

Air Quality Monitoring and Noise Control Unit An tAonad Monatóireachta ar Aercháilíocht agus Rialaithe Torainn



Annual Report 2007 Tuarascáil Bhliantúil 2007

**Environment and Engineering Department
An Roinn Comhshaoil agus Innealtóireacht**



Dublin City Council
Comhairle Cathrach Bhaile Átha Cliath

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Staff List 2007

Martin Fitzpatrick	Principal Environmental Health Officer
Paul Rutherford	Senior Environmental Health Officer
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Anne Marie McCartan	Environmental Health Officer
Michelle McNally	Environmental Health Officer
Paddy Douglas	Technical Support Officer

Introduction

This Annual Report deals with the activities of the Air Quality Monitoring and Noise Control Unit of Dublin City Council during 2007. These activities include:

1. Enforcement of air pollution control legislation
2. Monitoring of environmental noise and enforcement of noise control legislation
3. Air quality monitoring
4. Research and provision of expertise on an ongoing basis to other services and departments in Dublin City Council

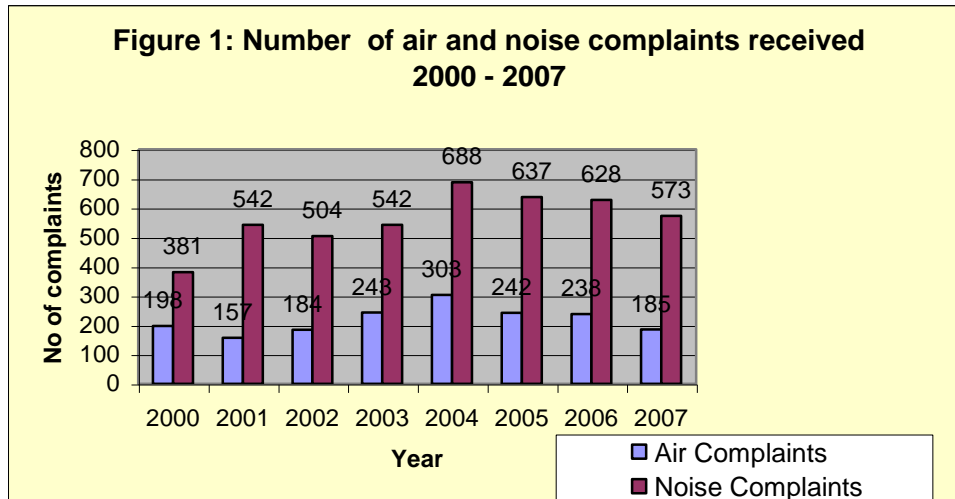
The areas of enforcement of air pollution and noise control legislation continued to be a major challenge during 2007. While overall the number of complaints for air pollution and noise decreased, it is evident that there is increase in the complexity of the issues dealt with. 2007 has also seen the introduction of new legal provisions for the control of a wide range of industries that use volatile organic compounds (V.O.C.s). This will lead to overall reduction in the levels of such pollutants being emitted and will also largely eliminate nuisance complaints associated with such industries.

Air quality during 2007 continued to be generally good. Levels of lead, sulphur dioxide, black smoke and carbon monoxide have been satisfactory. Levels of nitrogen dioxide remain a concern and particular attention will be required to this challenge in the coming years.

The Air Quality Monitoring and Noise Control Unit have developed an important role in participating in air quality research with various partners over the past decade. During 2007 the unit collaborated with the Joint Research Centre of the European Union and University College Dublin in their study of indoor quality in cities across Europe.

Enforcement Activities

Investigation of complaints made by the public in relation air quality and noise is a major element of the Unit's work. This includes general complaint investigations, out-of-hours calls to establish nuisance, and enforcement action. In 2007, 185 air pollution complaints and 573 noise complaints were investigated (See Figure 1) This is somewhat down on the numbers received in 2006. The breakdown and category of complaints are dealt with further into this section.

