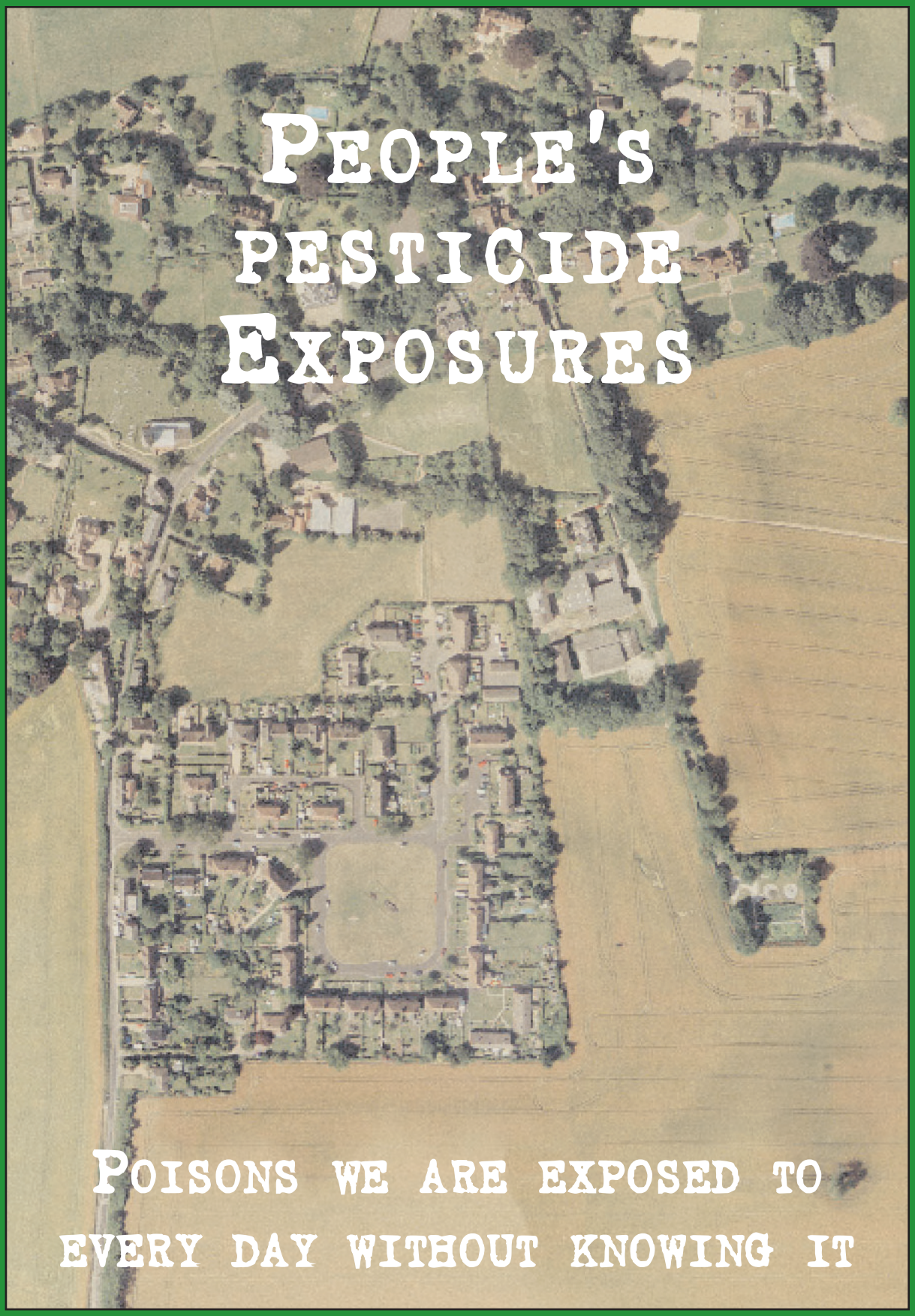

People's pesticide Exposures

Poisons we are exposed to every day without knowing it

Pesticide Action Network *UK*
Working to eliminate the hazards of pesticides

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Acknowledgements

People's Pesticide Exposures:
Poisons we are exposed to every day without knowing it

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Every effort has been made to ensure that the information in this report concerning the status of pesticide active ingredients is correct. However, the regulatory position at the European Union level is not static, and the situation for any one pesticide may have changed since going to press. The author cannot be held responsible for such changes.

PESTICIDE
ACTION
NETWORK *UK*

People's Pesticide Exposures

Poisons we are exposed to every day without knowing it

Alison Craig, PAN *UK*

December 2004

Executive summary

For the first time, a year's reports of human exposures via food, water, and the environment have been brought together. PAN *UK* presents the results of official monitoring, and we indicate the gaps in this work. By carrying out our own additional surveys and analyses, and comparing our results with government reports, we reveal levels of contamination which are usually hidden from public view. We evaluate the health impacts these exposures may have, and recommend a more precautionary approach to pesticide regulation.

This report is for members of the public and their representatives, including MPs, and policy-makers at a local and national level. It is for campaigners and organisations with an interest in food, the environment and public health. The aim is to produce a picture of the exposures to which an ordinary person in this country is subject on a day-to-day basis. We seek to raise awareness that, even if you are not exposed occupationally – by working in farming or in the agrochemical industry – you are regularly exposed.

Most exposure is at very low doses, and the report describes the assumptions which regulators make about the safety of low-level exposure. However, there is wide variation: some people – who live in homes adjacent to sprayed fields, for example – may have higher exposures on a regular basis. There are thousands of man-made chemicals used in the home and in the environment[1], all of which can interact with pesticides, and with pharmaceutical drugs if people are taking medication.

The best way to minimise your exposure to pesticides is to buy organic food whenever possible. This is produced using almost no pesticides[2], and is generally residue-free. Pesticides, which are very rarely detected in organic food, are usually from 'background' contaminants, ubiquitous in the environment, which also occur in conventionally produced food, such as the long banned DDT.

Gaps in official information are identified in this report. Important data are unavailable to the public, either because they are not disclosed by government, or not collected, or because they are presented in a way which is too complex for non-specialists to understand. Although the material here is technical, the report is intended as a step forward in disclosing to the public the actual extent of current pesticide pollution.

We challenge the inadequacies in official monitoring, and exposure prevention.

We have collected data for the year 2002, because a major report on Europe-wide food residues has recently been published (page 32) for that year. PAN *UK* believes the government should take a more precautionary approach, acknowledge scientific uncertainties, and focus on reducing pesticide use and human exposure.

Our findings:

- The pesticide industry has failed to fulfil a legal obligation, imposed over five years ago, to submit to the government reports made to them of illnesses caused by pesticide products.
- There is no information about the regulatory status of residues on imported food, and little information about the regulatory status of residues on UK-produced food. No label information is given about the pesticides used in the production of the food.
- Sixty-five per cent of the pesticides found as residues in our food have been designated by international authorities as having harmful effects on health. The levels detected are generally below legal limits, but we question regulatory assumptions of 'acceptable' risk.
- Toddlers are currently at risk from residues of acutely toxic pesticides, according to a new European Commission report.
- Results from one of the eight largest water companies in the UK, serving over two million consumers, indicate that drinking water is still contaminated above the limit of detection (but below the legal threshold) with a number of problem pesticides.
- Some local authorities have not carried out any tests for pesticides in private drinking water supplies since regulations were introduced in 1991.
- Information on the number of people poisoned by specific pesticides is not available.
- There is an urgent need for action to protect highly exposed communities, for example, those living near sprayed fields.

