are consulted:

- The Pollution Control Handbook, published annually by Environmental Protection UK (formerly the National Society for Clean Air) - see www.environmental-protection.org.uk.
- The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, published by Defra in July 2007 – see www.defra.gov.uk/environment/airquality/strategy.
- The Thematic Strategy on Air Pollution, published by the European Commission in 2005 as part of its Clean Air for Europe programme – see ec.europa.eu/environment/air/cafe/index.htm.
-

In addition, reference can be made to the following guidance documents and websites, which provide support to the air quality management duties of local authorities in the UK.

- Policy Guidance LAQM.PG(03), Technical Guidance LAQM.TG(03) and Local air quality management progress report guidance, Defra - see www.defra.gov.uk/environment/airquality/local/guidance/index.htm
- Development Control: Planning for Air Quality, November 2006, Environmental Protection UK (formerly the National Society for Clean Air) - see www.environmental-protection.org.uk.
- Review and Assessment Helpdesk – see www.uwe.ac.uk/aqm/review
- Action Planning Helpdesk – see www.airquality.co.uk/archive/actionplan.php
- Local Authority Support Helpdesk (monitoring, modelling and emissions) – see www.laqmsupport.org.uk

Key elements of the approaches in both the UK and the EU are:

- the formal adoption of air quality standards. These define the adequacy of the air quality and the need for actions to improve air quality;
- the monitoring of air quality against these standards using appropriately quality assured methods;
- the preparation and implementation of plans to improve air quality where standards are exceeded;
- the use of legislation to regulate emissions from new and existing sources, including industrial plant and motor vehicles; and
- the development of an Air Quality Strategy establishing the overall approach to air quality management.

11. UK Approach

The legislative base to air quality is provided essentially by means of four Acts of Parliament:

- The Environmental Protection Act 1990.
- The Clean Air Act 1993.
- The Environment Act 1995.
- The Pollution Prevention and Control Act 1999.

The Department for Environment, Food and Rural Affairs (Defra) has overall responsibility for air quality management at the national level. Responsibility for control of major industrial processes is devolved to the Environment Agency in England and Wales. Local Authorities have responsibility for local controls, including those for smaller industrial sources.

The Environmental Protection Act 1990

This Act set out the responsibilities and procedures for the control of major industrial sources of pollution. Her Majesty's Inspectorate of Pollution (subsequently the Environment Agency) was responsible for implementation of the industrial controls under Part 1 of the Act, with local authorities implementing the controls for smaller industrial sources. Part 3 of the Act set out the framework for dealing with nuisance.

The Clean Air Act 1993

This Act sets out the responsibilities and measures for the control of smoke emissions for sources, including domestic sources, not covered under the Environmental Protection Act 1990.

The Environment Act 1995

This Act sets the framework for air quality assessment and management in the UK. There are three key elements to this:

- the national approach, which is strongly related to EU legislation. This includes the implementation of EU requirements to monitor air quality and to limit emissions, in particular from industrial and motor vehicles;
- the establishment of a set of air quality objectives for key air pollutants. These take account of EU limit values and World Health Organisation Guidelines; and
- the system of local air quality management designed to supplement national measures within local hotspots.

The Pollution Prevention and Control Act 1999

This Act deals with the emissions from industrial processes and will eventually supersede Part 1 of the Environmental Protection Act 1990. It introduces procedures requiring permits to be issued for the operation of these processes. In England and Wales it is being implemented by the Environment Agency, with local authorities being

responsible for issuing permits for smaller industrial processes. The Act covers the requirements of the EU Directive on Integrated Pollution Prevention and Control.

12. EU Approach

The EU established the Clean Air for Europe (CAFÉ) programme in 2001. In 2005 it published a Thematic Strategy for Air Pollution setting out in broad terms the approach to be adopted to improve air quality across the EU. The approach includes:

- the adoption of air quality limit values and targets for key pollutants and dates by which they are to be met;
- the requirement to monitor and assess against these limit values and targets; and
- the requirement to develop plans and programmes to improve air quality where the limit values and targets are not expected to be met by the requisite date.

A number of other measures have been adopted by the European Commission to help ensure that the limit values and targets will be met throughout the EU. These include:

- the setting of national ceilings for emissions of a number of pollutants – the Member State is free to choose what controls to implement to meet these ceilings;
- the implementation of Integrated Pollution Prevention and Control to regulate emissions from major industrial sources; and
- the setting of emissions standards for new vehicles.

13. Examples of Good Practice

The air quality issues faced by the more rural local authorities within the UK provide a useful parallel to those faced by the States of Jersey. It is therefore appropriate to examine aspects of good practice within such authorities.

The Action Planning Helpdesk website (www.airquality.co.uk/archive/actionplan.php) contains examples of good practice by local authorities in the UK in developing air quality action plans. The South Lakeland District Council's Air Quality Action Plan is a relevant example, as this covered measures to deal with a traffic related hotspot in the town centre of Kendal in the Lake District. Monitoring had identified many occasions when the nitrogen dioxide objective in a narrow canyon like street had been exceeded. This was supplemented by modelling, which helped identify the sources that needed to be focussed upon. To help prepare the Action Plan the Council established a Steering Group, which included different Council departments and outside organisations. The Council considered a wide range of options, which did not just focus on the street where the objective was being exceeded, but extended to the whole of the town. A package of measures was adopted as part of the Kendal Transport Plan, including work travel plans; adjustment of the traffic flow system in the town centre; increased cycle network provision; revision of off-street parking charges; bus activated signals; and computer controlled (SCOOT) junction signals.

Key messages from this example are the need for departments to work together, in this case via a steering group, and that there is no one solution, but a package of measures is required.

14. Monitoring Requirements for Jersey

The Panel has been made aware that the current air quality monitoring programme in Jersey is inadequate. The key pollutants identified by the Panel are nitrogen dioxide and particulate matter (PM), with the local sources being emissions from motor vehicles. Particulate matter is currently represented by standards for PM_{10}, particulate matter less than 10 micrometres in diameter. There is a growing recognition that smaller particles are more significant in terms of their health effects, and both the UK and the EU are adopting standards for $PM_{2.5}$, particulate matter less than 10 micrometres in diameter. These will supplement the standards for PM_{10}, which are to be retained.

It is therefore appropriate to consider suitable measurement methods for both nitrogen dioxide and PM and a programme for monitoring both pollutants.

Methods for Nitrogen Dioxide

The reference method for measuring nitrogen dioxide in the EU is the automatic chemiluminescence analyser. This draws air into the instrument continuously, with the results usually logged as 15-minute average concentrations. This instrument needs to be located in an air conditioned housing.

In addition to the automatic monitors, the UK also makes widespread use of diffusion tubes. These are small plastic tubes 7 cm long and 1 cm in diameter, with a cap over one end holding a stainless steel grid that is coated in a chemical that absorbs nitrogen dioxide. The tubes are placed with the open end facing down and the nitrogen dioxide diffuses up the tube. After exposing the tube for a period of one month the open end is capped and the tube returned to the laboratory for analysis. The result reflects the average concentration over the month. These tubes are less accurate than automatic monitors, although they provide reasonable results for an annual mean. Their advantage is that they are relatively cheap and they are easy to locate. It is thus possible to have a relatively large network of monitors, which can be useful in identifying hotspots. They are not suitable for demonstrating compliance with EU limit values.

Methods for Particulate Matter

The reference method for particulate matter, either PM_{10} or $PM_{2.5}$ is a gravimetric method, which involves drawing air through a pre-weighed filter for 24-hours then returning the filter to the laboratory for re-weighing. The difference in weight before and after sampling representing the amount of PM collected over the 24-hours. This method is not widely used as it has two disadvantages. It is relatively labour intensive and it only provides results several days or weeks after the monitoring. Also by only giving 24-hour concentrations, rather than 1-hour concentrations, it provides less information to help determine the local sources contributing to the PM.

A number of automatic methods for measuring PM have been developed that overcome the limitations of the reference method:

- the tapered element oscillating microbalance (TEOM);
- the beta attenuation monitor (BAM); and
- optical methods, e.g. the Osiris.
-

There is a problem with these methods in that detailed comparison studies have shown that they generally do not give results that equate to the reference method. Work in the UK has shown that a modified version of the TEOM (called the FDMS-TEOM) and certain BAM monitors with adjustment factors are equivalent to the reference method. The optical methods, such as the Osiris, are not equivalent, and are thus only suitable for screening purposes.