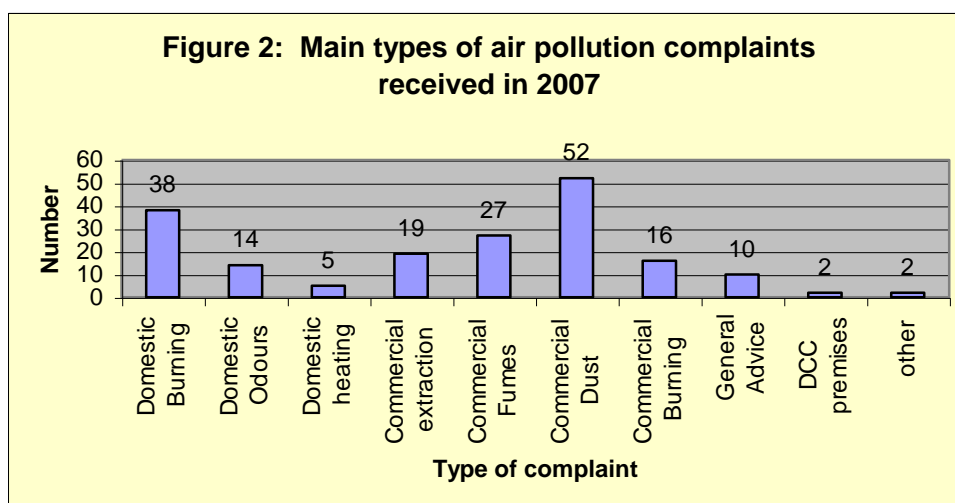


Air Pollution complaints

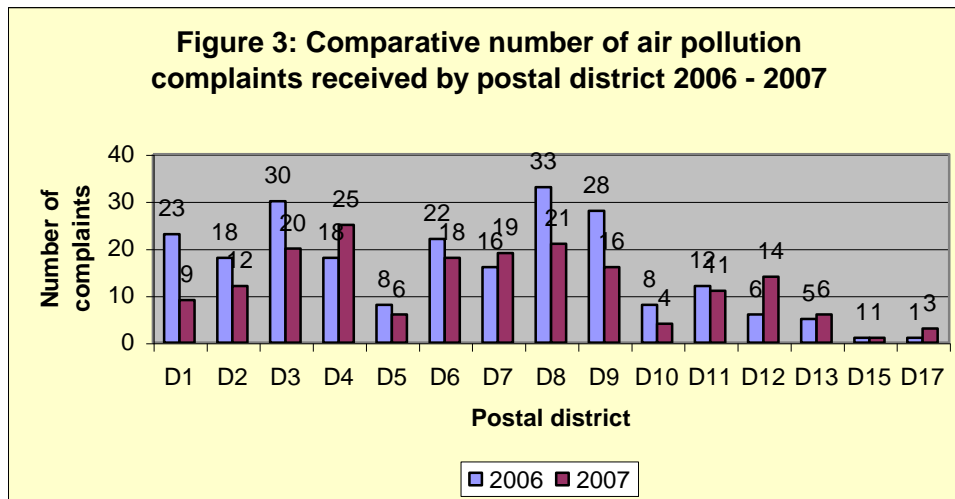
Complaints received by the Unit range from neighbours burning garden/household waste, to emissions from car spraying plants to odours from food premises or factories, and dust from construction sites. The Air Pollution Act 1987 states that the occupier of any premises, other than a domestic dwelling, shall take best practicable means to limit and, if possible, to prevent an emission from such premises. It also states that the occupier of any premises shall not cause or permit an emission in such a quantity, or in such a manner, as to be a nuisance.

The variety and complexity of complaints make each investigation unique, and site visits may take place with the owner of the premises and consultants specialising in the industry involved. On other occasions, it may suffice to send a warning letter to the premises involved advising compliance with the legislation. Should nuisance be established, and the property owners fail to take best practicable means to prevent or limit the nuisance, a Notice may be served under Section 26 of the Air Pollution Act 1987. Non-compliance with the Notice can lead to court proceedings but in the majority of complaints, there is resolution within weeks of the first site visit, negating the need for legal proceedings.

The 185 complaints recorded by the Unit in 2007 follow a similar pattern to previous years with commercial dust, domestic burning and commercial extraction systems being the main source of complaints (see Figure 2). The main source of commercial dust complaints are the many construction and demolition sites around the city.



As figure 3 shows, there was a marked decrease in the number of complaints received in many parts of the city. The most noticeable exception to this was Dublin 4 and 12.



