



The Whistle

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ASTHMA & INDUSTRIAL AIR POLLUTION

A Failure of Regulation

Freedom to Care
Campaigning for Ethical, Open & Accountable Organisations

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Important Notice

Every effort has been made to ensure accuracy and fairness in this report. It is made purely in the public interest (the interest of Pembrokeshire children in particular) in order to provide a *prima facie* case for an independent inquiry into regulatory breaches in the management of industrial emissions in Pembrokeshire and elsewhere in the UK. If any inaccuracies or misleading propositions remain we apologise for them and sincerely hope that an inquiry will uncover the whole truth. We do not believe confidentiality has been breached at any point, but if it has then this will be due to the paramountcy of the public interest in our thinking on this matter.

Acknowledgements

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Related literature is available from **FOE Cymru**, 33 The Balcony, Castle Arcade, Cardiff CF1 2BY, Tel. 0222 229577.

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FREEDOM TO CARE is a voluntary organisation and a company limited by guarantee. Its patrons are John Hendy QC and Allan Levy QC. It supports employees victimised for speaking up with a public concern and campaigns for ethical, open and accountable organisations. It is organised into a number of occupational networks which meet regularly, for example, a healthcare network and a scientific & medical research network. Membership costs £18 per annum (£3 for those on low income) and members are entitled to attend meetings and receive two issues of 'The Whistle' (special reports) and three issues of the 'Campaign Report' per year. For information contact :

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MAIN POINTS

- A retired doctor has shown that the burning of toxic waste in a power station or cement works leads to increased incidence of asthma in primary school children previously healthy
- An area in Southwest Wales, in the pollution fallout 'footprint' of the Pembroke power station, has probably the highest asthma prevalence in primary school children in the UK
- Pembroke power station, which has been burning bitumen waste on and off since about 1992, is applying for permission to burn more bitumen waste plus a Venezuelan bitumen emulsion to become the world's biggest such power plant when working flat out
- The warnings and concerns of forty one practising doctors in Pembrokeshire are being totally ignored
- The area public health department has published gross misinformation to mislead the public and regulators and to try to muzzle research findings in order to support the power company
- The regulators (Environment Agency, Environmental Health) have failed in their duty to protect the public. They are not monitoring the very fine particles which cause asthma, heart deaths and cancers, as they are refusing to install PM2.5 monitor heads in the high risk areas
- The Environment Agency is in breach of the Environmental Protection Act 1990 in that it has allowed health damage by local industrial emissions which they are supposed to prevent.

RECOMMENDATIONS

- Present proposals for Pembroke Power Station should be scrapped as unsafe
- National and properly resourced epidemiology of health damage by waste burning power stations, cement works, incinerators, waste sites and opencast coal sites should be conducted by the Department of Health
- The Department of the Environment should institute a thorough inquiry into the ineffectiveness and failures of the Environment Agency in policing and enforcing the regulations of the Environment Protection Act 1990. Funding of the agency should be independent of the polluters.
- The General Medical Council should use an independent investigative team to examine the actions of Dyfed Health Authority's public health doctors and their dissemination of gross misinformation.

Technical terms

Asthma = breathing difficulty from inflammation of the lungs due to allergens, irritants and toxic material leading to airway constriction; can become chronic.

BATNEEC = Best Available Techniques Not Entailing Excessive Cost

Baseload fuel = the main fuel for continuous operation

Bitumen bottoms = A tar-like substance left over from oil refinery

BPEO = Best Practicable Environmental Option

COSHH = HSE regulations on the Control of Substances Hazardous to Health

Cumulative sequelae = a piling up of medical problems in a patient

Dioxin = a very dangerous cancer-causing chlorinated hydrocarbon

Flue gas desulphurization (FGD) = removal of most polluting sulphur dioxide gas

Heavy metals = nickel, lead, arsenic, chromium, cadmium, vanadium many of which cause cancers, asthma and other disease

Ingestion = taking into the body through mouth, swallowing

Inhalation = breathing into the lungs

Immune-compromised patients = patients who have a weakened resistance to infection due to drugs or disease, so get sick easily

Nitrogen oxides (NOx) = nitric oxide, nitrogen dioxide; which affect breathing

Opencast coal mining = the mining of coal from above ground, which throws up a lot of coal dust into the air

Orimulsion ® = Bitor's trade name for bitumen/water emulsion

Ozone = a form of oxygen, a gas which in the upper atmosphere helps block radiation, but too much at ground level harms health

Particulates = tiny particles, fragments, dust in the air

Peak-low meter = measures how rapidly air is breathed out

Petcoke = a toxic processed bitumen bottoms fuel

Plume dispersion = spreading cloud of chimney fumes

Plume grounding = the fall of a cloud of chimney fumes to the ground

PM1 = particles of a diameter of 1 micron, that is, one thousandth of one millimetre. The monitoring standard is PM10. There will be 1,000 PM1 particles in the space of one PM10 particle. Half of all PM10 particles can pass into the lungs. Many pollen grains are about PM10.

Pollution abatement equipment = devices to reduce pollution at source

Polycyclic aromatic hydrocarbons = carbon-hydrogen compounds such as benzene

SLF = secondary liquid fuel. Waste oils, solvents, etc. mixed into an emulsion

Sulphur dioxide = an acid polluting gas which can turn to acid rain

Temperature inversions = weather causing warm emissions to be held near ground

Ugm/m3 = micrograms per cubic metre; measure of how much matter in a space

The Participants

Agenda 21 = principles agreed by UK at conclusion of Rio Summit on environment & sustainable development, with which County advisers should comply

Ainger, Nick MP (Labour, Pembroke)

Bitor = Bitúmenes Orinoco, S.A. Venezuelan company marketing bitumen emulsion (Orimulsion) from Orinoco oil fields.

CCW = Countryside Council for Wales

CPRW = Campaign for the Protection of Rural Wales

Delahunty, Dr. = Doctor who produced report for Dyfed Health Commissioning Authority in May 1995

DoE = Department of the Environment

DoH = Department of Health

DTI = Department of Trade & Industry

EA = Environment Agency (ex HMIP), started April 1996

EPAQS = Expert Panel on Air Quality Standards, DoE

Ferrers, Lord Earl - Environment Minister

FOE Cymru = Friends of the Earth Wales

Gummer, John MP - Secretary of State for Environment

Harrison, Mr Keith = retired BP technical manager

HMIP = Her Majesty's Inspectorate of Pollution, founded 1987, and later incorporated in Environment Agency

HSE = Health & Safety Executive, implements legislation such as Health & Safety at Work Act 1974

MAFF = Ministry of Agriculture, Fisheries & Food

National Power = privatised company which owns Pembroke power station

PCC = Pembroke County Council, Dyfed County Council existed prior PCC, that is until 31 March 1996

Pembrokeshire CHC = Pembs Community Health Council, representing patients

PHD = Public Health Department, a department in every health authority

PowerGen = a privatised company operating power stations

PCC = Pembroke County Council, formed 1st April 1996

PPDC = Preseli Pembroke District Council, now PCC

QUARG = Quality of Urban Air Review Group, DoE

Queenborough, Dr J = Director of Dyfed Health Commissioning Authority until 31st March 1996, then consultant to Dyfed/Powys Health Authority from 1st April 1996

Seal, Mr. = Director of the SPDC's Environmental Health Department

SEEC = Sea Empress Enquiry Committee

SPDC = South Pembroke District Council, now PCC

WDA = Welsh Development Agency

A Breath of Fresh Air

Geoff Hunt

FTC National Coordinator

Asthma out of Control?

Until the 1960s there were about 100,000 cases of asthma a year in the UK. Today there are **three million** cases and 1,600 deaths a year. There is hardly a school in any urban area in which children have no need for inhalers. In 1994 the NHS spent £380m on prescriptions for asthma drugs, an increase of 20% in two years.

Now new maps drawn up by a retired Pembrokeshire doctor, on the basis of his own research done without official funding, provide very strong evidence for the idea that air pollution causes asthma in schoolchildren. Three of his maps are published here. Dr Dick van Steenis, is a member of **Freedom to Care's** 'Fairness & Accountability in Science & Technology Network', and thinks the public ought to see the maps for themselves since the responsible authorities have not been taking them seriously.

The maps cover three quite separate parts of the UK and show a striking pattern of increased numbers of children taking inhalers to school downwind of industrial plants, particularly power stations. The nearer to the polluting industry the more inhalers are used; over one third of schoolchildren use them in one downwind locality. (Inhaler use is a good measure of asthma incidence.)

Since 1992 a great deal of poisonous waste, British and imported, has been incinerated in UK plants not designed to cope with it, such as power stations and cement works. The result has been a trebling of the asthma incidence locally and downwind of such plants in certain weather conditions.

Cheap and Dirty

A specific worry addressed in this issue of **The Whistle** is National Power's proposal to burn in a power station a natural bitumen mix imported from Venezuela and called Orimulsion®. This new fuel is cheap, and would save National Power money, but is dirty. It is planned to burn four to five million tonnes a year of this at Pembroke power station - making it the world's largest such plant, in fact twice all the other plants put together. Dr van Steenis' has produced a map for the area which shows that it already has very serious asthma problems downwind of the power station and oil refineries. The burning of Orimulsion without the most stringent pollution control could make matters worse. Orimulsion contains cancer-causing heavy metals such as nickel and vanadium which get into the air. (It also contains an additive called 'nonylphenol' which, if there was an oil spill, would cause great harm to fish and other sea life and probably human beings. The additive is known to damage the reproductive ability of marine animals. It is, of course, in this very same area that the tanker *Sea Empress* recently did so much damage.)

Communities in the USA have already rejected Orimulsion. There were demonstrations in Florida and the state government finally decided that the environmental harms outweighed the benefits.

The British Ostrich

The attempts by this conscientious doctor to gain the attention and action of the responsible authorities have been ignored or frustrated by these authorities. The Health & Safety

Executive has not prosecuted where they could and should have done, the Environment Agency (previously HM Inspectorate of Pollution) has allowed the Orimulsion application to proceed without due thought for the consequences, the local Public Health Department ordered Dr van Steenis to stop his surveys of schoolchildren, the local Environmental Health Department won't measure the very fine particles being emitted by local industry and has published misleading counter-information, and National Power (the power company involved) refuses to be open with its information and plans.

Yet Dr van Steenis has gained the support of no less than forty one community doctors in his area. Local environmentalists (such as The Council for the Protection of Rural Wales, Friends of the Earth, and the Phoenix group) are also very concerned and are opposing the proposal to burn of Orimulsion. **Freedom to Care** is particularly concerned about the failures of openness, ethics and public accountability. It is so typical of our secretive and closed political culture that once again a whistleblower has to risk everything in order to let the public know what it is their right to know anyway.