Monitoring Programme

Jersey has an ongoing monitoring programme for

- nitrogen dioxide using diffusion tubes at 21 locations and a chemiluminescence automatic monitor at 1 location;
- PM using Osiris optical monitors at 2 locations; and
- benzene, toluene, and xylene using diffusion tubes at 6 locations.
-

As noted above, the results from this monitoring can only be considered to be indicative, and cannot strictly be used for comparison with the standards. Periods of monitoring have been carried out in Jersey using automatic monitors for nitrogen dioxide and PM_{10}. The PM_{10} monitoring was however carried out using a TEOM analyser, which is now not accepted as giving reliable results.

The Panel recommends that air quality monitoring in Jersey should be improved by establishing a long-term monitoring site within St Helier to measure nitrogen dioxide using a chemiluminescence monitor and PM concentrations using a method equivalent to the reference method. The PM could be measured either as PM_{10} or $PM_{2.5}$, but the view of the Panel is that it is probably more appropriate to monitor $PM_{2.5}$. The results from the automatic monitors should then be made directly available to the public via the web.

The reason for proposing a long-term monitoring site is that the key standards for both pollutants are aimed at limiting long-term exposure, rather than short-term peaks. Annual mean concentrations can only be reliably established by monitoring over a full year. A period of 6 months is the minimum duration for monitoring recommended in the UK to give a reasonable indication of an annual mean.

Identification of long-term monitoring sites can be challenging. While a roadside site is useful for identifying the highest concentrations and the risk of exceeding the standards, there is the possibility that local decisions on traffic management can suddenly alter the characteristics of the site. In many respects a more suitable site would be an urban background site, at a location where the highest background concentrations are expected. Such a site would be more suitable for identifying long-term trends in concentrations, and identifying successes in improving air quality.

Panel recommendation 9

Monitoring of air quality forms an integral part of the Air Quality Strategy. There needs to be a long-term commitment to a programme of air quality monitoring. This should include use of equipment that meets EU standards, supported by other indicative methods where appropriate.

Panel recommendation 10

The Panel has not formed a strong view on the type of monitoring site to select, and this should be subject to further consideration, by the relevant departments.

Panel recommendation 11

The Panel also recommends that consideration be given to acquiring a second automatic monitoring station that could be used to monitor nitrogen dioxide concentrations at hotspot locations.

Panel recommendation 12

Finally, the Panel recommends that the automatic monitoring programme should be supplemented by the continued use of nitrogen dioxide diffusion tubes and the Osiris PM monitors. It would be appropriate to carry out a review of all the monitoring locations, changing them and adding to them as necessary, and of Quality Assurance / Quality Control procedures. The Panel sees no value in continuing the monitoring programme for benzene, toluene and xylene, as the results have been shown to be well below the standards.

Appendix 1

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Island Plan 2002 - Assessment of Proposed Energy from Waste Facility against Planning Policies (Part i)
Island Plan 2002 - Assessment of Proposed Energy from Waste Facility against Planning Policies (Part ii)
Energy from Waste Facility - App 4 - Outline Design Statement
Solid Waste Strategy - Technology Review
Appendix 6 - Air Quality - Wind Roses for Jersey Airport
Jersey Energy from Waste Plant - Review of La Collette Site
Energy from Waste Facility - Landscape Philosophy
Baseline Eco Assessment - Land at La Collette (Feb 2006)
Energy from Waste Facility - Noise Assessment (Nov 2006)
Noise Readings for TA Caretakers Flat
Noise readings for Waste Facility
Jsy Waste Strategy Traffic Impact Study - Appendix 11
Energy from Waste & Bulky Waste Facilities - Environmental Impact Statement - Vol 1 - Non Technical Summary (Jan 2007)

Appendix 2: Public Hearings

23rd November 2007

Senator F. Cohen, Minister for Planning and Environment
Deputy G. De Faye, Minister for Transport and Technical Services
Senator B. Shenton, Minister for Health and Social Services
Mr. M. Liston, Managing Director Jersey Electricity Company

26th November 2007

Mr. P. Chapman, X-Mile
Mr. Trevor Du Feu and Mr. Mark Le Brocq of Huelin Renouf

27th November 2007

Senator P. Ozouf, Minister for Economic Development and Deputy A. MacLean, Assistant Minister.

Appendix 3

Written submissions were received from: -

Letter from Mrs V Aygun, Up & Above
Jersey Airport Environmental Policy 2006
Letter from Mrs A Clark
Planning and Environment Submission
Health Protection submission
Letter from Keith Shaw
M Liston JEC
X-mile Folder
Ferryspeed
Mr R Le Seelleur
Chris Washington
Mr J Gillard
Minister EDC
Health Protection submission
Jersey Gas
Huelin-Renouf Shipping Limited

Appendix 4

Professor Duncan Laxen

Air Quality Consultants

Current Position:	Managing Director of Air Quality Consultants Ltd.
Year of Birth:	1949
Nationality:	British
Qualifications:	BSc Environmental Sciences (1971) MSc Environmental Sciences (1975) PhD Air Pollution Chemistry (1978)

Positions Held:

- Member of National Society for Clean Air (NSCA) Technical Committee (1988-97), Air Quality Committee (1995-current) and Council (1993-2003). Co-ordinator of National Society for Clean Air Local Air Quality Management Initiative (1993-95)
- Member of Environmental Issues Committee for PTRC Transport and Planning Summer Annual Meetings (1990-96)
- Member then Deputy Chair of Confederation of British Industry Wessex Environmental Committee (1991-93)
- Member of UK Government's Photochemical Oxidants Review Group (1985-94)
- Member of UK Government's Quality of Urban Air Review Group (1992-97)
- Member of EC Working Group on Airborne Particles (1995-2004)
- Member of EC Working Group on Ozone (1997-99)
- Member of EC Working Group on Guidance (1999-2000)
- Member of EC Working Group on Implementation (2002-2004)
- Member of EC Clean Air for Europe Steering Group (1995-current)
- Member of Air Quality Management Resource Centre Steering Committee, University of West of England (1998-2003)
- Chair of DfT's Monitoring Panel supporting work on Model Development for Heathrow Airport (2004-2006)
- Visiting Professor in Air Quality Management and Assessment, University of the West of England (2002-current)
- Member of UK Government's Air Quality Expert Group (2002-current)
- Member of UK Government's Committee on the Medical Effects of Air Pollutants (2003-current)

Key Experience:

Over thirty years experience in environmental sciences. Involved in major studies of air quality, including nitrogen dioxide, lead, dust, acid rain, PM_{10} and ozone. Responsible for setting up UK enhanced urban air quality monitoring network. 'Responsible for appraisals of all local authorities' air quality Review & Assessment reports. Carried out air quality assessments for power stations; road schemes; ports; airports; railways; mineral and landfill sites; and residential/commercial developments. Involved in numerous investigations into industrial emissions; ambient air quality; nuisance dust and transport emissions. Prepared specialist reviews on air quality topics. Contributed to development of air quality management in the UK. Expert witness at numerous Public Inquiries. Published over 70 scientific papers and given numerous presentations at conferences.

Employment Record:

1993- date	**Managing Director, Air Quality Consultants Ltd.** Established new company
1983-1993	**TBV Science** (now Casella Stanger), Assistant Director with responsibility for environmental consultancy. Previously Manager of Air Quality Department
1983-1989	**Research Consultant, Edinburgh University** Adviser to Edinburgh Lead Study.
1980-1983	**Research Fellow, Edinburgh University** Principal Investigator for study of trace metal behaviour in freshwaters
1978-1980	**Research Associate, Lancaster University** Responsible for study of heavy metal chemistry in polluted waters.
1973-1974	**Research Assistant, Lancaster University** Field work for study of hydrology of upland catchments.