This is the first in a series of PAN *UK* reports in which pesticide exposures through all routes will be presented. We urge the government to strengthen its monitoring programmes, and to compile its own aggregated reports, so that the actual extent of human pesticide exposure can be assessed.

1 Introduction

Why this report?

Many consumers and public interest groups share a concern that long-term, low-dose exposure to pesticides and other chemicals in our environment may be contributing to rises in chronic disease. Evidence in this report, and from PAN *UK*'s pesticide exposure (PEX) project, indicates that long-term, low-dose exposure to pesticides, in food, water, and the environment, occurs commonly, that hazards are poorly understood, and chronic ill-health effect monitoring is non-existent.

The government's Pesticides Safety Directorate (PSD), and the Food Standards Agency (FSA), reassure us that levels in food residues and in water are far below those which could cause harmful effects, and that any risks are acceptable. However, they also acknowledge that important factors are not currently taken into account in the risk assessment process by which pesticides are approved. For example, an action plan from work to analyse the potential effects of mixtures of pesticides in 2002[3] has not yet been implemented.

A more precautionary and rigorous approach is necessary in the regulation, use, and monitoring of pesticides and their effects. A national pesticides strategy, initiated by the PSD in 2003[4], has not yet been published. PAN *UK* believes the strategy should establish firm targets for reductions of pesticide use, risks and dependence, and that it should adopt a precautionary approach that acknowledges the scientific uncertainties of acute and chronic exposure to pesticides. PAN has devised strategies for pesticide use reduction both in the UK, and across Europe[5]. Organic agriculture, which reduces pollutants in food, water, and the environment, should be expanded.

'This has really scared me.
These [Alzheimer's, Parkinson's and motor neurone disease] are nasty diseases: people are getting more of them and they are starting earlier. We have to look at the environment and ask ourselves what we are doing.'
Professor Colin Pritchard, Bournemouth University, August 2004.

What are the health concerns about pesticides?

An important new report, from the Ontario College of Family Physicians[6], reviewed studies of pesticides, and concluded that risk of chronic diseases, including some cancers, and neurological disease, could be reduced by minimising pesticide exposure. The report has been refuted by the UK Advisory Committee on Pesticides (ACP), the top expert committee which advises Ministers. The ACP has acknowledged, however, that some of the Ontario report's conclusions accord with those reached by its own Medical and Toxicology Panel. 'There is an apparent consistency of epidemiological reports linking Parkinson's disease with pesticide exposure' … and there are 'frequent reports of positive findings of genotoxicity in pesticide-exposed workers … which seem at odds with the absence of in vivo genotoxicity for almost all pesticides when tested individually for regulatory purposes[7]'.

New evidence suggests that exposure to low doses of common pesticides, at levels currently assumed to be safe, and within dose ranges measured in people, can also have significant effects during the early stages of human development[8]. Involuntary exposure to carcinogens in the uterus or early childhood can cause DNA damage and heightened susceptibility to disease later in life[9].

Over the last ten years new concerns have emerged about the effects of pesticides on the hormonal system: endocrine-disrupting chemicals. Regulators and scientific authorities have identified a total of at least 49 such pesticides[10]. Studies of the effects of low doses[11,] and work by national and international authorities on chemicals, have identified these effects at very low doses.

In epidemiology, the identification of symptoms or disease relating to any specific pesticide exposure is problematic, because of the wide range of exposures to chemicals in the environment. The long time interval which can occur between exposure and the onset of disease makes establishing a causal link difficult.

A particularly disturbing discovery was made this year. A study[12] has found that deaths from brain diseases including Alzheimer's, Parkinson's, and motor neurone disease, have increased drastically in the last thirty years,

and dementia in men has trebled. In the late 1970s, there were around 3,000 deaths a year from these conditions in England and Wales. By the late 1990s, there were 10,000. The report authors suspect environmental pollution by chemicals, including pesticides, as the cause of the rise. Increases in neurological deaths mirror the rise in the incidence of some cancers in the west[13].

Can I find out which pesticides I am being exposed to?

This report sets out in detail the limited extent to which you can find out which pesticides are in your food, water, and local environment. Government surveillance programmes track trends in pesticide usage, monitor pesticide residues in food, and test for pesticides in drinking water (see Appendices). Only some of the data are published. Estimations for toxins emitted to air is carried out, but only three obsolete pesticides are included[14]. Food producers and retailers do not yet have an obligation to declare which pesticides have been used on labelling.

Currently you have no legal right to know what sprays are being used in the environment near you, even if they have made you ill. The pesticide-user is obliged to disclose the information to the Health & Safety Executive (HSE), but, under the Health & Safety at Work, etc Act, 1974, the HSE must gain his or her written permission to pass the information to you.

After a public consultation held by the PSD last year, the government decided to introduce regulations to allow the public to access the information but only via a third party, for example a GP, solicitor, or the Citizens' Advice Bureau. An important report by the Royal Commission on Environmental Pollution, due for publication next year, is examining risks to 'bystanders' and will also consider issues of openness, access to information, and public values.

Are government-approved pesticides safe?

Although these products are subject to extensive testing and regulatory control, they are not necessarily safe. A considerable volume of data is required from companies, and rigorously examined (described in Appendix 2) before approval is given by the PSD. However, there are some fundamental problems with the risk assessment process.

Risk assessment firstly characterises the hazard posed by the substance, and how it behaves in the body, and in the environment, then calculates risk based on estimates of people's exposures. It is the exposure assessment which is often the weakest part, for two reasons: firstly because of the vast number of variables in real life, and the hundreds of thousands of other chemicals in the environment. Secondly, the erosion of the science base in the UK[15] in which field measurements and hard data are used to inform robust evaluations, is reflected in current over-reliance on theoretical mathematical 'models'[16] which do not accurately reflect real conditions.

There are limitations to toxicity testing which are relevant to all pesticide exposures. Fundamentally this is because safety-testing of chemicals is carried out on laboratory animals, and the extrapolation of these results to humans is unreliable[17]. The basic problem is how to predict long-term effects on the basis of relatively short-term observations, and to judge if it is valid to extrapolate data from laboratory animals to humans. Another major source of uncertainty in toxicity testing is the difficulty of including all important end-points (measures). The relatively recent realisation that endocrine (hormone) disruption is important is a reminder that there may still be end-points that have yet to be recognised, and for which tests have not yet been developed[18].

The Acceptable Daily Intake (ADI) is derived from the NOAEL value. See Appendix 2, and page 22, for an explanation of the technical terms.

Tests involve determining the No Observed Adverse Effect Level (NOAEL), and adding uncertainty factors fixed at arbitrary values (usually by a factor of ten to account for differences within a species, and ten for differences between species). From this the safety threshold Acceptable Daily Intake (ADI) is calculated. But the NOAEL examines only 'observable' physiological changes in the laboratory animals. People exposed to pesticides often report sensations such as pain, nausea, numbness, tingling and headaches, none of which is detectable in laboratory animal tests.