The Departments of Health and the Environment have recently woken up to the disease-causing impact of the dust (particulates) thrown into the air by power stations, waste incineration and other industrial combustion. The trouble is that they are not monitoring small enough particles - ones that get deep into the lungs - and they are not looking hard where they should be - downwind of industries burning dangerous substances. Although particles of size PM10 (see Glossary) have become an international standard for air pollution monitoring, the Americans are already questioning this and thinking about much smaller ones. Perhaps we should now be monitoring particles which are one-quarter that size or even less. It seems that 85% of the particles in the emissions from Pembroke Power Station have been less than PM1, far below the current monitoring standard.

It is vital to get the balance right between economic demands and environmental ones. But one cannot even begin if one is not prepared to look hard in the right place and face the truth. Does it make economic sense to save on pollution control and waste on NHS bills for the treatment of asthma and other diseases caused by air pollution? Litigation from thousands of poisoned people looms on the horizon. The prima facie case for localised particulate emissions causing asthma and other diseases, such as cancer, is now so strong that it would be negligent not to proceed with concentrated research followed by the necessary action. It appears that we are very far from meeting the recommended levels of the government's Expert Panel on Air Quality Standards (EPAQS).

'There is no evidence..'

The official UK government position is still that there is no evidence that air pollution can cause asthma, (although they say there is proof it can make it worse for existing sufferers). No doubt readers will remember similar announcements about the connection between BSE and CJD in humans. In October 1995 the DoH said 'asthma has increased in the UK over the past 30 years but this is unlikely to be the result of changes in air pollution.' In November 1995 the DoH said its recent work 'confirms that there is no evidence that healthy people are likely to be affected by airborne particles.'

Yet academic researchers working in occupational epidemiology have long established hard evidence that inhaled pollutants in the workplace can cause asthma in people who did not have the disease and would not otherwise have developed it. Then there is the evidence of ordinary people all over the country. It is surely quite unethical to ignore this background in dealing with the issue of whether outdoor air pollutants can cause asthma.

Public accountability, openness and the honesty and boldness to look hard in the right place would certainly bring a breath of fresh air.

INDUSTRIAL AIR POLLUTION AND ASTHMA A Failure of Regulation

Dick van Steenis MBBS

Let the people know the facts,
and the country will be safe
Abraham Lincoln 1861

PART ONE: ASTHMA IN PEMBROKESHIRE

INTRODUCTION

The Fresh Air of Wales?

With clean Atlantic air blowing in on the prevailing wind one might expect no major problem with asthma in Pembrokeshire, West Wales. However, the incidence of diagnosed asthma in the primary school children locally due to temperature inversions and downwind of the power station and three major oil refineries appears overall to be the highest in the UK along with one school near Greenwich and one at Arkwright, Derbyshire. As many as 37.9% of four and five year olds are using inhalers in the power station pollution footprint. It is postulated that emissions of particulates smaller than PM1 of vanadium, nickel, other heavy metals, and possibly polycyclic aromatic hydrocarbons are to blame, potentiated in summer by high levels of ozone associated with the nitrous oxides emitted from the complex. Levels of nitrous oxides in Pembroke in April/May have been at peak London traffic levels.

American public health studies of over half a million people confirmed an increase of asthma and cardiac deaths due to health damage from sulphate particulates being the products of combustion of various fuels. Environmental Health departments in Dyfed, West Wales refused to monitor particulates prior to mid-1996. Since the hospital was built in Haverfordwest in 1979 asthma admissions had been second highest in the UK. The power station opened in 1973. After privatisation, with the oil refineries utilising the maximum extraction from crude oil, the power station was left with residuals comprising what might be described as "bitumen bottoms" which could be mixed with oils like waste vehicle engine oil or even solvents, to be called "residual fuel oil", or could be emulsified with water like the bitumen/water mix called Orimulsion® that comes from Venezuela, marketed by Bitor. The previous oil burned was called "heavy fuel oil". Bitor's

data sheet for the Health & Safety Executive (HSE), which had been available to no one but was extracted by Mr Keith Harrison (a retired BP technical manager) from HMIP, states that inhaling the products of combustion poses health damage such as asthma from the vanadium, cancers from the nickel etc, which applies not only to Orimulsion but also to heavy fuel oils. The power station had been since 1992 operating on and off burning residuals supplied, we understand, by Texaco and maybe British Petroleum.

Using a cold chimney, in the circumstances, emissions would not rise in the air on most days but descend almost undiluted on local populations. They did not have any pollution abatement equipment.

In 1991 the power company tried to push through an application for baseload Orimulsion without abatement which was withdrawn after opposition. In October 1994 a new proposal was put forward with initial consent to apply from HMIP. The power company made a presentation to the Health Authority, councillors and others, but the public were not told until early January 1995. The Health Authority leaders made a further visit to the power station and then approved the application without further ado.

UNCOVERING THE TRUTH

Finding out for Myself

About the same time the CPRW (Campaign for the Protection of Rural Wales) had invited me to join their Pembrokeshire Executive, so I was asked to look into the matter as the proposal had major health implications.

At the outset I was not aware of these background matters and have had to delve. Having prayed for insight and wisdom I determined to ascertain the incidence of primary school children taking inhalers to school for asthma, having previously observed that my wife and huge numbers of adults and children had developed asthma in the locality during and since 1992, mostly without previous history. My technique I later discovered had been previously used by Public Health in Derbyshire and County Durham and by Environmental Health in Bristol. (It is a pity that GPs' software cannot yet print out disease, age and postcode correlations.)

When mapped out the results were extremely clear cut with over one in seven children taking inhalers to school in the high zone downwind of the power station for over 40 miles, with one in fifteen to the north and south of the hills delineating the high zone, with only one in thirty on clear coastal areas. When initial results were presented at a public meeting in Martletwy and published on the front page of the 'Western Mail' newspaper on 3rd March 1995, the effect on the local district councils and health authority was electrifying.

Shutting out the Truth

The power company was thrown off balance by the challenge to their claims of safety. The Director of Public Health and relevant Director of Environmental Health, without having read my report, issued a press release to try and "calm asthma fears" and the Director of Public Health ordered me and CPRW to cease contacting primary schools forthwith. They later said that our sample was not large enough, when we were in the process of contacting every school in Dyfed. I had already obtained results from 30 schools and doctors' surgeries in three towns where manual searches of practice records had been done.

'The Lancet' published on 8th April 1995 a letter of mine, highlighting the findings. Claire Williams, secretary to Mr Jackson of Pembroke Power Station, wrote to 'The Lancet' disputing the contents of my letter without evidence, hence the editor declined to publish her letter.

The Public Health Department later produced a report in the name of a trainee registrar as their official response to the planning proposal for the use of the local district council (SPDC) and HMIP, which was actually published by the manager of the power station before being issued to councillors. The report was full of misinformation, incorrect claims and data, graphs had been deliberately relabelled with what they were not, to come to conclusions about the relabelled headings that were hence not valid (rather like plotting prescription data for paracetamol and relabelling it prescriptions for appendicitis to conclude that there was a lower rate of appendicitis in Pembrokeshire than in the rest of Wales). The report did not cover many relevant issues at all, and mixed up data relating to primary and secondary schools. If the primary school alleged data was mapped out, it coincided largely with my map. Nobody had referred to the Bitor Orimulsion data sheet which also admits that 85% of the particulates of heavy metals etc. are of a size less than PM1, which would cause maximum health damage.

During subsequent months public meetings and articles in the press revealed vehement opposition to my findings and their implications by the power company, Environmental Health, the Health Authority and the local MP. The Public Health Director even wrote to GPs declining to seek data but instead backing the power company with lots of misinformation. This included a map of rural SO₂ (sulphur dioxide) deliberately instead of a town SO₂ map which would have shown Milford Haven as being the fourth highest in the UK.

Seventeen Times the National Average

The local Community Health Council (PCHC), however, did pursue my claims and arranged a special meeting. The Director of Medical Services at the local hospital checked hospital admission data on the hospital computer and printed out asthma coded admissions (ICD 9.493.9) per 1000 people per area of Pembrokeshire. The results concurred with my primary school asthma inhaler map and revealed that hospital admissions for asthma (which in published studies have shown a correlation with asthma incidence) to be 17 times the national average in Pembroke and Pembroke Dock and some 14 times the national average in Milford Haven, Neyland and Haverfordwest.

One local newspaper declined to print my case for the two years. Both local newspapers constantly carried major articles and editorials promoting National Power, mostly using the "local jobs" argument. At one stage an advert had to be bought by environmentalists at the cost of hundreds of pounds to enable just a few aspects of the case to be presented. Elsewhere a newspaper had been threatened that if it dared print anything against the polluting company they would be sued. At two public meetings I was deliberately prevented from being allowed to ask questions.

However, a representative of the 41 Pembrokeshire GPs backed by a public health consultant and university senior lecturer on an S4C (Channel Four Wales) TV programme castigated Public Health and totally agreed with my warnings. Meanwhile BBC television declined to broadcast a programme in English, in Wales or nationwide. The 41 GPs wrote a letter on 23rd July 1996 to the County Council, Welsh Secretary, local MP, Environment Agency and John Gummer MP (Secretary of State for Environment) demanding a public enquiry as well as warning of impending health damage.

Following the 'Sea Empress' oil spill in February 1996 off the Pembrokeshire coast the

public perception of the inherent dangers altered, and the MP now called for a public enquiry, which the power company had been desperate to avoid. I continued to investigate industrial air pollution and was asked to assist in other problem areas: toxic waste burning cement works, power stations and opencasting of coal and toxic waste sites where investigation revealed clusters of asthma, heart deaths and cancers of the breast, lung, bowel and renal tract. Government policy had previously been to dump waste on landfill sites with consequent dangers of local air and water pollution, but in 1992 with shortage of land they began to incinerate waste without dedicated plants (i.e. not fitted with adequate pollution abatement systems), leading to wide spread air and agricultural pollution. Also toxic waste is being moved so affected sites can be redeveloped, again sometimes causing major dangers to those living locally and downwind, threatening food chain safety.

Are Pollution Laws respected?

The suffering public, you and me, are supposed to be protected by the Health and Safety at Work Act 1974, the Environment Protection Act 1990, various European directives such as the Incineration of Toxic Waste and air and water pollution guidelines. But these seem to be blatantly disregarded by the regulators who comprise the Environment Agency (ex HMIP), the HSE, public health departments of the health authorities, and Environmental Health departments of local councils. As long ago as 1988 secret trials with burning emulsified hydrocarbons (Orimulsion) were carried out at Pembroke Power Station, using specially developed burners. No record of monitoring or safety precautions has been found.