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Deputy R. Duhamel
Scrutiny Panel Chairman
Environment Scrutiny Panel
Scrutiny Office
States Greffe
Morier House
St Helier
JERSEY
JE1 1DD

16 October 2007

Our ref: HP/AP/Scrutiny Response
Your ref: 514/2 dated 3 October 2007

Dear Deputy Duhamel

Environment Scrutiny Panel – Air Quality Review
Health Protection Services Submission

BACKGROUND

1. Background Papers. The reports listed A to N below provide the context to air quality in Jersey. If for some unknown reason you do not have copies of these documents please contact me as soon as possible.

A. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 1997.
B. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 1998.
C. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 1999.
D. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2000.
E. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2001.
F. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2002.
G. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2003.
H. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2004.
I. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2005.
J. Air Quality Monitoring in Jersey; Diffusion Tube Surveys, 2006.
K. An Air Quality Strategy for Jersey, A report produced for the States of Jersey, AEA Technology, April 2003.
L. Report on Turnkey Osiris Particle Results at the Market, Havre Des Pas and Bellozanne Valley Sites in Jersey for 2006, Health Protection, Public Health Department (A Irving *et al*), February 2007.
M. Consultation Paper, Integrated Travel and Transport Plan for Jersey, Action Plan 2007 to 2011, Executive Summary, Transport and Technical Services Department, 2007.
N. Guidelines on Noise Control for Construction Sites, Health Protection, February 2004.

2. Strategic Plan. The entry in the States Strategic Plan relating to air quality is shown below:

"4.4.5 In 2007; debate and implement an Air Quality Strategy for Jersey, including proposals for monitoring and publishing levels of local air pollution, and targets, policies and timescales for reductions in air pollution levels that reflect best practice globally (P&E)"

The objective was erroneously attributed to the Planning and Environment Department; unfortunately the Public Health Department were not party to the drafting process or its content. The August 2007 update from Planning and Environment is shown below:

4.4.5	In 2007; debate and implement an Air Quality Strategy for Jersey, including proposals for monitoring and publishing levels of local air pollution, and targets, policies and timescales for reductions in air pollution levels that reflect best practice globally (P&E)		HPD to provide. P&E are not the lead department

The Health Protection Services update provided during August 2007 is shown below:

4.4.5	In 2007; debate and implement an Air Quality Strategy for Jersey, including proposals for monitoring and publishing levels of local air pollution, and targets, policies and timescales for reductions in air pollution levels that reflect best practice globally (P&E)		UK Air Quality Strategy 2007 published July 2007; objectives revised and implications need to be assessed (update provided by HSS Community Health Team).

A draft progress summary produced for the Chief Minister's Department is shown below:

"4.4 Clean air, clean water and uncontaminated land

What we measured:

4.4a Air Quality

Why it is important:

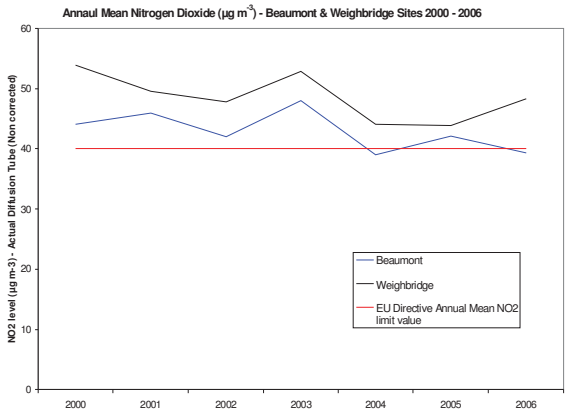
The visible contamination of our atmosphere is obvious; smoke, dust, exhaust fume and grit can be seen or smelt. The invisible pollution affecting the atmosphere, by its very nature, is less obvious. You don't have to be outside to be exposed to poor air quality. Most aerosols will contain chemicals, especially cleaning products; added to combustion products from gas or oil and the potential exists for a cocktail of chemicals to build up both in and outside the home. The Public Health Department are intent on measuring ambient air quality; unfortunately the work is expensive and the Department are unable to measure 6 of the 8 pollutants to the approved EU standard without Plant have all acted to reduce pollution. Vehicle traffic remains the significant unaddressed source of pollution; measurements suggest pollution shows no signs of going into long term decline. With the significant developments planned for the harbour area it is likely that pollution levels will increase over the short term; un-corrected levels will continue to be above the EU limit for protecting human health. Without investment in EU type approved monitoring equipment accurate assessments of air quality will be limited.

Performance:

added investment.

What was achieved:
The EU has generic indicators of air quality; the measurement of each has to be against an approved EU reference standard. The Health Protection team have been screening oxides of nitrogen (NO_x) since 1997; unfortunately the NO_2 (actual) results show the EU annual mean limit being breached at both the Weighbridge and Beaumont Street sites.

The replacement of the Crematoria cremators, reduced dependence on oil fired electricity generation and significant progress in the procurement of a new Energy from Waste



Source: Health Protection Services Department"

3. Health and Social Services Department Business Plan. Objective 6 for the Public Health Directorate is outlined as follows*:

	Key Objective	Key Performance Indicators	Target	Imp Year	Key Risks	SSP Ref
6	Protect Islanders against significant environmental hazards.	• Waste disposal strategy health impact assessment (HIA) commissioned and completed • St Helier air quality monitoring in place. • Contaminated land strategy completed.	Match EU directives for air quality standards	07	Capital funding HIA not accepted by community / politicians Reactive workloads and staffing pressures	4.4 2.10

4. Legal Framework.

Since the World Health Organisation first published its Air Quality Guidelines for Europe in 1987, the European Union (EU) and Member states have been working on a programme of measures designed to protect the public and environment from the affects of poor air quality. Over the years the EU has passed framework directives with subsequent daughter directives aimed at setting limits for certain key pollutants. In the UK this work has evolved into the 2007 Air Quality Strategy for England, Scotland, Wales and Northern Ireland (The UK Air Quality Strategy). The Strategy is supported by detailed guidance and underpinned by primary legislation.

The States of Jersey have not followed this same legislative approach to the review and assessment of air quality. Issues relating to air quality can only be considered under The Statutory Nuisances (Jersey) Law 1999. The UK Air Quality Strategy sets out leading practice in the review and assessment of air quality and it is the reference used by Health Protection Services in comparing and reporting its findings.

5. Progress in Implementing the Air Quality for Jersey.

The Health Protection Department commissioned AEA Technology to produce a health based draft Air Quality Strategy for Jersey to improve the island's air quality. The final

* Health and Social Services 2007 Business Plan, Directorate of Public Health, Objective 6, Page 27/28.

draft was submitted to the Health Protection Service in July 2002; this was a screening document that consolidated much of the monitoring data collated over the preceding 5 years. The draft strategy was presented to the former Health and Social Services Committee at its meeting on the 16th September 2002; they endorsed the principles and recommendations contained therein. A subsequent revision took place in 2003 following consultation with other departments and the addition of further monitoring results.

The strategy highlighted a number of aspects of concern:

a. The emissions from the non-conforming Bellozane waste incinerator.

b. Emissions from the JEC Power Station at La Collette.

c. Emissions from the Islands Crematoria.

d. Emissions from road traffic; which was considered the main source of fugitive air pollution on the Island.

Since the reports' endorsement Officers have worked using the resources available to ensure the integration of the recommendations into various States Departments initiatives.

The States Strategy for Solid Waste has been produced and debated in the States Assembly in 2006 with the intent to replace the Bellozanne plant with a new Energy from Waste plan by 2010. The JEC Power Station now runs for a limited period during the year due to the existing two French electricity links. This has resulted in a substantial reduction in emissions; a third connection is currently being commissioned. The Health and Social Services Department has replaced the old crematoria with new plant meeting current emissions standards. This leaves vehicle emissions, oxides of nitrogen in particular, as the principle pollution source to be addressed from the Strategy's recommendations.

Transport and Technical Services Department are currently consulting on the Integrated Travel and Transport Strategy for the Island. The proposals contained in the draft action plan for this document delivers all of the remaining objectives from the Air Quality document in relation to traffic. With the delivery of this strategy it is expected that vehicle emissions island wide will reduce, with the intention of bringing borderline kerbside and roadside air quality levels within the Air Quality Standards.