The responses of different species (for example, rats, mice, dogs and humans) to a toxin can be unpredictably different: for example, arsenic is deadly poisonous to humans, but sheep and hedgehogs can consume large amounts without ill-effect[19]. The

lethal dose of dioxin for hamsters is 5,000 times that for guinea pigs[20].

Relatively little is known[21] about the variations in response of laboratory animals to the toxin due to factors including the time of day – physiological changes occur in a twenty-four hour cycle in what are known as circadian rhythms – and hormonal fluctuations. Tests determining a NOAEL for each specific end-point are carried out on a small number of laboratory animals, usually 25 to 30 animals per dose group. This allows a 61 to 78 per cent chance of overlooking an effect in one per cent of those animals[22], the potential results of which could be problems for hundreds or thousands of people in a human population of millions. To test the chemical so as to take account of all of these variables would be too costly, so it is not done.

Pesticides are tested and approved one at a time. There is no requirement to test new substances in combination with the thousands of other chemicals which are already in use, to check for combination effects. Toxicopathologist Dr Vyvyan Howard has described[23] how, to test the commonest thousand toxic chemicals in unique combinations of three, it would require at least 166 million different experiments (and this disregards the need to study varying doses), which would be prohibitively costly. Work by Dr Vyvyan Howard and colleagues has subsequently raised concerns about the possibility of synergistic effects of mixtures[24]: when chemicals interact unpredictably and have a greater than additive effect.

There is a further concern for people taking medication[25]. One survey has found that 40 per cent of 9,000 study interviewees aged over 16 were taking prescription medicines at that time[26]. No checks are made for possible pesticide-pharmaceutical interactions in the pesticide approvals process. PAN *UK* regularly receives enquiries from people who have suffered unexpected effects from pesticides when under medical care and taking pharmaceutical drugs.

The approvals system maze

Before the Food and Environment Protection Act (FEPA, 1985), farmers and growers could use almost any pesticide on any crop. FEPA requires compliance with statutory conditions of use, and made each approval specific to certain crops. As a result of the cost of registering a pesticide for each crop, many 'minor use' products are covered by 'Specific Off-Label Approvals (SOLAs)'. Further 'off-label arrangements' allow pesticides additional minor uses.

Regulators now specify that approval on one crop can be a guide for approving use on other crops, a process known as 'equivalence'. For example, if a herbicide has been approved for use in apple, cherry or plum crops, it can also be used in almond, chestnut, hazelnut and walnut crops, but only if used on the orchard floor, and not if its Maximum Residue Level (MRL) (see page 23), is set at the limit of detection, or is lower than the MRL for the original crop, or where an MRL has been set for the original crop, but not the secondary crop.

Can I find out which pesticides are legally approved for use?

The PSD operates a well-informed and accurate enquiry service, and its re-structured website[27] came online this year. Because of the numbers of products involved, and their regularly changing regulatory status, the PSD does not publish an integrated, at-a-glance, list of which pesticides are approved for use in the UK or across Europe. Electronic databases[28] have replaced the government-published 'Blue Book' directory[29], which provided this information, although it went out of date rapidly. The industry-produced book, the UK Pesticide Guide[30], can also be as much as a year out of date. For a subscription fee, a database produced by the Central Science Laboratory, LIAISON, is available.

Pesticide products, containing the active ingredient and a mixture of substances making up the formulation, are given specific approvals by crop. Products may be approved for a very wide range of crops, or for only a few. Schemes for 'extensions of use' and Specific Off Label Approval also exist (see box), and complicate the task of finding out if a pesticide is legally approved.

Information provided by the PSD in their online databases can be weeks out of date: as they warn: 'There can be a time lag between new approvals being issued and their details appearing on our website databases.' Even though a number of PSD's databases have now been incorporated into the new pesticide register database, it is sometimes necessary to search several databases individually before the exact regulatory status of a particular pesticide can be established. Only some of the PSD databases are made public: the PSD information service team has access to many more.

A consumer wishing to find out if a particular pesticide, reported as a residue on, for example, apples, is 1) approved for use in the UK 2) approved for use in the UK on apples, has to search a minimum of two databases separately on the PSD website. If it is not

approved – ie, illegal – the consumer is not explicitly told this: instead the message 'No approved products were found that match your query' appears. This same message appears if the pesticide is long-banned, or is approved, but on a different crop. To find out the pesticide has been revoked or banned, a search of a further database is necessary. To confirm for sure its approval status, taking account of time-lags for information to be updated, it is necessary to ask the PSD information team for the current information.

From July 2003, 320 pesticide active ingredients were withdrawn from the European market as a result of an ongoing safety review of all pesticides by the European Commission[31]. This requires manufacturers to support their pesticide by providing sufficient data to prove it meets current safety standards. The 320 withdrawals are all pesticides that manufacturers decided not to support through this process, and so are not part of a strategy to remove the most dangerous pesticides, but rather are primarily down to economic decisions on the part of pesticide manufacturers. Highly hazardous pesticides, including paraquat and atrazine, are being supported through the review. PAN *UK* and other groups believe that a more precautionary approach based on hazard criteria should be used to complement the Commission's approach. The EC periodically updates its records on pesticide approvals in different member states under the current EC review, and these are published online[32].

It is commonly believed that many pesticides have been banned in the past by direct regulatory action as a consequence of emerging evidence of harmful effects. In fact, the vast majority of pesticides disappear from use because they are withdrawn for commercial reasons by industry. Many hazardous pesticides retain approval, and the risks are mitigated by label instructions. Regulatory action can take a number of forms: substances can be reviewed, amended, restricted or suspended, only to be put back on the market again on re-application by the manufacturer, with new safety data to meet regulatory requirements. Although the EC review has had a welcome effect in eliminating some pesticides from the market, very rarely has there been an outright revocation or ban: of the hundreds of compounds marketed as pesticides in the UK since the 1950s, only 37 are listed as ever having been banned[33].

Recommendations on page 19.

'History teaches us that the no effect levels used in risk assessments are time-dependent properties – our lack of understanding of how chemicals interact with biological systems leads us to regular revisions of the threat posed. However, despite giving lip service to the precautionary principle, regulatory authorities continue to insist that control must be on the basis of known risk, regardless of other indications of concern.'

Royal Commission on Environmental Pollution, Twenty-fourth report, Chemicals in products – safeguarding the environment and human health, 2003.

2 Food residues

Latest figures from the European Commission indicate that, across Europe, conventionally produced food is increasingly contaminated with pesticides. In a new report[34], the EC acknowledges that toxic chemicals in food are a risk to the health of children and vulnerable adults. Residues at illegal levels have almost doubled, from three per cent of the total in 1996 to 5.5 per cent in 2002. The percentage of samples found with residues at, or below, the legal limit has risen from 32 per cent in 1999 to 38 per cent in 2002.

Babies and toddlers are at risk from residues of some of the most acutely toxic pesticides in use[35]. The EC survey found breaches of safety limits with samples found at between 103 per cent of the limit (for diazinon, a toxic organophosphate used on carrots) and 477 per cent for methimadophos. Health risks to the very young are particularly of concern because they are known to consume, in proportion to their body weight, more food than adults, and more fruit and vegetables[36] (see box).

The number of samples contaminated with multiple residues is increasing, rising from an average of 14 per cent in 1999 to 20.7 per cent in 2002. There is considerable scientific uncertainty about the health implications of such mixtures. Of the countries which tested more than 2000 samples in the recent EC survey, only Denmark and France had a higher proportion of samples with mixtures of residues than the UK. Overall the percentage of samples with four or more residues has risen from 2.8 per cent in 1998 to 5.4 per cent in 2002.