My experiences during the past two years, some of which I discuss in the following pages, bring me to the sad and alarming conclusion that there is a need to investigate whether collusion has been taking place between the regulators and the polluters at the expense of the public. A colleague of mine was told that his small company would be bankrupted if he did not cease immediately opposing the power company's plans. British Telecom told me that with my "sensitive asthma research" I must expect the company to be tapping my telephone. Bitor, the Orimulsion supplier, is prepared to issue writs to prevent publication.

The Mayor of Dalhousie's Letter

The Mayor of Dalhousie, Canada, runs a consultancy introducing new business to his town. Apparently he introduced Bitor's Orimulsion to their oil/coal power station of 315 MW. After initial major problems of air pollution, the scrubbers were rebuilt and he has been happy since, especially as emissions blow out to sea. Recently an application for an extension was refused by the Canadian authorities on the grounds of excessive anticipated pollution. Meanwhile Pembroke power station's application is for 2,000 MW with emissions blowing onto land and people.

The Mayor wrote to the Florida authorities in April 1996 promoting Orimulsion, and Bitor copied this letter to key people in Pembrokeshire some months later. Orimulsion was refused in Florida and has not been allowed to be burned anywhere in the U.S.A. With tight controls those in Florida did not want a huge rise in NO_x (polluting gases) as would ensue in Pembrokeshire with consequent increases in toxic algae, and an experimentation on the population. The PCHC asked me to investigate the Mayor's letter. Following a long telephone conversation with him and subsequent fax I wrote a report to the PCHC on 23rd October 1996, which by 1st November 1996 had been faxed around the country by Lowe Bell Good Relations (PR company acting for National Power and Bitor). It transpires that they contacted the Mayor who was prompted to

write a letter to the Pembrokeshire County Council Chairman (dated 7th November 1996) to limit the damage of my PCHC report. Lowe Bell Good Relations then faxed the Mayor's letter between 13th and 20th November 1996 with press releases, but I was leaked copies.

In fact all the Orimulsion-fired power stations in the world put together add up to less than half the Pembroke application. Furthermore, National Power are building one in Spain by the gasification process which is much safer than their Pembroke proposal. The UK desperately needs a gasification plant to cope safely with oil-based waste, some toxic coking plant waste, etc. HMIP agreed in 1993 that this was the best way forward but nothing has been done.

PART TWO: THE NATIONAL EVIDENCE

**most of the available evidence does not support
a causative role for outdoor air pollution in
the initiation of asthma...**

Department of Health 19th October 1995

SUMMARY

Background

Studies into the health affects of UK air pollution have been few and almost entirely confined to the issue of traffic pollution, despite extensive documentation overseas. Evidence published confirms pollution exacerbating existing asthma, but investigations into consequences of UK industrial practices since 1992 of opencasting coal; waste sites; incinerating toxic waste and secondary liquid fuels in cement works, incinerators and power stations reveal health damage crying out for detailed study and action.

Method & Results

As existing GP computers mostly are unable to print out details of disease linked with ages and postcodes, I ascertained the proportion of primary schoolchildren taking inhalers to school for asthma over large areas in seven counties, mapping out the results with prevailing wind directions and fixed point pollution sources and various controls elsewhere, including results of manual searches of GP records.

I discovered, in broad terms, a trebling of the incidence of children taking inhalers to school for asthma, both locally due to temperature inversions and downwind of point sources burning toxic fuels without adequate pollution abatement with the incidence rising from zero to 10 percent in at least two schools, and a continuing steep rise year after year in the case of the worst sources. Local upwind areas remained at very low levels.

I discovered that many adults as well as primary schoolchildren, even those without a previous or family history, developed asthma for the first time only following a switch in fuel at the point sources. Results were identical in all areas surveyed which included over 23,000 children, which also revealed similar cumulative rises in prevalence of asthma in children within

three miles of opencast coal mines, where findings of PM1 size coal particulates within and outside buildings confirm exposure.

General Conclusions

The use of toxic waste/waste oils and solvent mixes in non-dedicated plants with inadequate pollution abatement, and also opencast coal mining, were found to cause a sharp rise in the prevalence of asthma in primary schoolchildren and others, with the rise including new cases of asthma associated with the pollution.

It is postulated that particulates of certain heavy metals such as vanadium, nickel, cadmium and arsenic and certain organic compounds are the causative mechanism, especially at times of concurrent high zone levels (associated with increased NOx and sunshine).

It is recommended that the method be used by community or public health officials to ascertain the current state of affairs, allowing investigations at a particular school which has exceptionally high levels (peak flow readings, history and tests). Local weather conditions and the temperature and nature of emissions determine outfall and consequent health damage. Cancer clusters have been discovered around toxic waste sites, confirming American findings.

RESEARCH DETAILS

Dyfed (Map 1)

In January to March 1995, I researched the incidence of asthma in 5 to 12 year old primary schoolchildren in Dyfed, Wales, obtaining carefully counted statistics of incidence of inhalers taken to school for asthma and mapped-out the results (**Map 1**). I telephoned head teachers repeatedly and in three towns, due to lack of co-operation, I was able to obtain figures from GP surgeries which had done manual searches of their records. Subsequent surveys were also carried out by telephone, sometimes backed up with letters, which allowed discussions about local problems and provided further information. With my system the response rate averaged around 80%.

Around the Pembroke greater area, with temperature inversions estimated at over 60 days annually, the prevalence of children taking inhalers to their primary schools averages 18%. Downwind with prevailing WSW winds the prevalence is some 14% as far as 45 miles. The adjacent area north and south of this long valley has a prevalence of about 6% whilst on the unaffected coastline prevalence was only about 2%.

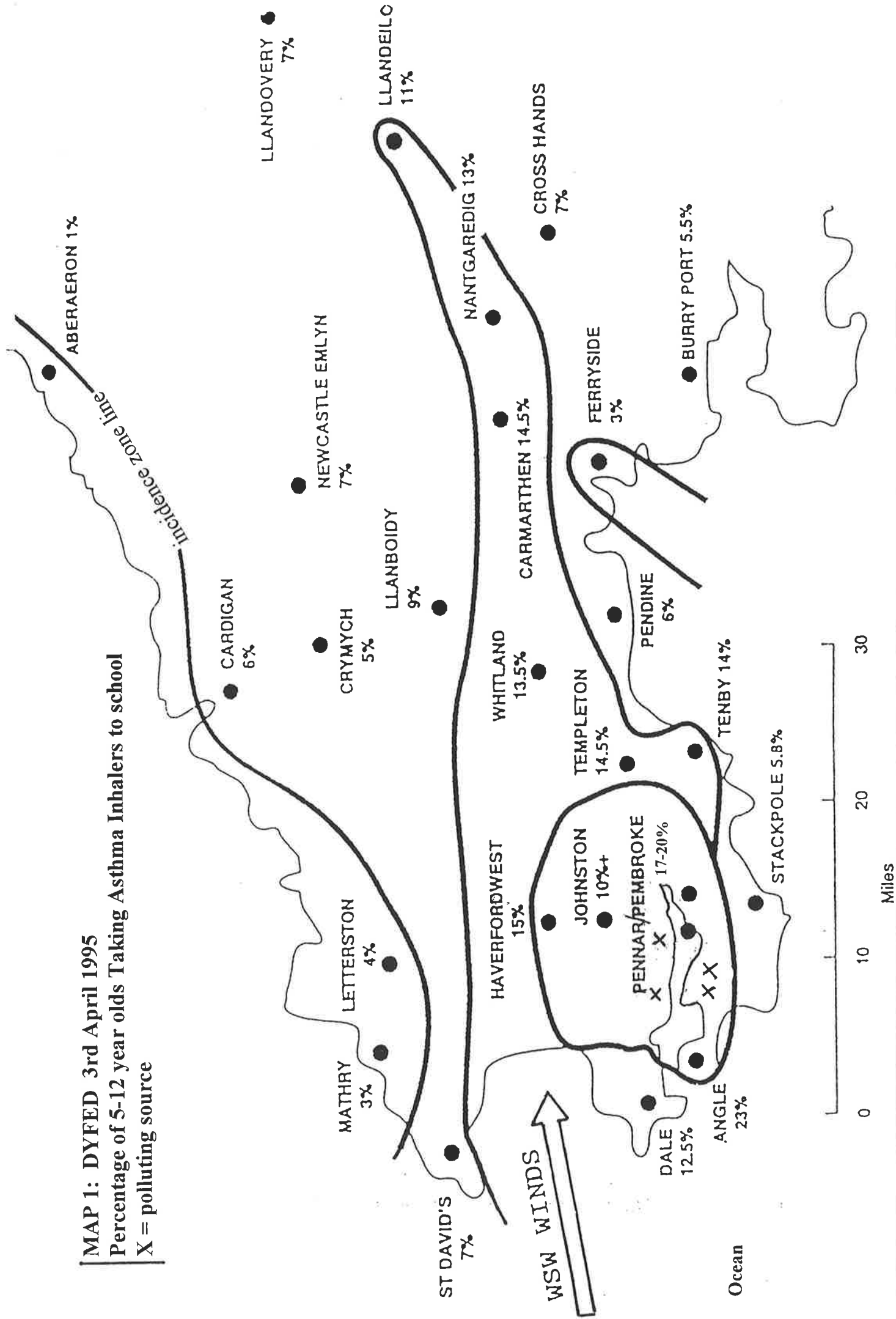
Similar results were obtained by Dr J Irving Spur of Weardale, County Durham, where upwind of the Eastgate cement works, only 1% of primary schoolchildren had asthma, whilst two miles downwind 7.1% had asthma, at four miles 12.5% had asthma and at eight miles downwind 9.1% had asthma. He analysed his surgery records. These effects would be expected from plume dispersion. Soil levels of heavy metals downwind from the cement works were double upwind levels.

In the Dyfed survey the lowest rate was 1% at Aberaeron and the highest at Angle of 22.7%, both on the seacoast. Cumulative effects of the bitumen waste burning power station along with asthma since 1992 beginning in babies resulted in a steep rise of prevalence of chronic asthma in infant school children by January 1997 typified by Whitland where 37.9% of four and five year olds now are asthmatic and the overall prevalence in the school of severe asthma is now

MAP 1: DYFED 3rd April 1995

Percentage of 5-12 year olds Taking Asthma Inhalers to school

X = polluting source



20.8% compared with 13.3% two years previously. Many asthmatics noticed an improvement in their condition during the months when the power station was closed. (Similarly in Derbyshire 27 to 34 percent of nine year olds were using inhalers where plumes or open cast dust appeared to ground.)