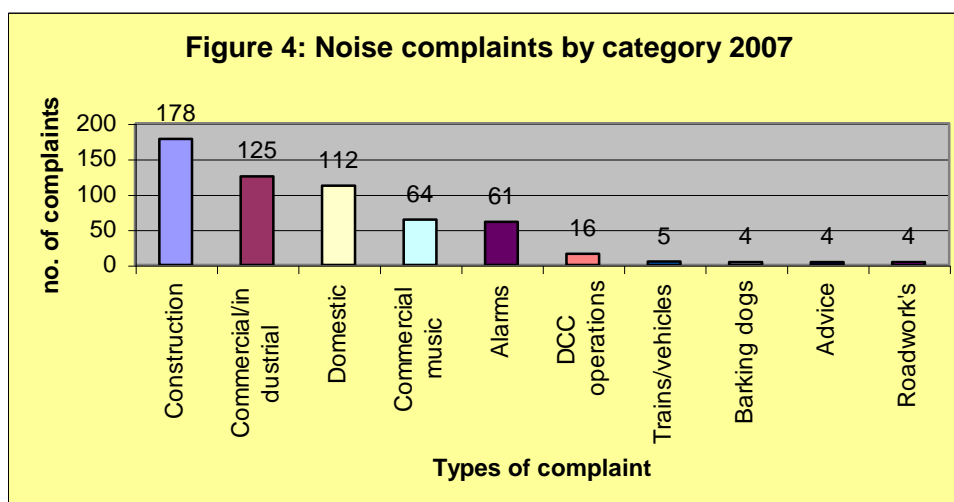
Noise pollution complaints

The Unit also deals with complaints in relation to noise pollution from a variety of commercial and industrial premises. The complaint procedure is similar to the air pollution complaints.

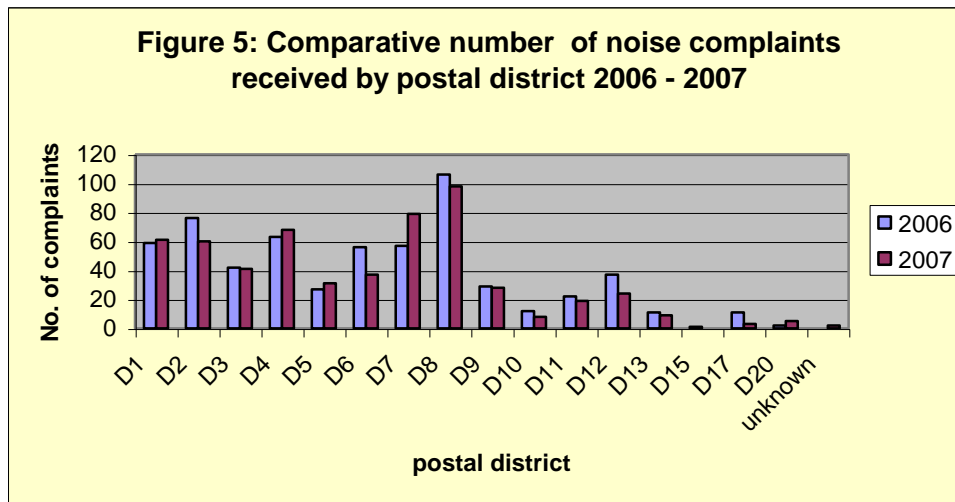
A Section 107 Notice under the Environmental Protection Agency Act 1992 can be served in relation to any “*premises, processes or works*” causing the nuisance. Failure to comply with the terms of the Notice within the time period specified on the notice can lead to the initiation of legal proceedings. An EHO may also serve a Section 108 notice where appropriate. If this notice results in a court case, the local authority will seek an order to be made by the court to eliminate the noise nuisance.

The Unit does not deal with neighbour noise nuisance complaints, as there is provision in the legislation for individuals to deal with this on their own behalf. E.H.O.s offer advice to the public about how they can go about taking their own action.

Construction noise continues to be the major source of noise complaint across the city (see Figure 4).



The number of complaints dealt with by the unit in 2007 was 573. As can be seen from Figure 5, the city centre postal districts of Dublin 1, Dublin 2, Dublin 4, Dublin 7 and Dublin 8 proved to be the busiest areas of the city.



Air Quality Monitoring

The Air Quality Monitoring and Noise Control Unit operate a network of air monitoring sites around Dublin City. This network is by far the largest operated by any local authority in the Republic of Ireland. The Air Quality Standards Regulations 2002 sets out the requirements for monitoring pollutants, and the limit values for each pollutant. This includes sulphur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), particulates (PM₁₀) and lead (Pb).

One of the important considerations of air quality monitoring is to ensure that sufficient data is obtained to guarantee a clear picture of the air quality at each site. This is referred to as data capture, i.e. the number of days that data is received for each site, relative to the number of days in a year. This is generally expressed as a percentage.