The only other outstanding item from the Strategy is the long term monitoring of air quality to show definitive compliance with EU standards. Health Protection Services continue to use diffusion tubes to monitor levels of Nitrogen Dioxide (NO_2); in addition to this a NO_2 analyser has been sited on the Halkett Place façade of the Market but these are limited in their ability to determine definitive compliance with EU Directives.

Gathering good quality long term data is an essential part of managing air quality; growth bids within Health and Social Services for equipment aimed at expanding our breadth of knowledge have yet to be successful. However, Health Protection Service has been seeking, through the planning application process, that applicants consider air quality and where necessary monitor in the vicinity of their sites to quantify the impact of their development and take appropriate remedial measures. An example of this is the letter regarding Esplanade Quarter, shown at Annex A, and the resulting report on the

Esplanade Quarter proposal, shown at Annex B. (**Annexes A and B are not to be released to the public**)

6. Air Quality Monitoring Budget. The approximate cost[†] of the current air quality monitoring programme per annum is outlined as follows;

a. Diffusion Tube Surveys - £9500

b. Nitrogen Oxide Analyser - £1200[‡]

c. Particulate Monitoring[§] - £1500[**]

d. Bio-aerosol monitoring - £250[††]

Capital growth bids for an OPSIS Air Quality monitoring system were submitted in 2006 and 2007; neither bid being successful and as such no additional funds have been allocated to air quality monitoring for 2008.

In 2005 air quality monitoring was reviewed by the Health and Social Services Committee; the agreed sum of £35000 to purchase type approved monitoring equipment was not released by the Planning and Environment Department. The background detail is shown at Annex C.

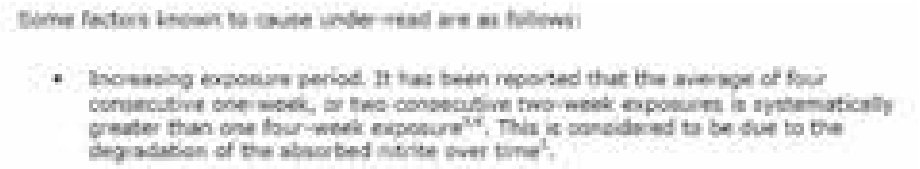
7. Current Monitoring Programme. The following air quality monitoring activity is underway:

a. **Diffusion Tube Survey**. The NO_2 and hydrocarbon annual survey, running since 1997, continues during 2007. The Guidance Note for UK Local Authorities[‡‡] reiterates the limitations of NO_2 diffusion tubes. In particular it must be noted they are a screening tool, not type approved for direct comparison with the EU health based air quality limits[§§]:

> NO_2 diffusion tubes are an indicative monitoring technique; although ideal for screening studies and for identifying areas of high concentration, they do not offer the same precision and accuracy as the automatic chemiluminescent analyser (which is defined by the European Union as the reference method of measurement for this pollutant). In particular, NO_2 diffusion tubes are affected by several mechanisms, which may cause them to exhibit positive bias (over-read), or negative bias (under-read) relative to the reference technique.

In Jersey four weekly exposures are used[***]:

[†] Cost does not include Officer or administrative costs.
[‡] Cost includes calibration gasses, analyser calibration & maintenance costs plus shipping charges.
[§] Not type approved measurement technique for comparison with EU Air Quality Limits
[**] Cost is for the calibration, maintenance and shipping costs associated with 2 x OSIRIS units. The cost does not include filter analysis at £85 - £250 per filter.
[††] Annual calibration cost.
[‡‡] NO_2 Diffusion Tubes for LAQM: Guidance Note for Local Authorities, Prepared for DEFRA and the Devolved Administrations, AEAT/ENV/R/2140/Issue 1 March 2006
[§§] Page 4, para 1, NO_2 Diffusion Tubes for LAQM: Guidance Note for Local Authorities, Prepared for DEFRA and the Devolved Administrations, AEAT/ENV/R/2140/Issue 1 March 2006
[***] Page 4, para 7, NO_2 Diffusion Tubes for LAQM: Guidance Note for Local Authorities, Prepared for DEFRA and the Devolved Administrations, AEAT/ENV/R/2140/Issue 1 March 2006



Some factors known to cause under-read are as follows:

- Increasing exposure period. It has been reported that the average of four consecutive one-week, or two consecutive two-week exposures is systematically greater than one four-week exposure[3,4]. This is considered to be due to the degradation of the absorbed nitrite over time[3].

The full report on NO_2 tubes is shown at Annex D. The final point to be brought out of this document is the appropriateness of using tubes at kerbside locations; tube results are unable to reflect short term variations and as such the 'relevance' of the locations currently used and the result obtained are an issue.

b. **Particulate Monitoring**. Health Protection Services have two OSIRIS particulate monitors with PM_{10} (particulate matter with a diameter of less than 10μm^3) filtering heads. One is sited in Harve des Pas, the other in Halkett Place. Once again these are screening tools and not type approved for direct comparison with EU limits.

c. **Nitrous Oxide Monitoring**. A chemiluminescent analyser measuring oxides of nitrogen is sited in the Market to measure levels in Halkett Place.

8. Other Issues. In addition to the issues already discussed, the following have the potential to impact on air quality in Jersey:

a **Composting**. The open windrow approach to composting has the potential to give rise to odour nuisance. It also has the potential to release bio aerosols immediately adjacent to the windrow.

b. **Fuel Farm**. The bulk handling and storage of fuel has the potential to release hydrocarbons into the atmosphere; the existing operation is comprehensively regulated by the relevant authorities.

c. **Animal Waste Slurry**. Large scale farming at Maufant and North St Helier historically gave rise to odour complaints. The storage and disposal of slurry is currently under review. Whilst herds have become smaller, the capacity to bulk store slurry has increased. This gives rise to the potential for widespread odour and bio aerosol issues when slurry is either laid to land or disposed of by some other means.

CONCLUSION

9. Health Protection Services understand the limitations of its current monitoring programme; the inability to give a definitive comparison with EU limits is clearly not leading practice. Using the limited resources available air quality monitoring has been prioritised to look at the risk pollutant; additional resources are sought at every opportunity, but without significant investment progress cannot be made.

Yours sincerely

Stephen D Smith
Head of Health Protection Services

Annexes:

A. Health Protection Services – Example of use of planning process to address air quality issues.
B. Report outlining the cumulative impact of development.
C. Background Information Relating To Funding Arrangements for Air Quality Monitoring.
D. NO_2 Diffusion Tubes for LAQM: Guidance Note for Local Authorities, Prepared for DEFRA and the Devolved Administrations, AEAT/ENV/R/2140/Issue 1 March 2006

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See Distribution 18 June 2007

Environmental Impact Assessment – Esplanade Development
Cumulative Impact on Air Quality

BACKGROUND

1. The recent scoping meeting for the Esplanade Square Environmental Impact Assessment (EIA) brought to the fore the potential adverse impact concurrent development in and around the Weighbridge area could have on human health.

2. Annex A contains the original email (Pritchard/Le Claire) that frames the issue. Annex B contains a graph showing historic levels of Nitrogen Dioxide (NO_2).

LEGISLATIVE BACKGROUND

3. The EU Framework Directive on ambient air quality assessment and management (96/62/EU) was adopted by member states in September 1996 for implementation by May 1998. The aim of the Directive is to protect human health and the environment by preventing harmful concentrations of air pollutants. The Directive identified 8 key pollutants and set limits for each. The States of Jersey adopted these limits.

4. Health Protection Services commissioned a review and assessment of air quality; reported in 2003. The report concluded that 4 emission sources were impacting on local air quality:

a. The waste incineration facility at Bellozane.
b. The emissions from the power station.
c. The Crematoria.
d. Emissions from road traffic.

5. To address these risk areas Health Protection Services have been working with other States Departments. The cremators at the crematoria have been replaced, the incinerator at Bellozanne is set to be replaced by an EU compliant Energy from Waste (EfW) plant and fixed electricity supply from France has drastically reduced the need for local electricity generation. Addressing road transport emissions is a difficult task, yet the Technical and Transport Services Draft Integrated Travel and Transport Plan for Jersey contains measures that aim to reduce car dependency, which if successful would naturally reduce NO_2 emissions.