For the purposes of this report, in PAN *UK*'s analysis of the UK government's data, we have taken the position of a shopper who selects food according to his or her family's tastes and budget, making no distinction between UK-produced and imported items. Our results (Appendix 4a) indicate that, in the UK, pesticides which have been known for years to be highly toxic are contaminating our food. Others, under scientific scrutiny for more insidious health effects such as hormone-disruption, are also occurring. Of the eighty pesticides detected in official UK data for 2002[37], 65 per cent have been designated by international authorities as having harmful effects on health. Of these:

- 41 per cent have been identified by the World Health Organisation as acutely toxic
- 35 per cent have been identified by international authorities as suspected carcinogens
- 12 per cent have been identified by international authorities as suspected endocrine (hormone) disrupting chemicals, implicated as possible causes of chronic disease, including cancer and reproductive disorders.

Daily risks to young children

A recent study[38] has found that, in the UK, between 10 and 226.6 children per day are likely to ingest toxic residues above the safety limit, the Acute Reference Dose (ARfD, page 23). Examining data on residues of dithiocarbamates, phosmet and carbendazim in apples and pears, the authors quantified actual risks by modelling consumption, from dietary survey data, with individual body weights, and the variability of pesticide residues within batches of food.

The study notes evidence indicating that the increase in the incidence of behavioural disorders among children in industrialised countries could in part be related to prenatal exposure to pesticides, and that subtle harm to the brain early in life may not become evident until much later. Early exposure to pesticides could predispose individuals to pesticide sensitivity as adults.

In the United States, the 1995 Food Quality Protection Act requires special consideration to be given to childhood exposures when making regulatory risk assessments of pesticide residue exposure, and in Europe, since 1999, there has been a combined maximum limit for all pesticide residues in baby foods of 0.01 mg/kg. However, this law only applies to processed baby foods, and dietary surveys show that the first solid food for one in five babies is pureed fresh fruit or vegetables.

In a response to the study[39], the chairman of the government's Pesticide Residues Committee, Dr Ian Brown, said 'Marginal exceedances are unlikely to represent a real concern as in setting ARfDs a protective approach is used which uses uncertainty or safety factors to set the reference point to typically at least 100 fold lower than the dose which caused no adverse effects in animals. Responsible consumer risk assessments draw clear conclusions as to the extent of erosion of these uncertainty factors and critically evaluate the theoretical intakes against the effects seen at specific doses within toxicological studies. It is also worth noting that given the number of exceedances and the size of the population any individual is unlikely to experience such exposures very frequently.' PAN *UK* believes that a system which tolerates 'erosion of uncertainty factors', and regular exceedances of safety limits, is not sufficiently precautionary.

'Testing procedures for the safety of food [residues] utilise toxicology tests on cells and animals. But there are serious questions about the applicability of such testing procedures to humans. We need to work to ensure that independent science works for the people on the issue of food safety and not just for industry.'
Dr Ian Gibson, Chair, All Party Parliamentary Group on Cancer, September 2004.

There was also non-approved use of pesticides on UK-produced food items as follows:

Carrots	Iprodione
Herbs	Cypermethrin
	Iprodione
Lettuce	Procymidone
	Vinclozolin
Pears	Chlormequat
	Tolyfluanid (not approved in 2002 but provisional approval for use on pears granted 9 July 2003)
Potatoes	Tecnazene

What the Pesticide Residues Committee (PRC) reports don't tell you

The publication of the results of the government's residue testing program was initiated in 1982[40], and annual reports were started in 1988[41]. The data became accessible more rapidly when it was posted on the internet in 1996[42]. PRC reports appeared online in 2000.

Although these moves towards greater openness are welcome, the reports do not provide consumers with all the information they need. Long lists of pesticide names are presented, without any characterisation of what they are, how they are used, or their known toxic effects. Very little information on the approval (legal) status of each pesticide is given. The PRC does not provide an online database with an electronic search facility, so it is impossible to search:

- a food item, in a single search, since 1988, to see what pesticides have occurred as residues in it;
- a pesticide, in a single search, since 1988, to see in which foods it has occurred as a residue;
- which foods have, and have not, been tested in the overall programme;
- foods or pesticides to see trends over time in residue occurrences.

At present there is no information about the regulatory status of residues on imported food, even from other EC countries, on the basis that 'there is no central source of information on pesticide approvals in other countries[43]'. The PRC notes that residues in imported crops, which would be illegal in the UK, do not automatically suggest illegal use, since the pesticide in question may be permitted on that crop in the exporting country. PAN *UK* believes that consumers have the right to know not only whether or not the residues in their food exceed the legal limit (the Maximum Residue Level, see page 23), but also the approval status of every residue.

Unlike the Maximum Residue Limits (MRLs) for veterinary medicines, those for pesticides are not health-based limits[44]. In the PRC results, residue findings are presented with a reference to the MRL. In media reports[45] there is commonly the assumption that, if there is a breach of the MRL, there is a health issue, even though the PRC states elsewhere that MRLs are legal limits 'to check that Good Agricultural Practice (GAP) is being followed and to assist in international trade in treated produce[46]'.

The PRC residue testing programme is based on surveys which are not random and therefore cannot reflect the overall prevalence of residues in food[47]. The collection of samples is orientated towards known problems, derived from reports received from other countries and other forms of intelligence or rumour. Other residue problems may be overlooked. According to a recent report, commissioned by the Food Standards Agency:

> *'A representative program of surveillance would be necessary to assess the frequency of residues, including multiple residues[48].'*

Staple foods including bread and milk are sampled routinely and repeatedly, so trends can be detected, but other than these a different selection of food items are chosen for testing each quarter. Some food items are not tested for years, or may be left out altogether. Supermarkets and food suppliers have their own self-funded testing programmes, which if put altogether would exceed the government's programme in size; but few of the results are disclosed to the public. A more comprehensive government testing programme is needed, funded by the agrochemical industry, on the 'polluter pays' principle.

3 Pesticides in water

In 1980, the European Union took the precautionary measure of setting the limit for a single pesticide in drinking water at 0.1 micrograms per litre, or one part in ten billion. For any combination of pesticides the limit is 0.5 micrograms per litre. The limit was a health-based precaution, as scientists agreed that they did not know about the long-term effects of pesticide mixes on human health or the environment. When the standard was set, this was thought to be the limit at which pesticides could be detected, and was effectively zero.

To read the reports of the government regulator for drinking water, it would be easy to conclude that pesticides in water are no longer a problem. 'During 2002, ten individual pesticides were detected above 0.1 micrograms per litre in 53,812 samples. In every instance the concentrations found corresponded to exposures far smaller than those to be harmful or likely to affect health. There has been a decrease in the number of zones breaching the individual pesticide standard … compliance with pesticide standards remains significantly higher than in 1993[49].'

Improved analytical techniques indicate that the technology is not removing all pesticides completely from water. The persistence of certain problem pesticides in drinking water is indicated in data provided by two respondents to PAN *UK*'s survey (see lower table on this page).

Biological effects are found to occur at much lower concentrations than previously thought. For example, a recent study found that atrazine has feminising effects in frogs at a concentration of one part in ten billion[50].