Several of the sites are deemed to be 'multi-pollutant', i.e., monitoring two or more pollutants at one location. The multi-pollutant sites at Winetavern Street, Coleraine Street and Ballyfermot have been in operation for a number of years and provide a good picture of air quality in populated areas of the city. The analysers used to monitor SO₂, NO₂, and CO at the multi-pollutant sites run continuously, producing data every 15 minutes. They require monthly internal calibration checks, and a six monthly external calibration and maintenance check. Since 2002 the air quality monitoring network has operated within a Quality Management System accredited to I.S.O. 9001 standards.

Sites:

Along with the multi-pollutant sites, there are other individual sites operated by the Unit. All of the sites have been incorporated into the Quality Management System.

Multi-pollutant sites

Winetavern Street – PM₁₀, NO₂, CO, SO₂, Lead

Coleraine Street - PM₁₀, NO₂, CO, SO₂, Lead

Ballyfermot – PM₁₀, NO₂, SO₂

PM10 sites

Marino

Phoenix Park

Rathmines

Lead

Kilbarrack

Rathmines

Black Smoke

Ringsend

Crumlin

Finglas

Cabra

Continuous Sulphur Dioxide (SO₂)

Exposure and health effects

There is a number of health effects associated with exposure to high levels of SO₂. This includes breathing problems and worsening respiratory and cardiovascular disease. People with asthma, or chronic lung disease or heart disease are the most sensitive to SO₂.

SO₂ also damages trees and crops, and along with NO₂, is a precursor of acid rain. It is therefore also responsible for acidification of lakes and streams and accelerated corrosion of buildings. The main source of SO₂ in Dublin is space heating from residential and industrial premises.

The limit values for SO₂ are found in Schedule 1 of the Air Quality Standards Regulations 2002. They are as follows:

Table 1: Limit values for SO ₂			
	Averaging Period	Limit Value	Margin of tolerance
Hourly limit value for the protection of human health	1 hour	350µg/m ³ not to be exceeded more than 24 times a calendar year	90µg/m ³ from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by 30µg/m ³ to reach 0µg/m ³ by 1 January 2005
Daily limit value for the protection of human health	24 hours	125µg/m ³ not to be exceeded more than 3 times a calendar year	None
Limit value for the protection of ecosystems	Calendar year and winter (1 Oct-31 Mar)	20µg/m ³	None

Results and discussion

Levels of SO₂ in Dublin at the three multi-pollutant sites are outlined below. The results are extremely low and well within the limits set out in the Standards.

Table 2: SO₂ results for Dublin City 2007		
Site	Annual Daily mean µg/m³	Maximum SO₂ µg/m³ (hour)
Coleraine Street	3	43
Winetavern Street	3	63
Ballyfermot	1	29

Nitrogen Dioxide (NO₂)

Exposure and health effects

Nitrogen Dioxide (NO₂) is a gas produced from the burning of fossil fuels in vehicles, industrial plant, power plants and other commercial and residential sources that burn fuel. The major indoor source is cooking with gas, although kerosene heaters and cigarette smoke can also contribute significantly. NO₂ irritates the lungs and lowers resistance to respiratory infection, especially for those already suffering with breathing difficulties e.g. asthma, bronchitis.

Nitrogen oxides and sulphur dioxide react with other substances in the air to form acid rain, which is associated with the acidification of soils, lakes, and streams, accelerated corrosion of buildings and monuments, and reduced visibility.

Table 3: Limit Values for Nitrogen Dioxide			
	Averaging Period	Limit Value	Margin of Tolerance
Hourly Limit Value for the protection of Human Health	1 hour	200 µg/m ³ not to be exceeded more than 18 times in a calendar year	40% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by 1 January 2010
Annual limit value for the protection of human health	Calendar year	40 µg/m ³	40% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by 1 January 2010

Results and discussion

Nitrogen dioxide is monitored continuously at three locations – Ballyfermot, Winetavern Street and Coleraine Street. The site at Ballyfermot is located some distance from the main traffic route while the other two sites are situated adjacent to heavily trafficked roads. As can be seen from the results below, the Air Quality Standards Regulations 2002 have been met at all of the sites. The results for Coleraine St are just below the permissible levels and it is generally recognised that meeting air quality standards for nitrogen dioxide does pose a challenge in the years ahead.