Analysis of 1,252 asthma hospital admissions (coded ICD 493.9) for 1993/94 at the Pembrokeshire NHS Trust Withybush Hospital (Haverfordwest), analysed into rates per 1000 population and into specific areas, confirmed my survey of inhaler usage at schools. On this basis hospital admission rates per 1000 were found as follows:

- Pembroke/Pembroke Dock 17.65
- Milford Haven/Neyland 14.49
- Haverfordwest 14.05
- Southeast Pembrokeshire 10.42
- North Pembrokeshire 6.74.

These figures are many times the national average, typified by Worcester Health Authority where rates per thousand annually between 1989 and 1993 averaged 1.07.

The Pembrokeshire high zone of primary school inhaler use is overall the worst in the UK yet found (apart from the two schools mentioned earlier). The Director of Public Health in March 1995 ordered me to cease contacting schools in Dyfed and this prevented the survey from covering a higher proportion of schools. Considerable opposition has been encountered in my research due to my "opening a can of worms" (BBC TV comment).

An investigation at three local schools near Gwaun-cae-gurwen affected by open cast coal mining, by the Welsh Office in 1993, revealed 12 percent of primary school pupils to have been taking inhalers to school for asthma, a further eight percent who had asthma symptoms undiagnosed. But when all the pupils were tested with peak flow meters before and after exercise the actual numbers diagnosed asthmatic amounted to 33 percent with most living one mile from the centre of the open cast. At Glynneath Dr Temple noted a cumulative rise in weekly new episodes of asthma in his practice following commencement of a new open cast mine, the rise being from 4.4 to 7.9 episodes (p less than 0.001) (13).

Northeast Derbyshire (Map 2)

Another study in Northeast Derbyshire in mid-1994 by Ken Coates MEP, with my own extra data added in June 1995, on a total of 8,318 children from 42 primary schools, revealed inhaler usage for asthma local and downwind from polluting chimneys and open cast mining at between 12 and 18 percent, dropping to seven percent under one mile from the high band, then to a more normal 4.5 percent clear of the pollution in North Mansfield, Clay Cross and the southern edge of Sheffield (**Map 2**).

At Arkwright primary school inhaler incidence was 33 percent near the centre of a huge open cast coal mine with brand new housing and school affected by the surface soil and coal dust churned up by diesel exhaust emitting machinery. The area affected by the coal mining particulates had a radius of some 3 miles (see **map 2**). At Grassmoor primary school just over two miles from Arkwright open cast, the inhaler usage rose from 11 percent after the open cast opened to 16 percent during the second year and 21 percent by October 1996, confirming the cumulative damage caused by particulate inhalation, with usage of inhalers varying with the daily weather.

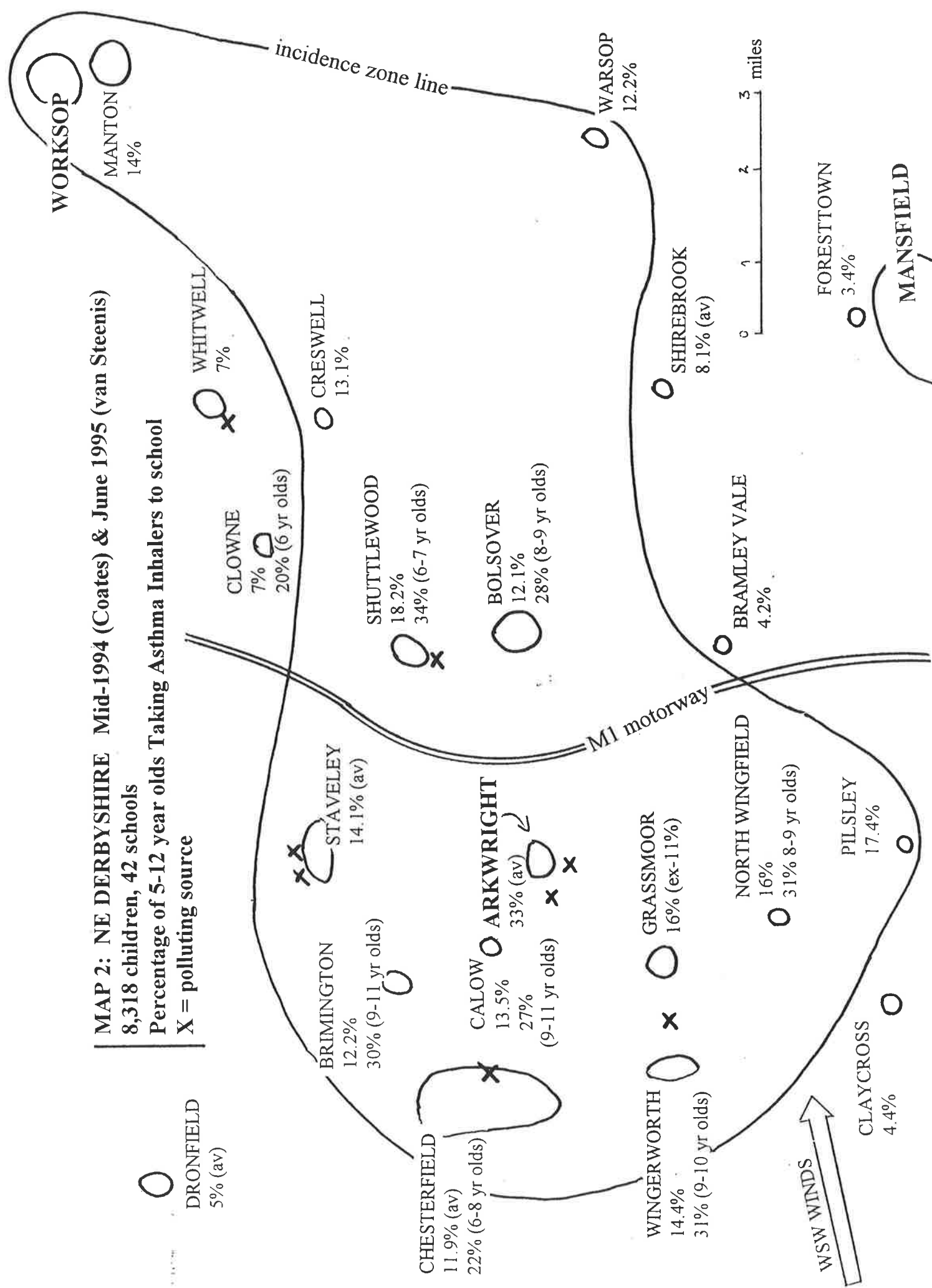
MAP 2: NE DERBYSHIRE Mid-1994 (Coates) & June 1995 (van Steenis)

8,318 children, 42 schools

Percentage of 5-12 year olds Taking Asthma Inhalers to school

X = polluting source

incidence zone line



Microscopy of dust samples within and outside buildings at Calow, Grassmoor and Bolsover revealed copious PM1 size coal particulates which would inevitably be inhaled by those exposed. For example at Calow, where 27 percent of 9 to 11 year olds took inhalers to school, PM1 coal was even discovered inside the local hospital building and at the bus shelter outside. With the prevailing wind, amounts of the PM1 coal particulates were slightly higher at Bolsover where 28 percent of 8 and 9 year olds took inhalers to school. Council SO₂ monitoring revealed that the highest levels in the county were at Staveley near a factory, which strongly suggests that the asthmatic problem is due to the particulates.

Preliminary results from some 125 schools surveyed in Greenwich/Bexley by the CHC in early 1996 reveal an ambient rate of 11.9 percent children taking inhalers to school with just one school at 30 percent at one at 20 percent in an area of heavy traffic and some 120 point sources of pollution. The latter two schools are being investigated as we go to press.

My surveys in primary schools in East Kent in 1995 showed an ambient rural rate of inhaler usage around six percent but at one school near Ramsgate downwind of the Orimulsion fired Richborough Power Station (closed March 1996) the incidence of children with inhalers rose from three percent before the switch to Orimulsion to 12 percent in the following three years. At Ellesmere Port near the Ince Power Station fired by Orimulsion, there have been so many complaints of asthma, a full survey of every 10th house is being undertaken by Liverpool University. Yet, Ellesmere Port receives downfall from Ince Power Station on about two days per week and the proportion of primary school pupils taking inhalers to school was found to be 13 percent. At Runcorn downwind of Ince, with downfall three or four days per week the proportion of those on inhalers was 17 percent. At Tranmere inhalers dispensed by the chemist trebled following the switch to Orimulsion at Ince. Of extreme concern was the admission by the Environment Agency dealing with Ince that they did not have the current Orimulsion data sheet which specifically warns that inhalation of the vanadium pentoxide and nickel compounds causes asthma, skin and eye irritation, respiratory tract cancers and other toxic reactions. Subsequently Powergen announced that Ince would be closed early 1997.

Emissions from coal fired plants have larger size particulates which are easier to trap in pollution abatement systems on flues and chimneys than smaller size particulates from secondary liquid fuels fired plants. Coal fired plants have flyash to absorb heavy metals and organics while oil based products, including petcoke, do not have adequate flyash, thus are a bigger hazard.

Ribble Valley, Lancashire (Map 3)

My study in June 1995 in the Ribble Valley, Lancashire, revealed a sharp rise in incidence of inhalers taken to primary schools in Clitheroe (with temperature inversions), and northeastwards into the Forest of Bowland and as far as Gisburn (**Map 3**). From an ambient rate of zero to five percent, we noted a higher band of 7.9 to 15.3 percent in relation to the cement works. This cement works began burning waste SLF mixes in 1992. The upwind village of Waddington had a rate of 2.9 percent usage, whilst near the chimneys, the Brookside school reveals a rate of 15.3 percent usage of inhalers, with a peak of 22 percent of 8 and 9 year olds. A survey of SO₂ levels by HMIP in March 1995 showed that no emissions from the cement works, near Clitheroe, were reaching Waddington, the Forest of Bowland was receiving emissions two or three days weekly, whereas Clitheroe was suffering daily. A milk dioxin level survey by the Ministry of Food, Agriculture and Fisheries (MAFF) revealed low levels at Waddington but levels four times higher at Clitheroe.

An analysis of prescribing for asthma by a large Clitheroe practice showed a steep rise following the switch of fuel at the cement works, including a 50 percent rise in steroid inhalers, 25 percent rise in oral steroids with 12 percent rise of total prescriptions. This again correlates with a rise in heavy metal emissions from the cement works including an 800 percent rise in nickel emissions. In August 1995 near Brookside mobile monitoring of PM10 particles revealed a peak of 490ugm/m³ compared with a peak of 75ugm/m³ at Waddington school. Unusually there had been easterly winds. Even NPL staff suffered health damage.