Since 1989, when the UK implemented the European Commission's new strict limit, the UK water industry has spent £1billion in capital expenditure, and £100 million per year, to remove pesticides from drinking water supplies[51]. There is no requirement in the risk assessment process to take account of the costs of removing pesticides from raw (untreated) or drinking water, so if they occur repeatedly, but at levels below toxicological thresholds, no regulatory action is triggered[52]. The high costs are confirmed in data received from water companies in response to PAN *UK*'s survey. Of 26 companies approached, and six respondents, three provided data on the costs of removing pesticides from water (see table, left).

In a recent review of water prices to consumers, the UK government's Environment, Food and Rural Affairs Committee has recommended that the costs of cleaning up agricultural pollution should not be included in water charges[53], and that 'the government must begin to address these costs in other ways under the 'polluter pays' principle.'

Water companies face a major difficulty in selecting which pesticides to test for, because there is no national scheme for statutory pesticide usage recording. The data companies have to rely on is extremely restricted. One of the six companies who responded to PAN *UK*'s survey reported it uses the sole UK-wide source of information on pesticide usage, the Central Science Laboratory's Pesticide Usage Survey Group data[54], based on a sample of up to 2000 farms throughout the UK.

Costs of removing pesticides from water.

Water company	Capital cost of removing pesticides from water, to date	Operational cost of removing pesticides from water for 2002
Severn Trent	£100 million	£2 million
Southern	£46 million	£220,000
Tendring Hundred	£2 million	£50,000

Source: PAN *UK* survey.

Pesticides found in water above the limit of detection but below the legal limit.

Water company	Pesticide	Percentage of overall samples in which the pesticide was found above the limit of detection	
Northumbrian Water and Essex & Suffolk Water	Beta HCH	24%	
	Isoproturon	17%	
	MCPA	35%	
Southern Water		Raw water	Treated (ie drinking)
	Atrazine	56.9%	77.8%
	Diuron	17.7%	39.3%
	Flutriafol	30.7%	68.4%
	MCPP (Mecoprop)	15.2%	2.5%
	Pirimicarb	9.2%	0
	Propazine	11.0%	1.2%
	Propiconazole	31.7%	75.0%
	Simazine	41.6%	55.6%
	Trietazine	13.1%	17.5%

Testing is orientated towards known problems. As Thames Water Utilities Limited points out: 'The degree of raw water monitoring across the Thames Water supply area is not uniform (eg with respect to what pesticides are looked for, where we look for them, and how frequently). The most intensive monitoring of raw water tends to occur where we have established that there is a pesticide problem. The data we generate for raw waters is therefore skewed and not representative of the catchment as a whole'.

Pesticides were found in breach of the EC drinking water limit by the following water companies in 2002: Dwr Cymru (Welsh Water), Essex & Suffolk, Folkestone & Dover, Northumbrian, Three Valleys, United Utilities (north west England), Wessex, Yorkshire[55]. Of the ten pesticides recurrently found, five have identified hazards: 2,4-D is acutely toxic, atrazine is a suspected carcinogen and endocrine-disrupting chemical, isoproturon is a suspected carcinogen, and simazine is a suspected carcinogen and endocrine-disrupting chemical. Of fourteen pesticides specifically and additionally tested for in drinking water by one or more water companies (ie, the pesticides they expected to turn up), seven are identified as hazardous to health to health.

Pesticides in the public water supply. Summary of PAN *UK* survey – Appendix 5a, page 33

PAN *UK* Questionnaires sent to:	All 26 water companies in England and Wales, Scottish Water, and the Northern Ireland Drinking Water Inspectorate
Number of responses received:	6
Number of companies reporting 10 or more pesticides found above 0.01 micrograms per litre in raw (untreated) water	4
Number of companies reporting 10 or more pesticides found above 0.01 micrograms per litre in drinking water	4
Number of companies who estimated cause of pesticide pollution	3: 'diffuse pollution due to agricultural usage'; '90% usage in agriculture'; '[originates] from the agricultural sector'.

Of the 23 pesticides detected above water quality standard limits for raw water (Environmental Quality Standards, see page 37)[56], nine are acutely toxic, six are suspected carcinogens, and eight are suspected to cause endocrine-disruption (both in humans and other species). Diffuse pollution in the environment increases risks of contaminants in drinking water. Problem pesticides found in breach of both raw water standards and the drinking water limit were: 2,4-D in Yorkshire, MCPA in Yorkshire and United Utilities (north west England), and mecoprop in Dwr Cymru (Welsh Water) and the United Utilities catchment. All these are widely used herbicides.

These levels of pollution of water in the environment will not be permitted for much longer. The 2000 EC Water Framework Directive is the most significant piece of European water legislation for over twenty years. The Directive requires surface waters to achieve good ecological and chemical status by 2015. Maps published by the UK Environment Agency on 1 September 2004[57], indicate that 20 per cent of all English and Welsh rivers are in danger of failing new laws to comply with the directive, because of pesticides.

Of particular concern are very high levels found in samples which are not noted in official reports. Northumbrian Water detected isoproturon in drinking water at 5.6 micrograms per litre, 56 times the legal limit (but below the current Acceptable Daily Intake). In the Southern Water catchment, diuron, a herbicide used exclusively for amenity and non-agricultural purposes, was found at the extremely high level of 8.5 micrograms per litre in raw water, and 0.026 micrograms per litre in drinking water (below the legal limit). Diuron is a known carcinogen. Fluroxypyr was found at 7.1 micrograms per litre in raw water, and 0.028 in drinking water (below the legal limit). Most spectacularly of all, pirimicarb, a highly toxic insecticide used in grain stores, was found at 71.2 micrograms per litre in raw water. According to Southern Water, this was due to a now defunct pesticide formulation plant, owned by Syngenta, at Yalding, on the River Medway, which has contaminated the site for decades. Although the company spent £4 million on a groundwater treatment plant in the 1990s, pesticides remain in the river sediment, and flood periods can result in high levels.

'Very low doses of glyphosate (Roundup) were toxic to either human embryonic cells, foetal cells or placental cells.'
Professor Gilles-Eric Seralini, March 2004.

Health protection?

Isoproturon is a widely used herbicide in arable crops, and has persistently occurred in drinking water. It has exceeded the EC legal limit in the Northumbrian Water catchment numerous times since 1995. To deal with the problem, the company has been obliged to spend £25 million on a new water treatment works, to be completed by the end of 2006. In the meantime, the Drinking Water Inspectorate granted the company what is known as an 'Authorised Departure' whereby levels found in excess of the legal limit of 0.1 micrograms per litre will be tolerated. This means around 600,000 people in the area, including babies, pregnant women, and the elderly, will be regularly exposed to a cancer-causing poison, a 'tumour-promoter', in their drinking water until the new plant is operating.

PAN *UK* contacted the Northumberland & Tyneside Strategic Health Authority, to ask if they would consider taking the following actions to protect public health:

- Contact the Pesticides Safety Directorate (DEFRA), and the Minister of State responsible for pesticides, the Rt Hon Alun Michael MP, to express concern about the exposure of the public in the area to isoproturon, and to urge that authorisations of this pesticide are withdrawn as soon as possible. Ask what action the PSD is taking to research and promote safer alternatives to isoproturon.
- Challenge the 'Authorised Departure' which has been granted to Northumbrian Water until December 2006, which they say allow them these exceedances of the EC limit 'providing there is no risk to public health'.
- Require the provision of bottled water by Northumbrian Water until the treatment works have been completed, especially for those groups most at risk.