6. Air Quality has been identified as a performance indicator in the Strategic Plan 2006 – 2011[†††]. The limits for each of the 8 key pollutants are stated and comparison with each limit must be made using an approved measurement technique. The use of NO_2 tubes is not an approved technique for NO_2; as a screening tool they are best suited to identifying the geographic areas where the more expensive and labour intensive monitoring analysers are needed.

CURRENT MONITORING EQUIMPENT

7. Historically Health Protection Services have used NO_2 diffusion tubes as a screening tool to understand NO_2 levels around the Island. These are 'cheap and cheerful' in the grand scheme of things when it comes to monitoring air quality.

8. The Department has one chemiluminescence NO_2 analyser sited in Halkett Place, St Helier. This type of analyser is type approved to measure against the EU limit for NO_2.

9. The inherent error associated with the use of diffusion tubes led to a bid for growth development funding during 2006. The application outlined the business case for investing in a piece of equipment that could measure air quality in an approved manner and report on the Strategic Plan performance indicators. The application outlined the ongoing reliance on diffusion tube data, but unfortunately failed to attract funding.

ISSUE

10. Health Protection Services is in a position where the best available information to frame responses to development in and around the Weighbridge area is based on a non-type approved monitoring technique with an error factor of up to 25%. Reducing the data error increases confidence and allows modelling for new development to be set in context. As things stand; it would appear that further development in and around the Weighbridge area would cause the health based annual mean limit for NO_2 to be breached. Whilst this remains the case all new development would have to prove that a breach would not arise; establishing the baseline is a priority.

OPTIONS

11. To be drawn out of meeting 19 June 2007.

Distribution:

Stephen Smith
Sarah Le Clare
Paul Nichols
William Peggie
Dave St George
Dennis Rive
Louise Magris
Jody Robert

[†††] Strategic Plan 2006 – 2011, Objective 4.4a - Air Quality

ANNEX A
DATED 18 JUN 07

From: Andrew Pritchard
Sent: 31 May 2007 12:10
To: Sarah Le Claire
Cc: Steve Smith
Subject: Esplanade Development EIA

Sarah,

Following our meeting regarding the EIA for Esplanade Square, you'll have noticed I'm worried about air pollution issues in and around the Weighbridge area; oxides of nitrogen in particular. The graph attached shows the uncorrected annual mean NO2 levels; the corrected values reduce the figures to just below the EU annual mean limit. Steve Smith and I have been discussing the cumulative impact of development on the Weighbridge area for a while. The HIA for the EfW Plant reinforced the public perception that development in and around the harbour was being considered in a piecemeal manner. Over the next few years we are undoubtedly going to see significant changes; which is why the scale of the Esplanade Square development means that Health Protection need to view the development in the context of the wider St Helier Town scheme.

With Castle Quays we needed to understand the impact of a 7% NO2 increase and asked the applicant for Diffusion Tube data; we weren't aware the Esplanade Scheme was round the corner.

With a potential 7% increase in NO2 associated with the Castle Quays development the headroom to the annual mean NO2 limit has effectively been used. This leads us down a difficult path; how to assist regeneration without breaching health based air quality limits (and failing States Policy to boot).

The Esplanade EIA provides an ideal opportunity to put all the current plans on the same bit of paper; St Helier Town Plan, EfW proposal, Castle Quays, Town Park, Liberation Square (Sinking the road!) and Esplanade Square are projects that I'm aware of, there could be more.

To help the Planning process Health Protection would like to use the Esplanade EIA as a means to ensure the infrastructure is in place to address air quality issues. This will help everyone concerned as we won't have to go over old ground each and every time a planning application is made for the Weighbridge / Harbour area.

Steve has briefly discussed this issue with the MoH; who is keeping a watching brief and will assist as necessary. Steve was hoping as a starting point States Officers with a stake in St Helier / Weighbridge / Harbour issues could come together to make sure we view the Esplanade development in the wider context. Issues that spring to mind are:

- Traffic Planning / trip management / local network capacity
- Land fill capacity
- Traffic assessments for construction traffic
- Air Quality
- Planning Gain

As the Esplanade EIA is still a work in progress, which we'll need to comment on at some stage, maybe it would be worth establishing a relevant group that could attempt to document all the likely developments in one place and then formulate our respective positions so we can quickly respond to the Esplanade scheme and have a stated approach to future developments?

I'm conscious that you coordinate the EIA comments; not wishing to tread on any toes, just wanted to highlight early in the process that we have a problem and the answers are unlikely straightforward.

Regards,

Andrew Pritchard
Team Leader - Community Health
Public Health Department
Le Bas Centre, St Saviours Road
St Helier
Jersey
JE1 4HR

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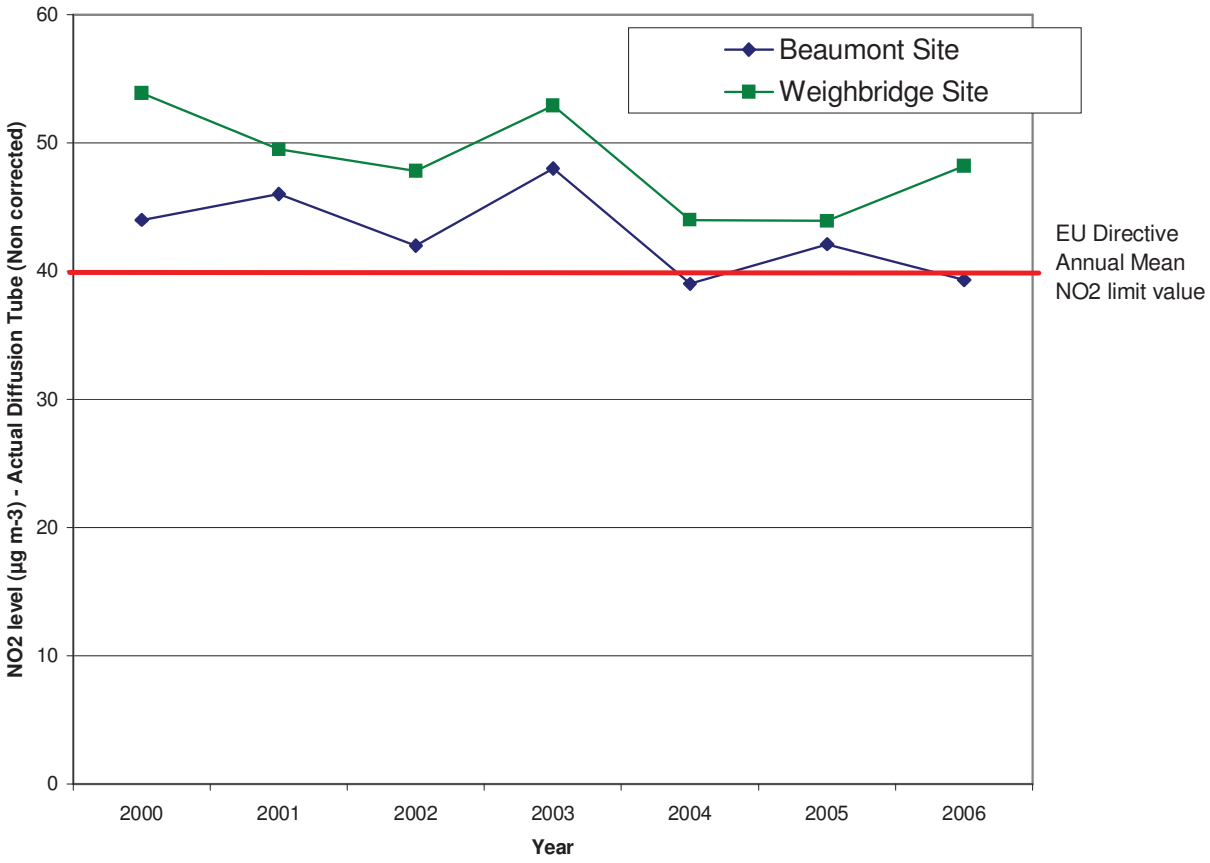
Fax: 01534 443720

Annual Mean Nitrogen Dioxide (µg m^{-3}) - Beaumont & Weighbridge Sites 2000 - 2006



ANNEX B
DATED 18 JUN 07

[Original Graph as shown in Annex A Dated 18 Jun 07]

ANNEX B TO
HP/AP/Scrutiny Response
DATED 16 OCT 07

PLANNING AND ENVIRONMENT

CUMULATIVE HEALTH AND ENVIRONMENTAL IMPACTS OF FORTHCOMING DEVELOPMENTS IN ST HELIER

Purpose of the Report

This report raises the question of the consideration of the cumulative health and environmental impacts of the forthcoming developments in St Helier, particularly around the Waterfront area, and suggest actions that need to be brought forward in relation to waste, air quality and traffic. It also highlights the need for a Strategic Environmental Assessment to be undertaken of the Strategy for the Future Development and Regeneration of St Helier and for the proposals for developing the area known as 'East of Albert'.