Lord Earl Ferrers, Environment Minister, has written that plume grounding at Clitheroe is not in dispute. Temperature inversions are more frequent at Clitheroe because it lies in a valley, averaging 16 days a month. In 1995 conditions were so dangerous that the Environment Agency (ex HMIP) declined to publish the results of the cement works chimney emissions onto the public register. The Public Health Department discovered that deaths in people under 75 years of age in four Clitheroe wards had risen to 40 percent above the national average, and a repeat primary school asthma inhaler usage survey around 1st October 1996 showed a steep rise in the local schools to almost double the 1995 figures, for example Chatburn school had risen from 10.8 percent in June 1995 to 19.0 percent October 1996, St James Clitheroe from 10.2 percent to 14.2 percent and Bolton by Bowland (zero until 1990) from 7.9 percent to 10.2 percent. By comparison Great Harwood school (industrialised Accrington, outside Ribble Valley) is 9.3 percent, and Barnoldswick, protected from the cement works by Pendle Hill, has a rate of only 3.8 percent. Even Waddington was affected by easterly winds and the rate doubled from 2.9 to 5.8 percent. This shows, I believe, that the effects of SLF burning plant emissions are cumulative, even from sub-lethal prolonged exposure. For example their lead, industrial solvent and halogenated hydrocarbon content are cardiotoxic quite apart from other health damage (14).

Cancers

Current investigations in the vicinity of coking plants in the UK at Wingerworth (Chesterfield), Abercwmboi (Aberdare) and Coed Ely are revealing not only an excess of cancer of the lung and other cancer deaths among the workers, but also clusters of breast and other relevant cancers among the population in the immediate vicinity of the waste sites, as would be expected following American studies (11). The scale of breast cancer incidence uncovered is particularly alarming, but should have been anticipated following warnings by Professor Epstein of Chicago who claimed in 1994 that as many as 70% of breast cancers were of environmental causes and hence preventable. At Wingerworth 12 women were discovered with breast cancer in 45 houses in 10 years, half of whom have already died. Nearby in Tupton another 10 have died of cancer. At Coed Ely out of 82 houses in the past eight years 24 people have died of cancers, comprising six gastro-intestinal tract, nine breast and nine lung, plus those not yet surveyed. This is more than 12 times the American incidence (11).

Ozone

Ozone has a further depressive effect on breathing ability (up to 25 percent) by setting up a lung cell inflammation for 24 hours which then would exacerbate the action of particulates such as vanadium, nickel, cadmium, as well as pollen, moulds, house dust mite and airborne viruses. A study among cyclists suggested antioxidant vitamin daily supplements, decrease airway hyperactivity (as does indomethacin) after exposure to ozone, but not the influx of white cells, which are reduced by prophylactic corticosteroid inhalers (5, pp 34-35). Several months exposure

to moderate concentrations of ozone leads to fibrotic and other changes in the lung lining (3, p 4). An editorial with associated papers in the 'British Medical Journal' (15) showed a logarithmic increase in asthma with six hour ozone levels above 80ug/m3 with a concomitant increase in daily mortality above 100/m3, especially when relevant particulate levels were also elevated. In Dyfed when ozone was monitored mid-1995 weekly averages in the high zone of **Map 1** were as high as 140ug/m3 near Haverfordwest. Many locals and others moving into this zone developed asthma for the first time in 1992/93, and this might be explained by the toxic residual fuel being burned by the power station from that time onwards. Local councils deliberately refused to monitor particulates in Dyfed until after the power station closed.

General Conclusion

While most research in the UK has investigated the effects of traffic and diesel emissions, my work indicates that industrial pollution is actually causing asthma in previously unaffected children and adults, explaining much of the surge in asthma incidence over recent years. Readers must note that the incidence of diagnosed asthma in the primary schoolchildren surveyed is about 1.3 times the school inhaler rate, as I have done controlled checks in several areas.

PART THREE: IS ANYONE REGULATING?

These issues are too important to ignore ...
As GPs, our duty is to highlight these potential health risks and
we strongly believe that a Public Inquiry is vital to ensure a balanced debate
We ... question the validity of the Dyfed Health Authority
1995 report on local disease patterns.
Letter from 41 Pembrokeshire doctors to Welsh Secretary, 23rd July 1996

LOCAL COUNCILS: **PLANNING & ENVIRONMENTAL HEALTH**

Preseli Pembrokeshire District Council (PPDC) Planning Department passed the power station proposal in January 1995 as quickly as they could. As they were not statutory consultees their decision was not binding on South Pembrokeshire District Council in whose area the application was sited. However, PPDC did cover a large area and population who would be directly affected by the proposal, and when the two councils amalgamated in April 1996 the early decision was used as an excuse by the new County Council to avoid any discussions whatsoever concerning the safety of the proposal.

When I saw the Environmental Health Department of PPDC concerning the very high asthma zone downwind of the power station in 1995, the Director said that the asthma was caused by gas cookers. I pointed out that gas was not available in many streets where asthma had arisen from 1992 onwards in the high zone. Other comments followed, all of which had been disproved by public health studies elsewhere. PPDC adamantly refused to monitor particulate

emissions in 1995/6. Furthermore Mr Watts of that Environmental Health Department had written to the Health Authority on 17th October 1994 asking whether the perceived increase in asthma incidence locally was not due to the pollution. Yet we have the response of the director in July and September 1995 deliberately trying to rubbish my report with unfortunate comments and deliberate misinformation taken from the March 1995 press release. This director took early retirement in March 1996. It was very interesting to note that Milford Haven SO₂ levels measured by his council were the fourth highest in the U.K. in 1994, and ozone levels when they dared to measure them in summer 1995 were in excess of critical health damage levels at all sites in the high asthma zone of my map (but below the critical level in the intermediate zone). SPDC Environmental Health Department also refused to monitor particulates in 1995/6.

The Director, Mr Seal, without reference to his chairman, issued the misleading press release on 23rd March 1995 in the names of himself, his press officer and Dr Queenborough, following a meeting in his office with G Davies, Drs Queenborough and Delahunty and me and Mr G Sinclair of CPRW. The press release made unreferenced, unsubstantiated and derogatory allegations about my findings. Mr Davies pressed the Health Authority for an alternative report to mine. That HA report was produced in the name of Dr Delahunty in May 1995 but was published by the manager of the power station before councillors were allowed to see it (at a special council planning meeting at which the HMIP officer was present). Councillors were very angry they had not been given opportunity to read the document and formulate questions. At a subsequent report for the power station liaison committee it was clear that all particulate emissions since its inception had been estimates. Furthermore the compilers of the council report assume that the vanadium and nickel content of the fuel being burned remained constant since 1973 when it was quite obvious that this is not the case. Even the fuel oil authorization sheet issued by HMIP dated 1st October 1970 allowed for the vanadium content in one batch to be 30 times higher than in another batch, without even contemplating further increments as the fuel became residual fuel oil since about early 1992.

Mr Seal in 1996 appointed the power station's PR secretary to be the Agenda 21 Coordinator for the new county council. At the first main Agenda 21 meeting discussions were held about future projects and areas of involvement, and the new Coordinator wrote up the minutes and without having these approved as a true and accurate record gave them to the newspapers. Non-council members were not invited to the second meeting, but found out unofficially.

When the new Pembrokeshire County Council was formed the Department of Trade & Industry (DTI) instructed them that they were the new relevant planning authority for the Section 36 (Electricity Act) application. The planning committee were determined to pass the power station proposal without mentioning any health matters or ensuring shipping safety or removing from the final vote all those who had a pecuniary interest in the application. The DTI, Countryside Council for Wales, and the Welsh Office put a holding order on the council at their first efforts to bulldoze an approval through. But on 12th December 1996, Councillor Hall (who had previously organised a public meeting to promote the power company's application to which only those who were in favour were invited) proposed a motion that the DTI's advice and the previous holding order be ignored and that the proposal be passed forthwith. The motion was passed. The formal letter of the 41 practising GPs of Pembrokeshire of 23rd July 1996 which had been sent to the council chairman and council members, was totally ignored and health dangers of the Orimulsion proposal were not even mentioned at the council meeting. When the DTI complained, a special

meeting of councillors was held to discuss the holding order later on 18th December 1996.

In accordance with new legislation four particulate PM10 monitors were installed by the county council in mid-1996. As some 85% of emissions would be below PM1 this exercise might be described as a waste of taxpayers' money as at least PM2.5 heads should have been used and preferably PM0.5 heads. Furthermore, the siting of these monitors avoided the peak pollution areas such as Neyland, Johnston, Milford Haven and Pennar. Despite challenge they refused to alter them.

On 7th January 1997 reporters from a national Sunday newspaper who were researching asthma were refused access to any school in the county by Pembrokeshire County Council Education Department refused. This is hardly surprising following my experiences and previous prohibitions.

Officers of Dyfed County Council (prior to Pembrokeshire CC) in mid-1995 deliberately omitted to mention "particulates" in their planning report for the Pembroke power station, even though I had warned them of health risks from particulates. Similarly in 1996 when the Welsh Development Agency (WDA) proposed Tesco's meat plant be sited 700 yards north of the Trecatty toxic hazardous waste site, the environment report and planning reports referred to Trecatty (one of Europe's largest) as "disused works" and "landfill". This was despite a 6,000 signature petition objecting to the siting in such close proximity to the waste being dumped (plus the problems of the road planned to be widened).

HEALTH AND SAFETY EXECUTIVE

The Health & Safety Executive was set up to implement the Health and Safety at Work Act 1974 and related functions, which involve monitoring of the responsibilities of employers to ensure the safety of their staff. It puts a duty on employers not to harm the public and specifically not to emit poisonous substances into the air (see box). Where hazardous substances are used in an industrial plant factory data sheets are obligatory under the Control of Substances Hazardous to Health (COSHH) regulations.

HEALTH & SAFETY AT WORK ACT 1974

Section 3(1) of the Act says, 'It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.' Section 3(3) requires that such employers give information about health effects to those who may be affected. Section 5(1) of the Act says, 'It shall be the duty of the person having control of any premises ... to use the best practicable means for preventing the emission into the atmosphere from the premises of noxious or offensive substances and for rendering harmless and inoffensive such substances as may be so emitted.'