In their reply of 13th May 2004, the Strategic Health Authority stated:

'It is worth raising that it is actually still conjecture at this point to assume that exposure to a potential hazard (isoproturon in drinking water) will actually result in harm to human health. As far as we are aware no studies have been undertaken to measure levels in drinking water alongside levels in urine. Such studies would be required to establish which drinking water levels result in which levels of body burdens for humans. The complete chain of evidence would need to include not just the identification of a hazard or the potential exposure, but also evidence of human body burden, of the hazard reaching its target organ, and then evidence of a resulting health outcome. The current lack of evidence is part of the rationale for using the precautionary principle approach' [in setting of the EC limit of 0.1 micrograms per litre].

'… We understand that drinking water samples are collected regularly, that samples exceeding the EC standard are rare, … and that no samples have exceeded the World Health Organisation Guideline Value of 9 micrograms per litre. … On the basis of these findings we do not consider that this issue is a matter of significant concern to public health in this area at present. On this basis we will not be pursuing the actions that you requested of us.

'Levels of cancers in the local population are routinely monitored through Cancer Registration and through mortality statistics. While it is true that liver cancer mortality is higher in Northumberland, Tyne and Wear than the national average, this is not out of line with the generally higher rates of cancers seen in our population. The principal reasons for variation in liver cancer rates in our population are considered to be alcohol and infective hepatitis rather than environmental toxins. We will continue to monitor this through routine statistics …

'… While we remain concerned about minimising unnecessary exposure to any pesticide or other potential toxin, we are also greatly concerned about the need for affordable and healthy food for our population. The North East has the lowest consumption of fresh fruit and vegetables of any region in the country and the potential benefits of increasing that consumption vastly outweigh the speculative risks associated with pesticides currently used in its production. Embarking upon actions that may compromise the cost of food and the viability of local farms and business would need to be justified in this context. The case of isoproturon is not persuasive in this respect'.

Public health professionals may be underestimating possible health impacts of environmental pollutants, especially on the foetus and children, and PAN *UK* is working with the UK Public Health Association to raise the issue on the public health agenda. The government should revoke the approvals of pesticides such as isoproturon which occur repeatedly in drinking water.

People dependent on private water supplies may be at higher levels of risk from pesticide exposure. Local authorities are statutorily required to keep themselves informed about the 'wholesomeness and sufficiency' of water supplies in their respective areas. The definition of wholesomeness, defined by reference to standards in the Water Supply (Water Quality) Regulations 1989, applies equally to public and private supplies and is incorporated in the Private Water Supplies Regulations 1991. New regulations on private water supplies to implement the new EC Drinking Water Directive will bring arrangements for monitoring private supplies into line with public supplies[58].

PAN *UK*'s questionnaire survey, in November 2003, was sent to all local authority Chief Environmental Health Officers (over 400), of which 37 responded. Three local authorities indicated that they have not carried out tests for pesticides since 1991, required under official guidance[59]: Allerdale Borough Council, which is responsible for testing 260 private water supplies; Wychaven District Council, responsible for testing 140; and North Lanarkshire Council, responsible for testing 18.

Others are more diligent, but relatively few tests are done: none of the local authorities which responded to our survey tested for more than 89 pesticides. About 350 active substances are approved for use as agricultural pesticides in the UK. If account is taken of old chemicals such as DDT, which are now banned in the EU but are persistent in the environment, potentially 1,000 different chemicals might be looked for[60].

Pesticides in private drinking water supplies. Summary of PAN *UK* survey – Appendix 5c, page 38.

PAN *UK* Questionnaires sent to:	468 local authorities in England, Wales, Scotland and Northern Ireland
Number of responses received:	37
Number range of private water supplies for which local authority respondents responsible for testing	1 to 1780
Number range of private water supplies tested by local authority respondents in last ten years	0 to 76
Number range of pesticides reported by local authority respondents as tested for	0 to 89
Number of local authority respondents reporting that 100 per cent of the pesticides they tested for were detected in all tests above limit of detection	8
Number of local authority respondents reporting exceedances of legal limit (0.1 micrograms per litre)	3

As with public water supplies, the quality of intelligence informing the selection is poor and highly variable. Laboratory tests are expensive, and, as Winchester City Council pointed out, pesticide tests cannot be 're-charged', ie charged back to the property-owner, unless additional tests are requested. However, remedial works to remove the pollution *are* the liability of the 'responsible person' (most often the home-owner), even though its source is almost always neighbouring farmland. Local authorities may be understandably reluctant to impose such costs unless there is an acute health risk. If action is taken, it is because the 'Acceptable Daily Intake' level, set by the World Health Organisation (WHO)[61] is exceeded, rather than the existing legal level set by the EC. For example, for isoproturon, this is 9 micrograms per litre, ninety times higher than 0.1 micrograms per litre set by the EC.

Pesticides in air

The National Air Emissions Inventory (maintained by AEA Technology)[62] is a government-funded organisation whose remit is to compile estimates of emissions to the atmosphere from UK activities. Emission inventories are estimates of the amount and the type of pollutants that are emitted to the air from all sources, including traffic, household heating, agriculture and industrial processes. However, for historical reasons, the NAEI estimates emissions to air of only three obsolete pesticides: hexachlorobenzene, lindane, and pentachlorophenol. The NAEI acknowledges that 'at present no relevant measurement programmes [for pesticides] are known of[63]', and therefore 'it is difficult to reduce the uncertainty associated with [the] estimates.'

'Some preliminary evidence, mostly from the UK, from laboratory animals, shows that early life exposures to certain kinds of pesticides, is associated with Parkinson's dementia. Laboratory animals exposed early in life, followed by an exposure in adult life, have two injuries to the brain, one very early and one later. The combination can elicit the cascade of neuro-degenerative changes leading to full blown Parkinson's. There is something about silent toxicities early in life, matched by exposures in adult life, that elicit changes and appear to be behind Parkinson's dementia.'

Dr Sandra Steingraber, author,
***Living Downstream* and *Having Faith*, December 2003.**

4 Pesticide poisonings

PAN *UK* believes the public has the right to know how many people are poisoned by pesticides, per year, in the UK, and by which pesticides. The National Poisons Information Service (NPIS), now part of the Health Protection Agency, collects some data on exposures to pesticides (see Appendix 6) but pesticide-specific figures are not publicly accessible. The NPIS is a consultant-led resource from which doctors and other NHS healthcare providers can obtain information on poisoning by any toxic substance.

There are six regional centres of the NPIS, in Belfast, Birmingham, Cardiff, Edinburgh, London, and Newcastle upon Tyne. The centres publish academic studies and their annual reports[64], which give the number of enquiries received by the NPIS from healthcare providers, by telephone and electronically by their online database, TOXBASE. The information is classified into generic categories, such as 'non-pharmaceutical chemical'. The majority of enquiries are about pharmaceutical drugs. Details of pesticide active substances are not reported.