Background

The following major developments are planned

- Waterfront: Castle Quays, Esplanade Quarter, Underpass, Liberty Wharf,
- East of Albert
- Town Park
- St Helier Regeneration plans resulting from the EDAW study

Comments on the main issues to consider

1. Waste

1.1 Landfill

Background
A number of major developments are proposed, each of which are either known or assumed to produce large amounts of inert waste, of which only a small amount is currently proposed to be reused or recycled. It should be noted that the developer for Esplanade Quarter will be required within the EIA to explore innovative techniques for reusing a large proportion of the excavated material, however,
even if this is achieved, the volumes are such that a large amount is still likely to end up for disposal at La Collette II within a short space of time.

Estimates of landfill from proposed developments

Proposed development	From excavations (tonnes)	Notes
Castle Quays – Phase 1	110,000	No recycling proposed. Free tipping arrangement.
Castle Quays – Phase 2	Currently unknown	
Esplanade Quarter	900,000	Recycling proposed but likely to be limited given nature of soil.
Underpass	150,000	Currently unknown, estimate
Town Park	100,000	Contaminated waste
East of Albert	Currently unknown	
Estimated total	**1,260,000**	

The Island Plan 2002 contains very clear policies on waste management (WM1 and WM2) in relation to minimising construction waste.

The current recommendations from the Solid Waste Strategy in relation to the provision of additional landfill site are as follows:

- The Waste Hierarchy will be strictly applied through planning policies and also through recycling and reuse opportunities to minimise waste needing disposal. This should be reinforced by fiscal measures. This will extend the life span of La Collette to beyond the currently predicted completion date of 2015.

- Identify a new landfill site before La Collette is full. Capital investment will be required for this and a full Environmental and Health Impact Assessment will be fundamental to identifying a new site. The date will be kept under review, and proposals will be brought forward at an appropriate time, taking account of other Strategies, such as the Mineral Strategy.

Key points
The current proposals for a single level basement car park on the Castle Quays site and three storey basement car park on the Esplanade Quarter site, along with sinking the Underpass will be contrary to policies on waste within the Island Plan, Solid Waste Strategy and the States Strategic Plan 2006-20011. In recognition of the drive for economic growth, if Ministers are minded to move forward with these developments, the following points need to be borne in mind:

- The estimated total volume of inert waste from just these developments equates to four to five years of fill for La Collette II at current fill rates. This means that these developments will bring forward the need to find another inert landfill site by this timescale.

- Logistical questions also arise from the timescale of the proposed developments. The maximum number of loads per day that can be taken to La Collette II is 450 loads/day. The current peak runs at around 360 loads/day. This only allows 90 loads/day spare capacity. Phasing of the excavations will therefore be essential to allow loads to be accepted.

- There is a need to allow settlement time to ensure that the site is suitable as a construction base post fill.

- The outer wall will need to be lined. The current cost above the water line is £28m^2. This cost will increase to line the site below the waterline. The current estimate to line the site is in excess of £1million.

Recommended action:

- A study on the strategic options for solid inert waste disposal is carried out as a matter of urgency, including a full strategic environmental assessment.

- Developers must be required to demonstrate innovative solutions to reusing a large proportion of excavated material and how this might be carried out in practice.

1.2 Adequate provision of space for recycling facilities

- All developments should clearly demonstrate that adequate space is provided for recycling facilities as an integral part of their design from the outset.

2. Air Quality

Background
Emissions from road traffic were identified as one of the four main sources that impacted on air quality in a report commissioned by Health Protection Services (reported on in 2003). Air Quality has been identified as a performance indicator in the Strategic Plan 2006 – 2011[‡‡‡]. The limits for each of the 8 key pollutants are stated and comparison with each limit must be made using an approved measurement technique. Levels of NO_2 emissions are of particular concern in relation to the cumulative developments proposed around St Helier.

The Technical and Transport Services Draft Integrated Travel and Transport Plan for Jersey contains measures that aim to reduce car dependency, which if successful would naturally reduce NO_2 emissions. However, Health Protection does not currently have the appropriate equipment to accurately measure NO_2 levels.

Historically Health Protection Services have used NO_2 diffusion tubes as a screening tool to understand NO_2 levels around the Island. These are a 'cheap and cheerful' option for monitoring air quality. The use of NO_2 tubes is not an approved technique for detailed NO_2 assessment and certainly not suitable as the basis for strategic decision making; as a screening tool they are best suited to identifying the geographic areas where the more expensive and labour intensive monitoring analysers are needed.

The Department has one chemiluminescence NO_2 analyser sited in Halkett Place, St Helier. This type of analyser is type approved to measure against the EU limit for NO_2.

The inherent error associated with the use of diffusion tubes led to a bid for growth development funding during 2006, which unfortunately failed to attract funding.

Key points
Health Protection Services is in a position where the best available information to frame responses to development in and around the Weighbridge area is based on a non-type approved monitoring technique with an error factor of up to 25%. Reducing the data error increases confidence and allows modelling for new development to be set in context. At present, it would appear that further development in and around the Weighbridge area would cause the health based annual mean limit for NO_2 to be breached. Whilst this remains the case all new development would have to prove that a

[‡‡‡] Strategic Plan 2006 – 2011, Objective 4.4a - Air Quality

breach would not arise from the traffic related emissions associated with that development. Establishing an accurate baseline and ongoing monitoring is therefore a priority.

Recommended action

- An agreement needs to be reached with developers of large developments to contribute towards ongoing accurate NO_2 monitoring. This is currently estimated to be up to £156,000 over a five year period. Given the size of the Esplanade Quarter development, it is suggested that this should be met by this developer. To cover a ten year period an investment of approximately £80,000 would be needed at the five year point.

3. Traffic – (from attached report from Dave St George)

Background

The issues of traffic circulation resulting from the Waterfront developments can be considered in two parts: -

- Can La Route de La Liberation be buried without deterioration in the road network?
- What effect will the development proposals have on the overall road network?

The impact on the overall road network of proposals for East of Albert and the regeneration of St Helier also need to be considered.

Key points
The proposed developments on the Waterfront will lead to severe congestion and requirement for alterations to traffic circulation.

Estimates of car parking provision on the Waterfront

Car Parking Provision	**Residential**	**Commercial**	**Existing Spaces**	**Net Total New Spaces**	**Total spaces**
Esplanade Square	0	1334	525	1334	1859
Castle Quays	377	70		447	447
Harbour Reach	55			55	55
Waterfront Hotel	0	103		103	103
Liberty Wharf	0	54		54	54
Total	**618**	**1140**	**525**	**1993**	**2518**

- La Route de la Liberation can be buried and a road system at least comparable to the existing layout provided, enabling the connectivity between the “old St Helier” and the waterfront developments to be greatly improved.

- A gateway roundabout at West Park would not cope with the predicted levels of traffic. The best solution for that junction would retain traffic signal control.

- The quantum of development and associated parking proposed at the Waterfront would result in severe peak hour traffic congestion unless road capacity is increased at West Park and in particular through Green street roundabout, the tunnel and La Route du Fort, or significant investment is made in encouraging more sustainable transport modes and a reduction in the relative share of trips made my private car.

- Separate discussions about mitigation have been held between TTS and Planning.

Recommended action

- Until the effect of the proposed development has been fully assessed over the wider network by the developer through a full Traffic Impact Assessment and appropriate mitigation agreed, the Transport and Technical Services Department would advise against agreeing to the scale of development and parking provision as currently suggested by Hopkins Architects unless satisfactory mitigation can be provided to accommodate the predicted traffic increases.