Mr Keith Harrison discovered that the regulations are being flouted in that National Power are and have been burning bitumen bottoms waste without a data sheet at Pembroke Power Station. Castle Cement also declined to produce a data sheet at times when the public were being made ill

by their emissions at Clitheroe when they were using up to 90% SLF (oil and solvent industrial waste) as fuel. It remains to be established why the HSE are so reluctant to prosecute. At Clitheroe last year when a spill of a toxic fuel occurred and staff were affected, HSE was contacted, but a prosecution was handed over to the Environment Agency, when it was really an HSE matter. The absurd situation arose that court adjournments resulted from vital submissions not having been exchanged by the EA. Then one of the company managers boasted that the company would not be fined much, if at all. Eventually a £4,000 fine was imposed.

Regarding the coking industry the HSE has not itself carried out any studies into cancer among workers but they claimed that they regularly monitored research by others. These include reports published in 1983 and 1987 leading to a 1993 review which confirmed increased risks of lung and genito-urinary and kidney cancer mortality in workers dealing with coke ovens (Circular from HSE Director General, 8th March 1996). What alarms me is that the population exposed around the plants have not been considered worthy of a study anywhere (despite Section 5 of the Act, see Box).

In 1984 the HSE had no comment to make concerning an application for a waste disposal licence at Abercwmboi at an area called the White Horse Stocking Site. The previous waste tip represented a pond into which all the toxic rubbish was dumped until 1987, that is, 13 years after the Control of Pollution Act 1974. No licence has ever existed for that tip. There were clear dangers of pollution of the River Cynon from the 1984 application but it was passed. In 1991 the phurnacite works were demolished and the demolition waste was dumped on the White Horse (1984) site despite no planning or licence existing for that demolition waste. What was the HSE doing between 1974 and 1991?

Proposed reclamation has now in consequence become a nightmare scenario with the Welsh Development Agency involved in Wales, and English Partnerships in England. The HSE does not appear fully to comprehend the dangers not only to workers but to the surrounding public affected by bulldozing and transporting hazardous waste in open vehicles. Sites to which the waste is moved are being protected only by plastic sheeting and clay, which is almost certain to result in leaching of the contaminated products into the local water, both surface and underground, hence putting some present and future water supplies at risk. For example at Coed Ely in 1994 some residents developed asthma for the first time in their lives due to the particulate matter thrown in the air by partial clearance of the site. No doubt there will be a cancer risk in years to come.

The HSE is also unwilling to prosecute National Power in spite of massive health damage probably having resulted from its burning of bitumen bottoms without any pollution abatement equipment, and trying to pass the buck to the Environment Agency. When data sheets on North Sea crude oil were not used by local councils and the 'Sea Empress' incident team (SEEECC) in protecting workers following the 73,000 ton oil spill from the tanker 'Sea Empress' again the HSE refused to prosecute the councils. Yet some workers became ill from lack of stipulated protection, and the Pembrokeshire County Council refused follow-up medical examinations on the workers and refused to supply names and addresses of the workers for medical surveillance.

The question must be asked why the HSE declines to prosecute following breaches of the Act? Following further correspondence between the HSE and Mr Keith Harrison and myself the HSE wrote on 20th December 1996 to say that Sections 1(1)d and Section 5 of the 1974 Health and Safety Act (covering industrial emissions) were repealed in parliament with effect from 16th December 1996. Both Mr Harrison and I had been informed by the HSE helpline of the

contents of Section 5 within days of 16th December 1996 (see box below).

ACT'S SECTIONS TRANSFERRED

Freedom to Care is inquiring into this repeal of sections 1(1)d and 5 of the Health & Safety at Work Act. So far it has been told by the HSE that the sections have been transferred to the Environmental Protection Act 1990 (EPA), that the transfer is determined by committee and not by any parliamentary discussion and that statutory instrument 3056 (1996) was employed. **Freedom to Care** is curious about the effect of the transfer and has written to Dr Douglas Bryce at the Department of the Environment and Mrs J Willis at the Health & Safety Commission. As a result of our concern the office of Austin Mitchell MP has written to John Gummer, Secretary of State for the Environment, asking for clarification. In particular we want to know if the new sections in the EPA will have the same force, scope and effectiveness as the previous sections in the Health & Safety at Work Act. The timing of the transfer is also interesting.

With legal aid becoming more difficult to obtain and the Environment Agency failing to act effectively the prospects for the affected public are bleak. I have now discovered that Sun Alliance Insurance Company has issued a notice to policy holders of an important change to their policies entitled 'Pollution Exclusion' which means the insurers will no longer pay out on any claims or expenses caused directly or indirectly by pollution which could or should have been expected, were intentional and not a sudden incident, or were not during any period of insurance. My fear is that the HSE, the Government and insurance companies are well aware of the consequences of current industrial air pollution and are taking preemptive action to deny the public proper channels of protection and recompense.

HMIP (NOW ENVIRONMENT AGENCY)

As a result of the 1976 Royal Commission on Environmental Pollution (Fifth Report), Her Majesty's Inspectorate of Pollution (HMIP) was established in 1987. It was followed by the Environmental Protection Act 1990 which specifically instructs HMIP to curtail or neutralise emissions so that they do not cause any damage to human health, senses or property. The underlying principle for authorising or insisting upon modifications of industrial plant should be the "Best Practicable Environmental Option (BPEO)". In the field of air pollution control within the general context of integrated pollution control (IPC) HMIP was the enforcement agency for about 2,000 works with the greatest pollution potential. For those polluting the air, as a concession, the Government allowed a dilution of standards to that of "Best Available Techniques Not Entailing Excessive Cost (BATNEEC)". Publication of the WHO Report in October 1995 led to a Government response in recognition of the need for tighter limits on certain items contributing to air pollution such as a limit of 50ugm/m³ of PM₁₀ particulates at ground level.

By mid-1994, following detailed American studies and the advice of the White Report (an independent report to HMIP), the leadership of HMIP agreed that the safe and best way forward for dealing with industrial oil waste including residual fuel oil and Orimulsion was by gasification. The oil is first turned to gas, which means pollutants can be much more effectively controlled. Yet today no such plant exists or is proposed in the UK. The Spanish Government is building such

plant. Despite this knowledge HMIP Cardiff in late 1994 allowed National Power to go ahead with an application to convert their Pembroke power station to Orimulsion and oil refinery waste residues, using inadequate electrostatic plates and flue gas desulphurization (FGD). By July 1995 HMIP guidance to IPC (Integrated Pollution Control) was that the addition of ceramic or fabric filters would represent current best technology standard and fabric filters were to be considered for all scales of operation. However, the Cardiff Inspector had not told National Power this fact.

It was further clear that the extremely fine particulates from Orimulsion penetrate through FGD systems and would accumulate in humans by inhalation and the food chain. In the public HMIP record I found a comment that the proposed air levels of nickel and chromium anticipated by the National Power application would be "intolerable". The HMIP officer insisted he did not know that asthma could be caused by inhalation of nickel particulates even though it is described in the medical literature (for example, on page 693 of Casarett and Doull's 'Toxicology' 5th Edition. The same textbook also describes its role in producing lung cancer.) Yet the Environment Agency still persist in pressing on with the application process.

National Power produced an environmental report about October 1994 without local weather maps, without local heavy metal air or soil surveys and without ancillary jetty arrangements. The HMIP officer gave presentations sometimes with National Power or in their company at various venues between October 1994 and May 1996. Despite complaints from 41 local GPs and myself, and the evidence of a public health consultant and university senior lecturer that the Health Authority 'Delahunty Report' of May 1995 was flawed and full of misinformation and alleged scientific medical fraud, the HMIP (now Environment Agency) Officer has written that he is determined to stick to that report. The officer thus dismisses complaints and comments by the doctors as anecdotal instead of heeding these 44 doctors and calling for a public enquiry or, even better, dismissing the National Power application as not being up to the required standard for protecting the health of the public according to the 1990 Act.

When Keith Harrison asked the Environment Agency officer covering Ince power station about their Orimulsion data sheets they had an obsolete version and not the December 1993 one, which stipulates that inhalation of the products of combustion would be expected to cause asthma and cancers (as with heavy fuel oil, perhaps to a lesser extent). A few weeks later Powergen announced that they were closing Ince in early 1997. Why did the HMIP officers in Cardiff not pass on the Orimulsion data sheets produced by Bitor to the Health Authority and relevant councils and order the health warnings to be printed in the environmental assessment? (One notes health warnings on cigarette packets!) It was only due to persistence by Mr Keith Harrison that he was able to prise out the data sheet from HMIP.

What is the Power Station Burning?

Although HMIP allege they knew the ingredients of the product being burnt at Pembroke Power Station, they allowed huge variations from batch to batch, did not insist on a data sheet for HSE laws and when challenged by me repeatedly refused to sample the contents of the fuel tank at the power station. An HMIP Officer even told me there was no fuel tank because it was piped in direct from Texaco. When the power station admitted their tanks were nearly empty when containing 10,000 tons the falsehood was blown wide open. The power station manager admitted at a public meeting that he was also receiving ship loads of fuel from elsewhere. Mr Harrison investigated this and it could well have been from BP who produce bitumen and they would also have waste, including spent oils collected by Swansea Council such as motor vehicle oils (which

apparently are not recycled at Llandarcy refinery but are sent away for "disposal"). The Environment Agency Officer wrote to Mr Harrison that BP did not produce fuel oil and anyway, it was now owned by Mobil. I telephoned the Llandarcy refinery and was told they still produce every grade of fuel oil and that BP was still producing bitumen.

When the power station resumed operations in November 1996, having been closed since 31st March, I was told backdated authorization was given at a subsequent date. The MP (Mr Nick Ainger) then wrote to Mr Harrison that the power station were burning No 3 fuel oil. When I questioned a refinery about No 3 it was described in a 1950 American textbook as being the next grade down from domestic heating oil and had been obsolete in the UK for some 30 years and had not been for sale in the UK for at least 15 years. From the descriptions given one might have expected the power station to have been burning No 3 or 4 oil in the 70s, No 5 in the 80s and No 6 since 1992 (the worst). Why was it not possible to locate in the Public Register details of the fuel burnt at Pembroke Power Station and detailed emissions coming out of the chimneys? Equally worrying is the lack of information concerning the 1988 secret trials of Orimulsion at the power station.

The Public Relations line

Following the incorporation of HMIP into the Environment Agency on 1st April 1996, an office was opened in Swansea and a free complaints phone number was supplied. A number of complaints about health and smell damage of emissions were fobbed off by officers with comments such as: the dark orange/brown emissions were steam seen in poor light (even though photographed), emissions were due to sprays on the field adjacent to my house (never sprayed), due to coal fires (only three in adjacent 120 houses), "in the mind" (even when another person complained from another part of the town).

Secret Agendas?