Dr Nick Bateman, Director of the Edinburgh centre of the NPIS, and member of the Advisory Committee on Pesticides explained, at a meeting with PAN *UK* on 16th June this year, why information on specific pesticide enquiries is not easily available. The NPIS priority is patient care, driven by patient presentation, severity of poisoning, and financial pressures, which currently make the work of analysing pesticide exposures of lower priority. He explained that the data is all stored in different systems: it can be extracted but it is extremely labour intensive. Dr Bateman is concerned that if the NPIS release provisional data it may be incomplete and therefore poor quality. He foresaw problems in protecting patient confidentiality if the data was provided. He also was concerned that if TOXBASE – currently accessible to registered NHS providers only – was accessible to the public in its present form, human lethal dose information on products of all kinds would then be accessible to potentially suicidal people.

The NPIS in Birmingham has developed an in-house pesticide database for use as a poisoning reference and which takes account of both the current approval, and marketing, status of each product. It is estimated that approximately 1,000 new pesticide products are registered by the Pesticides Safety Directorate each year, with a similar number withdrawn or revoked[65].

A new pilot study was started in April 2003, to run for a year and funded by the Pesticides Safety Directorate (PSD). The 'Proposal for a pesticide exposure surveillance scheme using TOXBASE and the National Poisons Information Service', was initiated as a result of the Advisory Committee on Pesticides (ACP)'s work on monitoring pesticide-related ill-health. A follow-up questionnaire to healthcare providers making enquiries about pesticide poisonings, aims to capture medical outcome data. Although we welcome this study, it is for acute exposures only, which are likely to be few, and the problem of long-term, low-dose exposure needs to be addressed.

The post-marketing surveillance of new pesticides is limited, and is not as rigorous as that for new medicinal products[66]. Although both classes of substances have biological effects, pesticides are not deliberately swallowed like medicinal drugs. The lack of surveillance means symptoms that pesticides could cause may not be identified at an early stage, so making toxicological judgement even more difficult for consultants required to diagnose a potential pesticide poisoning case.

Laboratory assays – tests – for patients poisoned by pesticides are only available for paraquat and organophosphates[67] within the NPIS service. Dr Bateman explained that this is because pesticide poisonings are relatively rare. He indicated that, for any other pesticide, samples could be sent by NPIS to the agrochemical companies for testing, or, if there was a fatal poisoning, to police forensic services.

Poisonings reported directly to pesticide companies

Most poisoning data is kept confidentially by the agrochemical industry. Since March 1998 there has been a legal obligation for companies to report adverse effects, including human health effects, to the PSD immediately. There is no obligation to report them to the NPIS. As this year's survey by the PSD has shown, the industry was failing to report many of these effects even to the PSD[68].

At a meeting of the Advisory Committee on Pesticides' Medical and Toxicology Panel on

16th April 2003, PAN *UK* questioned whether the pesticides industry had been complying with their legal obligation[69] to submit immediately any new information on the adverse effects of their products (including health and environmental impacts) to the Pesticides Safety Directorate (PSD). They have had this obligation since March 1998[70].

In September 2003, an official from the PSD circulated the following letter to approval-holders (pesticide companies) requesting reports of complaints about products, and health effects, for the year 2002 under an informal amnesty arrangement:

For some time, there has been concern that the adverse effects of pesticides are not being fully reported, and about whether the different existing information gathering schemes could be centrally co-ordinated, and therefore made more comprehensive. The independent statutory body, the Advisory Committee on Pesticides (ACP), has already considered this issue in some detail and is aware that industry gets many enquiries from customers about alleged adverse health effects. To evaluate this possible additional source of information, PSD is asking all approval holders to submit details of all human ill-health incidents involving their pesticide products reported to them by users in 2002. Returns (including nil returns), however slight or insignificant, should be submitted by 10 November 2003. One return should be completed for each incident reported … The information required, although limited to that provided directly to you by the users of your products, is intended to cover the full range of incidents which users believe may be attributable to pesticide exposure. There may not seem to be an immediately obvious relationship between the use and subsequent ill-health, but we ask you to cast the net widely over the reports you have received, however circumstantial.
I can also assure you that we do not intend to take any regulatory action regarding specific incidents and suggest, in any case, that personal details of individuals affected are not included on the pro-forma. The survey's sole purpose is to help determine, by looking at a particular source, whether the claims that human ill-health caused by pesticides is under-reported are valid. Whether the exercise needs to be repeated will depend on the results and a full response, including nil returns, will be important in this respect.
I do understand that some screening of your past contacts will be necessary to complete your responses, that is why we are giving a period of 2 months for responses to this important survey.

Only eighteen companies responded to the survey by the deadline, however[71], so the PSD circulated a reminder, giving the companies more time[72].

PAN *UK* is very concerned by the results (see box, page 15). They indicate that offences have been committed under the Control of Pesticides Regulations and the Plant Protection Products regulations. PSD guidance to applicants is clear that 'Failure to immediately submit any adverse information, or to knowingly give false information, is an offence and may result in prosecution and/or revocation of approvals[73]'.

PAN *UK* is demanding that:

- The government's Health Protection Agency sets up a new, rigorous, surveillance scheme for pesticide and chemical-related ill-health, requiring companies to publish on product labels a hotline and website, so that people can report adverse health effects directly to government.
- The PSD reviews, and considers the revocation of approval, of all the products for which adverse health incidents (which occurred when legitimately used according to label instructions) have now been reported.
- The PSD urgently requires from the companies, under an amnesty, the disclosure of all other health incidents, and all adverse data in studies in industry literature, on products since March 1998 to date; and that the companies fill the gaps in the information in the 2003/04 survey.

'The control of pesticides, as of all synthetic chemicals, in most industrialised countries relies heavily or even entirely on safety data supplied by the manufacturers. Such a regulatory system can only be effective if the companies conducting and reporting the studies honestly disclose any adverse findings. The record shows, however, that all too often company executives and their scientists knowlingly suppress or manipulate information that could affect the licensing and sale of their products.'
Samuel Epstein, University of Illinois School of Public Health, 1990.

- The PSD urgently reviews, and considers the revocation of approval, of all products for which adverse health incidents are reported.
- In future, the PSD prosecutes companies found to have failed to disclose adverse data.
- The government introduces post marketing surveillance of new pesticides, and the registration of all trials on new pesticides so that both negative and positive results are reported.

Over a year later, the PSD has produced brief summary results of their survey:

- 171 Approval Holding companies submitted responses to the survey. These companies represent over 99% of the pesticides market.
- Regulatory action has been taken against those approval holders who did not respond, in that their product approvals have been either suspended or revoked. The survey also established that a small number of companies are no longer trading.

16 Approval Holders reported a total of 137 contacts involving pesticides during 2002. These companies account for over 80% of the pesticides market. PSD has attempted to broadly categorise the reports into general categories according to whether the products in question appeared to have been used in the correct manner when the incidents occurred.

The responses were classified on the basis of the (variable) information supplied into;

- 12 enquiries or requests for information about the possible health effects of pesticides,
- 55 concerning misuse or accidents resulting in expected symptoms, for example irritation caused by products being splashed in the eye or
- 8 were unclassifiable from the information supplied

The remaining 62 appear to involve the approved use of pesticides, although no causal link between the pesticide and the symptoms described has been proven.

These 137 contacts were roughly split between amateur and professional products.