Table 4: NO₂ results for Dublin City 2007			
Site:	Annual mean µg/m³	Maximum NO₂ (hour) µg/m³	No. of times NO₂ hourly level >200µg/m³
Coleraine St	39	127	0
Winetavern St	34	182	0
Ballyfermot	19	171	0

Carbon Monoxide (CO)

Exposure and health effects

Carbon monoxide (CO) is colourless, odourless gas produced during the incomplete combustion of fuels such as gas, kerosene, oil, wood or charcoal. Sources include space heaters, gas boilers and stoves, generators and tobacco smoke. It becomes hazardous when appliances are not ventilated adequately or are not functioning properly.

CO interferes with the distribution of oxygen in the blood to the rest of the body. Depending on the level of exposure, the symptoms include fatigue, headache, disorientation, nausea and dizziness. These symptoms are similar to that of flu or food poisoning so it may prove difficult to diagnose. However, it has the potential to kill or poison in high levels, especially in poorly ventilated premises.

The Air Quality Standards Regulations 2002 set a limit value of 10mg/m³ measured as an 8-hour average.

Table 5: Limit Value for Carbon Monoxide for protection of human health		
Averaging Period	Limit Value	Margin of tolerance
Maximum Daily 8-hr mean	10 mg/m ³	6 mg/m ³ from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by 2mg/m ³ to reach 0mg/m ³ by 1 January 2005

Results and discussion

There are two sites monitoring CO in the city, at Winetavern Street and Coleraine Street. The results for 2007 showed a very slight decrease at Winetavern Street, and Coleraine Street. The results are still very low in comparison with the limit set out in the legislation.

Table 6: Carbon Monoxide results for Dublin City 2006 & 2007		
Site	Annual mean 2006 (mg/m³) 8-hr rolling mean	Annual mean 2007 (mg/m³) 8-hr rolling mean
Winetavern St	0.3	0.2
Coleraine St	0.6	0.5

Particulate Matter (PM₁₀)

Exposure and health effects

The main sources of particulate matter (PM) are vehicles, dust from construction sites, construction equipment and any crushing and grinding operations. Indoors, the main sources are tobacco smoke, wood burning stoves, fireplaces and other home heating sources.

When inhaled, the particles can evade the body's natural defence system and lodge in the lungs. Symptoms of exposure include a sore throat, persistent cough, wheezing, shortness of breath and chest pain. PM can increase the number of asthma attacks, or aggravate bronchitis depending on the exposure. However, those already susceptible are a greater cause for concern. This includes children, the elderly and those already suffering with breathing difficulties.

There are different types of PM, but the coarse particles known as PM₁₀ are monitored at 6 sites around the city. Schedule 3 of the Air Quality Standards Regulations 2002 provides legal requirements for monitoring PM₁₀. There are 2 stages for compliance, 2005 and 2010.

Table 7: Limit Values for PM ₁₀			
	Averaging Period	Limit Value	Margin of Tolerance
24 hour limit value for the protection of human health	24 hours	50µg/m ³ PM ₁₀ not to be exceeded more than 35 times in a calendar year	30% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by 1 January 2005
Annual limit value for the protection of human health	Calendar year	40µg/m ³ PM ₁₀	12% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by 1 January 2005

Results and discussion

The results from 6 monitoring sites in 2007 were almost identical to the results from the previous year.

All of the sites had days where the limit value of $50\mu\text{g}/\text{m}^3$ was exceeded. However, all sites were well within the legislative requirements of a maximum of 35 days.

Table 8: Levels of PM ₁₀ recorded Dublin City 2007		
Location	2007 Annual Mean ($\mu\text{g}/\text{m}^3$)	No. of days $>50\mu\text{g}/\text{m}^3$
Phoenix Park	12	2
Coleraine St	18	6
Marino	13	2
Rathmines	17	7
Winetavern St	18	7
Ballyfermot	15	5

Atmospheric Lead (Pb)

Exposure and health effects

Lead was widely used in petrol until the early 1990s in Ireland but since the introduction of lead free petrol, the levels of lead detectable in air have dramatically reduced. Internally, lead based paint was also popular in the past. Other industries that produce lead particles are various metal processing plants. Not surprisingly, levels of air borne lead in Dublin City are at their lowest levels for many years.

Lead is a highly toxic substance, exposure to which can produce a wide range of adverse health effects such as fatigue, irritability, loss of appetite and insomnia. Lead poisoning in children can result in brain and kidney damage, learning disabilities, hyperactivity and behavioural problems. Young children under the age of six are especially vulnerable to lead's harmful health effects, because their brains and central nervous system are still developing.

Atmospheric lead can be removed from the air by rain, and deposited on soil. This is the greatest risk to children playing in contaminated soil due to the chance of them ingesting the soil.