HMIP covering Cambridge is also interesting. When the cement company wished to switch to SLF (industrial oil/solvent waste) the local Medical Research Council said that a full survey of the health of the children in the area expected to be polluted by the plant should be undertaken plus 25 independently monitored unannounced readings of details of air pollution over a period of 5 months before any authorisation for permanent use be given. Instead HMIP, and now Environment Agency, has been giving authorisation based on one sheet of readings done by the polluter itself. This has applied to SLF in cement works, tyre burning in cement works and no doubt many other sites and situations. At Thrislington the Agency gave approval for permanent SLF use based on one day's results out of a three year trial.

Why did HMIP Cardiff not call for these health surveys and unannounced independent monitorings local and downwind of Ince and Richborough where small amounts of Orimulsion were being burnt, and the same around Pembroke following the burning of bitumen bottoms residual fuel oil before contemplating allowing stage one for an application by National Power using what they knew was the wrong process? This is a very important question. Two experts told me how decimal points were conveniently moved in self-regulation one-sheet reports to mislead. After two months notice of a site visit it is easy for a company to fiddle by switching fuel tank contents, and invoices can be worded appropriately. Comments concerning new fuels claimed to be less polluting need to be carefully checked out as to what they really mean, because

in some areas a slight reduction in SO₂ emissions has been interpreted as meaning a cleaner fuel while deliberately hiding massive increases in heavy metal, dioxins, and/or toxic organic compounds, which would really cause massive health damage.

Secrecy prevails under the guise of commercial confidentiality concerning the truth of emissions and fuel composition. Why is the Environment Agency not revealing exactly what "special" waste is being dumped next to homes in various areas? At Nantgwyddion Refuse Site (near Tonypany) the Environment Agency allowed the dumping of industrial toxic filter cakes on a site only licensed for domestic and inert waste. This resulted in vociferous complaints of health damage including sore throats, also noxious odours due to the hydrogen sulphide etc. produced, clearly a breach of the Environment Protection Act by the Environment Agency. The same waste was refused by Trecatty (Merthyr Tydfil) following complaints to the Merthyr Council.

Clitheroe

Following the pleas from sufferers at Clitheroe, I undertook a survey of the incidence of inhalers for asthma at the primary schools in the area and managed to obtain results from every school in the 'Yellow Pages'. The results were incorporated into my report. Following a public meeting the HMIP carried out independent air monitoring as well as chimney emissions from the plant they had authorised to burn up to 90% toxic waste based on one sheet of company's own figures. The results of chimney emissions in August 1995 have still not been published. Results in the school play grounds were appalling with one school having PM10 levels of 490ugm/m³ compared with a new U.K. limit of 50ugm/m³. My report caused consternation and the area HMIP obtained a copy (together with the Dyfed Health Authority rubbishing press release) via the Cardiff HMIP. Within days my report was with the managing director of the company and the HMIP wrote that they no longer had it.

Even more interesting was the observation that at a second public meeting I took in Clitheroe none of the 17 executives of the company nor Environment Agency experts were able to present faults with my findings and presentation. Following further complaints from the public the HMIP covering Clitheroe ordered the company to reduce Nickel, Chromium and Lead emissions plus various other orders/variations in early 1996. The company appealed and the Department of the Environment appointed an inspector to adjudicate. A prehearing meeting was arranged for sorting out the details. With colleagues I was allocated one and a half days to give evidence, the Environment Agency one and a half to two days and the company three days (with a QC). Weeks later just before all the evidence had to be with the Inspectorate, the company's solicitor wrote that the hearing was off. This was not because the company were now going to fully comply with the demands, but they appeared to say that the Environment Agency had suddenly, after secret discussions, become quite happy with everything so there was no longer a problem or need for appeal. It was noted that the company were willing to install scrubbers on one of the three kilns only (the one not burning SLF), but even that would not be in operation until December 1998 due to new electricity supply required etc. Why did the Agency not require scrubbers and special filters on the other two kilns burning SLF and why did they allow toxic waste to be burnt before scrubbers were in operation plus filters? As the company were and still are being paid money to burn SLF it should not be such a problem to recoup the expense of the scrubbers and filters. It is now clear that the Agency's interpretation of BATNEEC appears to be "the cheapest systems they dare get away with".

During the prehearing meeting I asked the Environment Agency whether they were

authorising the cement works as a toxic waste burning plant or as a cement works. After discussion their solicitor said "as a toxic waste burning cement works". I further asked why it was then not being brought under the European Directive for Incinerating Toxic Waste mandatory in the UK by 31st December 1996. I further asked why PM10 levels were way above the UK limit in the school play ground. The Agency claimed they had never heard of these two laws, nor had they heard of a third law quoted by my colleague. I wrote to Dr Maynard (Chairman of WHO) of the U.K. Department of Health and asked whether these matters revealed local corruption or were Government orders. It was alleged the letter never arrived, but the Environment Agency weeks later, I understand, did order the company to reduce the toxic waste to under 40% to escape the European Directive I had quoted.

The company had also asked the Agency in mid 1996 to approve their scrubber plans before they went to the borough council, to avoid third party comment on the application. The Agency wrote that it could not but many weeks later complied with the company request. The Agency had demanded action by 31st December 1996 but, as one might expect, nothing had been achieved by that date. One is reminded of the refusal of anybody to date to call a public enquiry into the Orimulsion application at Pembroke.

Serious Breaches of EC Law

Barristers' opinion from County Durham was compiled into a report which revealed serious breaches of EC and UK law by the UK Government, UK agencies such as the Environment Agency and companies, allowing an excess of heavy metal and other toxic pollutants to be released into the air we breathe and pollute water, soil and food chain. Health damage is already resulting with epidemics of asthma and cancers and premature deaths from heart problems. The Environment Agency covering Clitheroe has also allowed the kiln dust containing huge excesses of lead, mercury and arsenic to be mixed with cattle feed and spread on the crops and fields. The disposal of the toxic ash from the power station at Pembroke has not been sorted properly either, some having been sent to Trecatty.

Surveys are now proceeding in the vicinity of various waste sites in England and Wales which confirm American findings in the vicinity of 593 waste sites of increased deaths from cancers of the breast, lung, bowel and bladder. Already clusters of breast cancer patients have been discovered in three affected UK areas. These waste sites represent waste dumps and areas around closed coking and other plants. The Environment Agency should be investigating around every hazardous waste site such as Trecatty and Nantgwyddion where solicitors and I are investigating complaints from those living in the vicinity of health damage including three recent cases of gastroschisis (exposed intestines in newborns).

Even the Agency's Chief Executive, Ed Gallagher, admitted that the matter of the Environment Agency's incompetent regulation of cement kilns burning secondary liquid fuel (SLF), the controversial fuel made from industrial wastes, was a "serious embarrassment to the Agency" ('ENDS Report' December 1996).

PUBLIC HEALTH (HEALTH AUTHORITIES)

With subtle but major changes in fuel content and waste management taking place since 1992 one might understand some public health directors not keeping themselves adequately informed of the

nature and implication of changes and their effects on human health. At Clitheroe by 1996 the Director discovered that the death rate of those under 75 years of age had soared to 40% above the national average in wards affected by plume grounding of the cement works which had switched to burning toxic waste.

In North East Derbyshire, without examining postcode data or journal articles, the public health consultant alleged that the breast cancer cluster in Wingerworth was a coincidence and had nothing to do with pollution. On 'Radio 5 Live' she commented that just a few workers at the coking plant may have died of cancer without ascertaining the facts that some 300 workers had died of cancers of the lung etc. at that plant and a similar one at Abercwmboi, when the carcinogenic dangers of coking plants have been well publicized. The same consultant is quoted in the opencast industry's house magazine as saying "there is no proof that opencasting triggers asthma". The validity of this comment is jeopardized by findings of her MEP (Ken Coates), my journal article and maps (in this issue of **The Whistle**) and even the published findings concerning industrial point sources of pollution by her own department and a letter from her Director.

In Pembrokeshire we find the letter from the consultant to PPDC of 29th November 1994 stating that no health authority "is in a position to say what their local incidence of any disease is." Yet the necessary data for the calculations resides within General Practice. Why then did the Health Authority, without seeing my report, determine in March 1995 to counter my findings with a very widely publicized press release with scurrilous comments without evidence or references, and send the Director to South Pembrokeshire DC who ordered me to cease surveying Dyfed schools? Their motives should be investigated.

My introduction discusses some of the events of 1995. Returning to the letter of the Director to Pembrokeshire GPs of 16th May 1995, he alleged that only SO₂ is a relevant measure of air quality regarding asthma, but the 'British Medical Journal', other journals and textbooks and my findings confirm that ozone and particulates are the relevant parameters. Particulate levels have never been properly measured and when ozone was checked in 1995 levels in the high zone of my map were greatly in excess of danger levels. The Director also commented on asthma prescribing, but prescription graphs in his registrar's report relate to all respiratory conditions and not asthma and had been deliberately relabelled to deceive readers and come to conclusions based on the false relabelling. The Director claimed that pollutants from the power station had decreased steadily, making no mention of changes in fuel content or the effects of emissions from a cold chimney with on/off operation leading to earlier plume grounding at much higher concentration of particulates due to less dilution. The Director alleged that all pollutants at ground level would remain well within the guide levels, but WHO has concluded that there is no safe lower limit of PM_{2.5} and smaller particulates. The Bitor data sheet and power station report both state that 85% of particulate emissions would be below PM₁, that is the most dangerous size and would contain carcinogenic heavy metals. The Director claimed there was no pattern of inhaler use in school children, but deliberately mixed up primary and secondary schools, hiding the fact that the registrar's alleged primary school results when mapped out coincided almost exactly with my map.

The Director's registrar's report consists almost entirely of misinformation. Hospital admission figures do not agree with those published in Hansard, nor with those printed off the hospital computer. Toxicology figures and comments do not agree with the current textbooks and we have comments such as "air concentrations much less than in 50s and 60s" referring to

"respirable fine dust" (tiny particulates), while readers may be interested to learn that the power station opened in 1973, Elf Refinery in 1973 and Gulf Refinery in 1968. Referring to incidence of asthma in polluted South and Mid Glamorgan of between 9 and 15% of children quoted in the report it then alleges "we can, therefore, expect a similar background level in Pembrokeshire." Why?

Claims are made that "asthma has increased as air pollution has decreased, and its incidence is higher in least polluted areas such as ... the Isle of Skye." When I phoned primary schools in the Isle of Skye there was not a single child with asthma on the west coast and around 4% taking inhalers around the port. Comments are made about toxic heavy metals, alleging "with Orimulsion still lower than rural background level", without mentioning that rural background was measured immediately downwind of the large nickel factory in Clydach and nickel was measured in England, and Pembrokeshire soil samples of heavy metals have shown a relentless recent rise.