4. General cumulative impacts

Background

Strategic Environmental Assessment (SEA) is a tool used to enable the environmental consequences of strategic decision to be taken into account during the development of a policy, plan or programme.

Key points

- The use of SEA has been formalised by the implementation of the 'SEA Directive' by separate Regulations in the UK.

- The 'SEA Directive' (2001/42/EEC) applies to a wide range of plans and programmes, across a range of sectors, that set a framework for future development consent for projects listed in the EIA Directive (85/337/EEC). The overall objective of the SEA Directive is 'to provide for a high level of protection of the environment and to contribute to the integration of environmental consideration into the preparation and adoption of plans with a view to promoting sustainable development.'

- The EIA (Jersey) Order is based on the provisions within the EIA Directive.

- The SEA Directive does not apply to Jersey and there is currently no formal trigger for requesting an SEA. However, the current scale of proposed development would benefit from an SEA in order that environmental considerations are given early, strategic consideration in a structured manner.

Action required

- A Strategic Environmental Assessment should be required for the EDAW Strategy 'A Strategy for the Future Development and Regeneration of St Helier' and all East of Albert proposals.

Report prepared by:

Sarah Le Claire, Assistant Director for Policy, Environment Division, Planning and Environment (27/06/07)

With contributions from:

Dennis Rive - Solid Waste Manager, Transport and Technical Services

Andrew Pritchard – Team Leader - Community Health, Health Protection Department, Health and Social Services
Dave St George – Manager, Transport Policy, Transport and Technical Services

Attachments: Traffic Circulation Implications of Esplanade Square and Waterfront Developments – Interim Report (31/05/07)

STATES OF JERSEY HEALTH AND SOCIAL SERVICES
PUBLIC HEALTH SERVICES

Report from the Chief Environmental Health Officer
to the Health and Social Services Committee

An Air Quality Strategy for Jersey

Introduction

To deal with air quality, a Group has been formed with the task of formulating a Jersey Air Quality Strategy for Health and Safety Services..

Although healthy individuals are unlikely to experience acute effects at typical air pollution levels, there is evidence of associations with advanced mortality, chronic illness and discomfort for sensitive groups. In some areas - particularly congested urban centres - emissions from traffic, industry and other sources can still affect the quality of life for all, and the Environment as a whole.

A strategy is needed to improve areas of poor air quality, to reduce any remaining significant risk to health and to achieve the wider objectives of sustainable development in relation to air quality. It will also identify areas where quality is good and no action is required except maintaining the Status Quo.

Objectives

A strategy policy document would be produced for Committee to :-

1. provide an inventory of significant sources of local pollution and pollutants,

2. decide the appropriate standards to be achieved,

3. identify areas where standards are exceeded. Consider whether further assessment / monitoring is required,

4. prioritise a timetable for consideration of the list of pollution sources,

5. create appropriate action plans to achieve targets, including responsibilities,

6. consider appropriate monitoring to assess efficiency of the above action plans,

7. estimate costs of the above,

8. raise public awareness to air quality as a whole.

Legislation

The Strategic Policy Review of 1995 gave the task to the Planning and Environment Committee of recommending targets or bringing forward proposals for the approval of the States where appropriate in respect of air pollution standards. (para. 3.5)

The 1997 review makes particular reference to air pollution levels within St Helier and a need to control emissions from motor vehicles. (para. 3.8) The opinion is given that further information should be sought as a matter of urgency so that appropriate transport policy measures can be accurately targeted to reduce pollution levels.

This is reiterated in the States Environmental Adviser's 'Sustainable Development' consultation document which also goes on to suggest key indicators for air quality of CO, NOx, and SOx. (para. 18.5.6)

The Pollutants

A preliminary list of local pollutants and pollution sources is attached (Appendix 1).

The main sources of airborne pollution are:-

Road Transport is a significant and in most areas the main source of pollutants. The proportional emission of pollutants varies depending on the traffic, weather and other local sources.

Energy generation - combustion plants which provide public power are currently the dominant source of Sulphur dioxide and also produce Nitrogen oxides, some particles and other pollutants. Small combustion plants with less impact can affect local air quality, again contributing towards emissions of Sulphur dioxide, Nitrogen oxides and particles.

Industrial processes - many different sources are involved, for example:-

Volatile Organic Compounds (VOCs) evaporate from many liquid fuels, paints and cleaners and are also formed during combustion processes.

Particles are given off by quarrying, construction and many other processes.

Domestic sources - emissions from domestic fires have reduced significantly as a source of pollution. However some areas may remain where domestic emissions, particularly from oil fired central heating, of sulphur dioxide and particles have a

significant impact on air quality. In addition domestic use of solvents and paints, varnishes and other products is an important source of volatile organic compounds.

Setting Standards and Objectives

The States of Jersey have the policy of complying with EC Directives.

The European Air Quality Directives 96/62/EC,

1. defines and establishes objectives for ambient air quality in the community designed to avoid, prevent or reduce harmful effects on human health and environment as a whole,

2. recommends and assesses the ambient air quality in member states on the basis of common methods and criteria,

3. recommends obtaining adequate information on ambient air quality and ensuring that it is made available to the public,

4. requires maintenance of ambient air quality where it is good and improve it in other cases.

The Directive sets standards for SO_2, NO_2, PM10 and lead. Populations with less than 250,000 only require full monitoring at one location. This location will be important as it must conform with certain physical criteria and placement and be where the highest concentrations are likely to occur.

For some pollutants it has been possible to identify concentration at or below which effects are unlikely even in sensitive population groups. This has been the case for Ozone, Sulphur dioxide, Carbon monoxide and Nitrogen dioxide. It is recommended such concentrations are the standards for those pollutants. In other cases it was not possible to identify levels at which there is zero risk. This was the case for Benzene, 13 Butadiene and Particulates. In recommending standards for Benzene and 13 Butadiene therefore a toxicological approach has derived levels at which risk to public health would be exceedingly small.

Progress from Current Policies which will affect Jersey

a) **Benzene, 1.3 Butadiene, Carbon monoxide and lead.**

It is likely that the continuing improvement from vehicle and fuel standards already in place will bring ambient concentrations down to the proposed levels by 2005.

b) **Nitrogen Dioxide and Particles**

These are both essentially urban pollution problems. Further steps will be required to achieve the required scale of emission reduction.

c) **Sulphur dioxide**

This is unlikely to be a general problem in Jersey though there may be areas where local effects occur. However there are global considerations with regard to acid rain etc.

d) **Ozone**

Due to the transboundary nature of the problem, there cannot be any improvement without co-operation of neighbouring countries in North West Europe. Jersey is likely to have a minimal effect again due to the global nature of the pollutant.

e) **Carbon Dioxide**

The global nature of the pollutant requires international action. An objective from the Earth Summit in Brazil was to return emissions to 1990 levels by 2000. This objective has been developed by the European Union in strategy document COM (92) 246 which includes :

reducing energy demand
carbon tax
monitoring CO_2 emissions
reducing CO_2 emissions from cars

Resource Implications

It is expected that, as the authoritative body concerned with air quality and pollution, Environmental Health will provide the main expertise for steering the formulation of the Air Quality Strategy with input from the appropriate 'stakeholders' e.g. Public Services with regard to traffic pollution and incinerator emissions.

Monitoring Strategy

Monitoring for compliance with EC Directives is required by all European Member States, and is therefore appropriate for the Island.

If pollutant concentrations are higher than the assessment threshold for NO_2 or SO_2, monitoring at one location will be required.

The site should be located in an area where highest pollution levels are likely to occur, but in an area representative of where the majority of people spend most of their time.

The most appropriate monitoring strategy for Jersey is as follows:-

a) To install an “urban background” monitoring station in the centre of St Helier. Such a site would provide valuable data about general population exposure. Pollutants to be monitored continuously should include NO_X, SO_2 and PM_{10} particulates as a minimum; CO and possible Ozone and hydrocarbons could be installed if finances permit.

b) Continuous monitoring should continue with NO_2, SO_2 and BTEX diffusion tube surveys, to provide information about the spatial distribution of pollutants on the Island. The data from the tubes can also be used to estimate peak concentrations at the tube sites, using the data from the continuous monitoring station as a scaling guide for the tube data.