The limit value for lead is set out in Schedule 4 of the Air Quality Standards Regulations 2002.

Table 9: Limit Value for Lead			
	Averaging period	Limit Value	Margin of Tolerance
Annual limit value for the protection of human health	Calendar year	0.5µg/m ³	60% from the date of entry into force of these Regulations, reducing on 1 January 2003 and every 12 months thereafter by equal annual percentages to reach 0% by January 2005

Results and discussion

Lead was monitored at 4 locations in 2007 at Winetavern Street, Coleraine Street, Rathmines and Kilbarrack. The results indicate the presence of very little lead in the atmosphere, and are identical at each site. As can be seen from the table below, the levels of lead are negligible and a good indicator of the benefits of removing lead from petrol.

Table 10: Lead results for Dublin City 2007		
Site	2006 Mean $\mu\text{g}/\text{m}^3$	2007 Median $\mu\text{g}/\text{m}^3$
Coleraine St	0.01	0.01
Winetavern St	0.01	0.01
Kilbarrack	0.01	0.01
Rathmines	0.01	0.01

Background Air Quality Monitoring

Black smoke

During the 1980s there were 18 black smoke and sulphur dioxide monitoring stations in Dublin City. These provided information on daily air quality at these sites during the particularly bad years of smog in the city. With the improvement in air quality since the introduction of the coal ban, and the development of new technologies for monitoring air quality, these sites have been dramatically scaled back and there are currently only 4 such sites operational in Finglas, Cabra, Crumlin and Ringsend.

Black smoke monitoring is now carried out as a form of background monitoring, using the benchmark of EU Directive 80/779/EEC, although the standards in this Directive have now been superseded by more recent Directives dealing with particulates.

Results and discussion

The results for 2007 indicate that the sites all comply with the EU limit values. The maximum level of smoke was recorded at Crumlin, with $38\mu\text{g}/\text{m}^3$. It is encouraging to note that all levels were within the guide values as set out in EC Directive 80/779/EEC.

Table 11: Smoke results for Dublin City 2007			
Site	Annual Mean Smoke $\mu\text{g}/\text{m}^3$	Annual Median Smoke $\mu\text{g}/\text{m}^3$	Maximum Smoke $\mu\text{g}/\text{m}^3$
Ringsend	2	0	26
Cabra	4	2	29
Crumlin	6	5	38
Finglas	6	5	26

Control of Volatile Organic Compounds (V.O.C.s)

V.O.C.s are air pollutants which can have detrimental effects on human health by contributing to respiratory illnesses, and some VOCs are mutagenic or toxic to reproduction and harmful to the unborn. They also have harmful environmental effects (crop, vegetation and materials damage, reduced visibility) when they chemically react with oxides of nitrogen and sunlight to form ground-level ozone.

Potential sources include vehicle emissions, fuel combustion and domestic solvent usage. Other major sources of VOCs include commercial and industrial activities using organic solvents.

The Emissions of Volatile Organic Compounds from Organic Solvents Regulations 2002 introduced controls on emissions of V.O.C.s from various sectoral activities ranging from dry cleaning and pharmaceutical manufacture to vehicle respraying. .

During 2007 the Air Quality Monitoring and Noise Control Unit issued 18 certificates of compliance to operators of facilities using V.O.C.s in their operations.

With effect from 2008 new regulations will come into force that deal with the control the V.O.C. content of certain paints, varnishes and vehicle refinishing products which are placed on the market.

Research

AIRMEX project

In May – June 2007 Dublin City council collaborated with the Joint Research Centre of the European Union and University College Dublin in the Airmex project. This project studied indoor air quality in a number of locations across a range of European cities. The Dublin City Council properties involved included Civic Offices, a crèche and a library. The interim report indicates that various indoor pollutants (both chemical and biological) are at very low levels within these premises and well below any levels that might give rise to any public health concern. The object is to repeat the exercise in 2008, at which time a full report will be issued.

Reference Material and Internet Addresses

For information on services provided by Dublin City Council:

<http://www.dublincity.ie/>

For Information on real-time air quality monitoring:

<http://www.epa.ie/whatwedo/monitoring/air/data/>

For updates on developments at European Union level on air quality:

<http://ec.europa.eu/environment/air/index.htm>

For information on developments at European Level on noise control:

<http://europa.eu/scadplus/leg/en/s15003.htm>

For information on national environmental issues:

<http://www.environ.ie/en/>

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