The Health Authority continually refused to ask Pembrokeshire GPs for relevant data. So 41 GPs, representing almost all Pembrokeshire GPs from 10 practices, finally wrote a joint letter to the County Council, Community Health Council, MP, the Welsh Secretary and others on 23rd July 1996, highlighting the detrimental health effect of ultra-fine carcinogenic heavy metal dust particles, anticipated increased NO₂ and ozone that would result from the Orimulsion proposal. They wrote, "These issues are too important to ignore ... As GPs, our duty is to highlight these potential health risks and we strongly believe that a Public Inquiry is vital to ensure a balanced debate... We ... question the validity of the Dyfed Health Authority 1995 report on local disease patterns." Contrast this with the unreferenced allegations of the Health Authority: "No adverse health impact from the burning of Orimulsion is predictable". Friends of the Earth (FOE Cymru) also saw and wrote to the Director and registrar.

On 19th September 1996 a colleague and I saw the new Director of Public Health for the new amalgamated Dyfed/Powys Health Authority and pleaded with him to withdraw the May 1995 report and revise it. I explained and discussed many relevant matters with him. He remains intransigent and refuses to discuss or remove the report from the public arena for revision. He did suggest that he might ask for finance which would be given to do a small pilot study, but this would consist of looking at one small site of his choosing and no control, hardly what one would call a valid study. He has refused to respond to follow-up letters from FOE Cymru and me.

CONCLUSION

My research strongly suggests a link between industrial air pollution and asthma in primary schoolchildren and adult cancers. My efforts to draw the attention of the authorities to the significance of my research has demonstrated a failure by the Environment Agency to monitor independently and without warning, and to regulate and to punish breaches of the Environmental Protection Act 1990; and a failure by the Public Health Department of Dyfed Health Authority, along with other public health departments elsewhere in the UK, to protect the health of the public.

RECOMMENDATIONS

In consultation with **Freedom to Care**, I now recommend the following:

- Present proposals for Pembroke Power Station should be scrapped as unsafe
- National and properly resourced epidemiology of health damage by waste burning power stations, cement works, incinerators, waste sites and opencast coal sites should be conducted by the Department of Health
- The Department of the Environment should institute a thorough inquiry into the ineffectiveness and failures of the Environment Agency in policing and enforcing the regulations of the Environment Protection Act 1990. Funding of the agency should be independent of the polluters.
- The General Medical Council should use an independent investigative team to examine the actions of Dyfed Health Authority's public health doctors and their dissemination of gross misinformation.

APPENDIX: Other Research Findings

Extensive research since 1974 by Dr D W Dockery et al (1) of Harvard School of Public Health and Dr Joel Schwartz (2) has documented the adverse health effects of air pollution with particulates comprising soot, acid condensates, sulphates, nitrates and compounds of heavy metals; the range of metals being determined by the content of the items burned or processed. Particulates of a size under PM10 are inhaled, the critical sizes being PM0.03 to PM6 which go to the alveoli at the bottom of the lungs. Heavy metals could stay there indefinitely. Vanadium, cadmium, nickel and arsenic in particular will in some children and adults cause an inflammatory reaction leading to asthma, which may lead to chronic obstructive pulmonary disease.

Particulates in general also may restrict activity due to illness and even at a level of PM2.5 as low as 10 micrograms per cubic metre, may lead to premature death, especially in those patients on the borderline with pulmonary and cardiac disease (3, pp 16 & 28), partly because of the platelets becoming more sticky with the inflammation caused, leading to problems with circulation to the heart. Professor A Seaton found such effects in relation to emissions from diesel powered vehicles (4). Hence, it is not surprising that some 9 percent of people develop asthma from heavy diesel traffic fumes as found in Japan and as confirmed in Egham, Surrey, adjacent to the M25 motorway and airport, where a team from St George's Hospital, London, measured peak low in children at the primary school and found 10 percent to have clinical asthma. I found 7.5 percent (that is 75 percent of these) to be taking inhalers to school for asthma. At Spaghetti Junction, Birmingham, some 9.5 percent of primary schoolchildren took inhalers to school. At

Walsall, alleged to have severe asthma problems, 13 percent of the primary schoolchildren took inhalers to school, the level dropping sharply less than a mile away. The critical distance appears to be within 500 metres of the road (5, p 167).

In addition to diesel vehicle emissions American research has included studies of tyre dust particulates from wear on the highways with 60% of tyre dust being smaller than PM10 and microscopy by Dr M Straight of Denver, Colorado, has revealed the sticky latex attaching to the diesel particulates at sizes around PM1.5 upwards. Further studies in America have shown that latex from the guayule plant does not cause the usual allergy that results from regular latex used in gloves and car tyres. Hence a switch in latex source and active use of "city diesel" should have a beneficial effect in reducing traffic related asthma.

Furthermore, WHO has published tables of extra deaths, hospital admissions and exacerbation of asthma in the short term due to only 3 days of moderate particulate air levels, the severity being directly related to the air particulate concentration (3, pp 16-20). A further study in Seattle of all hospital casualty attendances at all eight hospitals over a 12 months period, showed a statistically significant positive correlation between asthma visits and PM10 particulate levels outdoors for the previous 4 days. This relationship was graded with no evidence of a threshold in all ages up to 65 years. The reason for the delay would be the time for an inflammatory reaction to get going and home treatment to fail (5, p 141). A further study of 552,138 residents between 1980 and 1989 proved an association of fine particulate air pollution, especially sulphates from fossil fuel combustion, with heart and lung mortality not attributable to tobacco smoking (6). A study of casualty attendances for asthma in Philadelphia revealed increases up to 9 fold on stagnant days associated with high levels of pollution irrespective of pollen counts or epidemics of upper respiratory infection (5, p 139).

A Bristol city study of inhaler usage in primary school asthmatic children by McMahon and Fryer (7) indicated that PM10 air pollution primarily from traffic when directly influenced by the weather resulted in a high use of inhalers at the school up to 14 days later paralleled by a large increase in hospital admissions. Insufficient attention has been paid to local weather causing plume grounding from industrial point sources during temperature inversions (K Harrison), noting that cool emissions from cold chimneys or Scrubbers/FGD could be prone to ground almost undiluted.

Apart from asthma, arsenic (8, 14), chromium (8, 14), nickel (9 p 19 S116 & 14) and coke-oven particulates (8) and polycyclic aromatic hydrocarbons (14) all can cause respiratory cancers (9, pp 267/573 and 14). Cadmium, coal-dust, rock-dust, graphite, iron-dust, etc, can cause pneumoconiosis (8). Cadmium can cause prostate cancers (14), arsenic can cause liver cancer (14) and chromium and nickel are also alleged to cause gastrointestinal tract cancers (14) and aromatic amines such as 2-naphthylamine found in coking plants can cause urinary bladder cancer (14). Arsenic, cadmium, lead, mercury and thallium and certain aromatic hydrocarbons have been proven to be vasculotoxic with effects on brain, heart and kidneys (14). Dioxins and PCBs present in much hazardous waste, can cause endocrine, immunological and reproductive system effects (10) e.g. endometriosis, sperm loss, susceptibility to viral infections, diabetes, reduced testosterone levels in males. Other reported dangers of dioxin exposure include chloracne and cancers (only if a high body burden is evident), and even learning disorders were noted in laboratory monkeys following exposure. Exposure to benzene can result in leukaemia (14).

In some cases body metabolites are more dangerous than the items inhaled, ingested or absorbed (14). The EC issued a directive 94/67/EC on 12th December 1994 which was

mandatory in the UK by the end of 1996, limiting emissions from burning hazardous waste; exhaust dust to be a maximum daily average output of 10mg/m³ and limiting heavy metals to 1.1mg/m³ total in existing plant (0.55mg/m³ for new plant). Some of the exclusions are a grey area and need legal decisions, such as Cemfuel® and emulsified or remnant residuals (bitumen bottoms made into residual oil, ex-refinery).

The UK on 8th November 1995 accepted 50ug/m³ as a 24-hour average maximum for PM10s, but as the WHO report revealed no safe lower limit for PM2.5s it would seem much wiser for environmental health departments to be using PM2.5 heads or even PM0.5 heads on their monitors especially as most of the most troublesome emissions are in the 0.1 to 1.0PM range. Many particulates are too small and gaseous to be trapped by electrostatic precipitators and even FGD/Scrubbers (M Hubbard *Energy World* Nov 1991).

Dangers exist not only from chimney emissions but from hazardous waste sites, noting that open-casting of coal may involve open-casting of hazardous waste above or adjacent to coal deposits. A study of 593 waste sites in the USA with evidence of associated contaminated ground drinking water revealed clusters of excess cancers of the lung, bowel, bladder, breast and gastrointestinal tract (11).

In the USA, asthma prevalence in the under-10s is stated at 2.5% and in the under 18s at 4.1% for ethnic whites and 5% for ethnic blacks, the increase being blamed on teenage smoking. Of course, we have many allergic causes such as cow's milk allergy (age 3 to 18 months onwards), house dust mite allergy (age 3 onwards when children are in the house most of the day or at an older age following triggering of the immune system and lung cells), allergy to other foods or food additives, allergy to dog or cat hairs, allergy to pollens such as cedar trees and oilseed rape crops, moulds, some grasses, reactions to diesel traffic emissions, reactions to particulates of vanadium and nickel found in air pollution emissions from oil refineries and power station, cocktails of heavy metals from SLF burning cement, brick and lime works and dust from open cast coal mining and coal fired cement and other works. If sulphuric acid coated vanadium is inhaled, the corrosive inflammatory effect in the lungs is 30 times greater than inhaling dry vanadium particulates. More studies are required on the effects of inhaling particulates from vehicle tyres both due to wear and tear and following incineration in cement works. Special filters are now available to reduce emissions of volatile organic compounds in certain industries but one wonders whether they are being used as widely as conditions would indicate. Some women are allergic to nickel from jewellery and would hence respond immediately to a nickel particulate challenge.

The study in Derbyshire by Singleton et al 1995 (12), confirmed that physical factors such as overcrowding, double glazing, type of heating, pets or parental smoking had no statistical effect on asthma prevalence in young children, but there was some association with traffic fumes, damp in the house and family history (24). Singleton's mapping was concentric hence only showed up temperature inversion effects and not downwind.

A German university study measured outside PM10, PM2.5, PM0.5 and PM0.03 particulates and correlated the results with daily diaries and daily peak flow measurements and concluded the PM10 and PM0.03 were most strongly associated with decreased peak flow, increased prevalence of feeling ill, shortness of breath and cough (8).

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