Together these two packages of monitoring should provide a comprehensive picture of air quality on the Island. If required, short term continuous monitoring at identified “hot spots” can be used to supplement the surveys.

Costs

A typical site measuring NO_X, SO_2, and PM_{10} would cost in the order of £30, 000 to £35,000 and £10,000 to 15,000 per annum if operated on behalf of the States (including service and maintenance). The analysers would be expected to give 6 to 8 years of reliable service before replacement would be required. Environmental Health staff would be able to reduce costs having the expertise to calibrate the equipment.

Anthony Bruce
Chief Environmental Health Officer

9 June, 1999

STATES OF JERSEY HEALTH AND SOCIAL SERVICES
PUBLIC HEALTH SERVICES

Report from the Chief Environmental Health Officer
to the Health and Social Services Committee

An Air Quality Strategy for Jersey

Following the presentation of the attached report to the Environmental Monitoring Working Group, it was anticipated that the report would be independently presented to the Public Services, Health and Social Services and Planning and Environment Committees by their respective officers from the Monitoring Group in order to receive endorsement that the Strategy indicated the right way forward.

This Strategy Report is not intended to be any more than an initial indicator for that way forward for it would be for the designated Competent Authority to obtain the necessary resources to develop and progress the Strategy. The Report gave no financial commitments for any Committee. At its presentation to the Environmental Monitoring Group, I made it clear that the financial responsibility did not lay with Health and Social Services. If anything it was a general Island States responsibility which may need a specific resource allocation from the Policy and Resources and Finance and Economics Committees.

However, the Chairman of the Environmental Working Group, wishing to progress matters, indicated a possible availability of funding from the Planning and Environment Central Environment Vote for the provision of an urban background monitoring station estimated to be within a £30K to £35K bracket. Notwithstanding that offer, it was reiterated that whilst Environmental Health ought to be able to provide a manpower input, the annual service and maintenance operational costs would have to be sought elsewhere.

Previous to the report being presented to the Monitoring Group, the Health and Social Services Committee had requested confirmation from the Policy and Resources Committee for recognition as the Competent Authority for Air Quality in Jersey. That recognition was considered important in that it would determine the Health and Social Services Committee's future role in the matter. It was further considered that the Competency issue should be resolved before the attached report came before the Health and Social Services Committee. As the Committee is aware, that matter remains in abeyance.

I can not explain the three months delay in the circulation of Planning and Environment Committee's January Act B12 but it has now been examined and Mr Walton's comments are appended.

Anthony Bruce
Chief Environmental Health Officer

19 April, 2000

Environmental Health Comment in respect of:

Planning and Environment Committee Act No. B12. 20th January, 2000

Air Quality Strategy

Whilst the financial help from Planning and Environment has been essential in order for Environmental Health to instigate the three phase air monitoring programme of 1997 and this is much appreciated, there are certain statements in the Minutes which are misleading.
The first of these concerns a statement that "the gathering of atmospheric baseline data was carried out by the Environmental Monitoring Working Group". The three phase monitoring programme was actually undertaken on behalf of the Health and Social Services Committee with finance from the Environment Fund, which is controlled by the Planning and Environment Committee. This was with the support of the Public Services Committee and also of the other members of the Environmental Monitoring Working Group . Environmental Health had previously carried out more limited monitoring with diffusion tubes.
The programme was actually carried out throughout 1997 and not as stated between May and September. It was the ozone survey which was carried out during this period.

The Minutes also state that "some areas had air quality comparable with parts of Central London". Comparison of the kerbside monitoring site with UK sites actually show similar levels to roadside sites in South London and Exeter, the levels being higher than those generally found in suburban and rural environments.

The Minutes go on to note three recommendations from the Air Quality Sub group. Two of these concern financing of an urban monitoring station. The initiative taken by Planning and Environment in offering to take on the capital funding of the station from the Central Environment Vote is a very positive step but it had been noted by the Air Quality Sub Group that agreement had not been forthcoming from Environmental Health to meet maintenance costs and the suggestion had been that financing should be discussed between Planning and Environment, Health and Social Services and the Public Services Department. The last, being a "Trading Department", have apparently considered in their Traffic Strategy Report either employing consultants to do the work or making the money available to the appropriate "competent authority".

The Minutes also mention endorsing the continued monitoring of potential atmospheric pollution and of 'radioactivity'. Though mention of radioactivity was made in the meeting, this inference is a misunderstanding by the Committee Clerk

The Committee Minute goes on to propose that "the Water Resources Steering Group which comprised representatives of all the relevant Committees, should also act as an Air Quality Steering Group, under the chairmanship of the Planning and Environment Committee, to monitor the ongoing testing."

It is not known why this proposal should be made when all the appropriate expertise presently lies in the Monitoring Sub Group which is under the chairmanship of Environmental Health , the Competent Authority for air pollution.

It should also be noted that the Water Resources Steering Group is presently not under the chairmanship of Planning and Environment but the Public Services Department. It is presumed that this initiative is suggested in order to bring all pollution matters under Planning and Environment. However the present system is that the Monitoring Group brings together and co-ordinates the different departments who retain their autonomy and individually carry out their professional functions, including monitoring.

Martin Walton
Senior Environmental Health Officer

17th April, 2000

MEMORANDUM

To: S D Smith
M C Walton

From: Alan M Irving
Environmental Health Officer
Environmental Health

Date: 13 December 2002

Air Pollution Monitoring Base Station

Further to our discussion at the staff meeting I write to confirm my comments.

It was agreed as part of the interim Air Quality Strategy that Planning and Environment would provide the capital funding for a base station (ie £35,000) (see attached Committee minute). This money was available as of June 2002 (Ref John Rive) in the Environment fund. However I am not aware of the current position.

It was also agreed that this Department would fund the running of the base station at around £10,000/year. This figure could be reduced if AEA trained us in data collection/analysis/QA/QC.

I attach an email from Brian Stacey giving some provisional capitals costings, however if we get the go ahead tenders would be needed.

Related to this is the Air Quality Strategy which recommends extra monitoring in the form of a base station. The Air Quality Strategy should be completed within the next 7 days. It will then be emailed to Dr Beth Conlan asking her to provide 20 hard copies. Sarah Le Claire at ESU has asked for copies to be distributed to the Monitoring Group in January 2003. It is important the monitoring group are aware they've already commented on the draft. It is hoped the AQS will be supported by P & E and PSD and the recommendation for a base station taken up as soon as practicable.

Alan M Irving
Environmental Health Officer

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Mrs S Le Claire
Senior Environmental Officer
Environmental Services Unit
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JE2 4US

Our ref: SDS/AMI/DH

09 January 2003

Dear Sarah

Local Air Quality Monitoring

Further to the telephone discussion on Wednesday 8th January, 2002 with Alan M Irving Environmental Health Officer, I write to confirm my comments.

I understand £35,000 is still available for the Air Quality Monitoring base Station. The provision of such has been delayed since 2000 because of delays in finalising the Jersey's Air Quality Strategy. This is now completed and recommends continuous monitoring is carried out in accordance with the EU Framework Directive on Ambient Air Quality Assessment and Management 196/62/EC.

The costs of running of such a base station would be borne by this Department. The data obtained would also provide useful in assessing compliance with the Protocol 3 (Sofia) Control of Emissions of Nitrogen Oxides or their Transboundary Fluxes (NOx Protocol) which Jersey has signed up to.

In furtherance to John Rive's letter dated 23rd January 2002 in which he states the Central Environment fund is designed for 'one off' and capital projects and not revenue expenditure such as the diffusion surveys, the matter was brought up recently at Health and Social Service who agreed to fund this aspect for 2003.

I hope the above is helpful and I look forward to hearing from you regarding the support and provision of the base station.

Yours sincerely

Stephen D Smith
Head of Health Protection

NO_2 Diffusion Tubes for LAQM: Guidance Note for Local Authorities, Prepared for DEFRA and the Devolved Administrations, AEAT/ENV/R/2140/Issue 1 March 2006