The PSD concludes:

- While it is clear that a number of incidents should have been reported to PSD and/or the Health and Safety Executive (HSE) the results do not indicate that there is a need to take any immediate regulatory action. However, we will now forward details of all of these incidents to the Advisory Committee on Pesticides (ACP) and the HSE's Pesticides Incident Appraisal Panel (PIAP) for consideration.

We will also

- Remind companies of their legal duty to submit any new information concerning adverse human health effects following use of their products to PSD. In future we will require that companies notify us of any significant incidents reported to them within one month of these reports coming to their attention, and of all minor incidents within three months.
- Review our internal procedures for evaluating reports of incidents.
- Repeat the exercise in order to monitor the effects of any changes made to the system.

PSD website: www.pesticides.gov.uk/approvals.asp?id=1479, 17 Dec 2004

LEGAL REQUIREMENT: CONFIRMED

Countess of Mar:

'In what ways is the information requested from agrochemical companies on adverse human health data in the current Pesticides Safety Directorate, Questionnaire on possible effects of pesticides on human health, additional to that already required, which all approval holders have to submit on dangerous effects immediately under the Control of Pesticides Regulations, under section 16(11) of the Food and Environmental Protection Act 1985 and under regulation 21(1) of the Plant Protection Products Regulations?'

The Parliamentary Under-Secretary of State, Department for Environment, Food and Rural Affairs (Lord Whitty):

'The questionnaire is aimed at ensuring that the obligations already set out under the Food and Environmental Protection Act and the Plant Protection Products Regulations are fully complied with.

Section 16(11) of the Food and Environmental Protection Act 1985 grants Ministers general powers to require the submission of information about pesticides. In order to ensure that data on adverse health effects is obtained, all approvals granted under the Control of Pesticides Regulations 1986 (as amended) include a specific requirement that any information obtained regarding adverse health effects be submitted promptly by the approval holder to the Pesticides Safety Directorate to consider.

In addition, regulation 14(1) of the Plant Protection Products Regulations 2003 requires that the holder of any approval granted under those regulations must immediately notify the Pesticides Safety Directorate of any information on potentially adverse effects.

The purpose of the questionnaire is to seek reassurance that information on adverse effects is being fully reported as required'.

Reply to Parliamentary Question by the Countess of Mar, 12th March 2004 [HL1580].

5 Pesticide 'incidents' and 'bystander' cases: exposure in the environment

In common with campaigner Georgina Downs, and many other individuals and organisations, PAN *UK* is concerned that the government's risk assessment for the pesticide exposure of those currently known as 'bystanders' is wholly inadequate. Based on an occupational exposure 'model' in which exposures of a few months[74] are assumed, these assessments are supposed to protect people who may be living next to regularly sprayed fields for decades. The new study under way by the Royal Commission on Environmental Pollution[75], due for publication next year, will examine these issues.

Risk assessment for pesticide exposures in the environment do not consider: duration of exposure, mixtures of pesticides, volatilisation, next-day spraydrift, pesticides present in air, dust, or rain; interactions with medication; multiple exposures, or exposures while walking across fields treated with pesticides which may have specific 're-entry intervals' (when unprotected people and animals must be kept out of the treated area). There are no routine biochemical measurements (eg, of blood, urine, or breast milk) made of people's exposures, although a new Defra study[76] will generate some data. In the USA the government initiated a National Health and Nutrition Examination Survey (NHANES)[77], in which approximately 2,000 subjects are tested, providing policy makers with data and a benchmark on the extent of current human contamination.

If a person is made ill as a result of exposure to pesticides being used by another person in the course of their work, they could report the incident to the Health & Safety Executive (HSE). All such incidents are forwarded by the HSE to the Pesticide Incident Appraisal Panel. However, this body is not equipped to protect human health for a number of reasons set out below.

Cases reported to the PEX project illustrate that chronic, repeated exposures, which the HSE would not classify as 'incidents', occur commonly, and we describe a number of ways in which people fall through the surveillance net. PEX receives 1100 to 1500 enquiries a year, around half of which are from new contacts. There are 890 entries on our database classified as people who have been, or are being, exposed.

Chronic exposures.

Case 1. Mrs A and her husband have lived for 37 years in a row of houses adjacent to fields which for years have been intensively sprayed. In the same row there are eleven children growing up. The symptoms a number of residents experience during the spraying season are: rashes, itchy eyes and scalps, sore throats and coughs. They feel there is nothing alarming enough to report to the authorities. Residents are also concerned by the number of spray rounds, for example, five on a pea crop. They have had correspondence with the farmer and asked him to notify them of when he is about to spray, and to convert to organic agriculture, but he says neither of these is possible.

Symptoms which would not be detected in laboratory animal tests, and a medical response.

Case 2. Mrs B lives in a house adjacent to sprayed fields where sulphuric acid is commonly used on potatoes. Because it is impossible completely to avoid the sprays in that area, she takes care to close windows and takes other precautions. On one occasion, on a walk home on the road, she passed a field which had just been treated with sulphuric acid. She experienced a cognitive disorder: she couldn't think in a normal way or remember things. She also had a prickly sensation on her scalp. After ten days she went to her GP who prescribed rest. But the symptoms persisted for another week, so at her next visit to the GP she mentioned the potato spraying. He immediately knew the cause of her symptoms and prescribed an anti-inflammatory drug. According to her GP, disorders such as hers due to sulphuric acid are common locally, and the spray can hang around in hedges and gardens for over a week.

The effects of pesticides on someone who is already ill; the uninvestigated effects of pesticides on companion animals; the heavy burden of proof required in law.

Case 3. Mrs C suffers from lupus which is deteriorating, overlapping multiconnective tissue disease, and other disorders. She is sure these are being exacerbated by farm sprays – her garden is adjacent to sprayed

fields. Mrs C breeds pedigree show dogs and three of them have died possibly as a result of heavy spraying within yards of their quarters. Two developed tumours infiltrating both the nasal cavities and the brain. One had cancer of the spleen. Mr and Mrs C keep chickens in their garden, and a cockerel they had died after developing a tumour in the head. Mrs C reported the farmer spraying near her garden, and in February 2002 he was prosecuted by the HSE for overspraying a watercourse (the ditch next to her garden). Mrs C reported to the HSE that she had suffered various ill-health symptoms linked to the chemicals: diarrhoea, a sore throat and eyes, a sore nose and a puffy face. Although magistrates fined the farmer £4,000 for risks to the environment, her complaint of ill-health was dismissed, on the grounds of insufficient medical evidence.

Studies of companion animals, such as Mrs C's dogs, comparing those which are exposed to pesticides regularly with those that are not can indicate elevated risk. For example, Scottish terriers exposed to herbicides used in lawns are four to seven times more likely than those which are not to contract bladder cancer[78].

The HSE's Pesticide Incidents Appraisal Panel (PIAP)

PIAP comprises a panel of government toxicologists and medical experts, and considers all incidents reported to the HSE's Field Operations Directorate where there is any allegation that the use of a pesticide has caused harm or ill health.

PAN *UK* has made a number of representations to government – most recently, in April 2003, to the Medical and Toxicology Panel of the Advisory Committee on Pesticides[79] – that PIAP should be abolished and replaced with a more effective surveillance scheme. PIAP evolved from an Agricultural Poisons Appraisal Panel established by the HSE in the early 1980s[80], and has been given this role. However it has not worked in the way it was intended.

A key drawback of the current system is PIAP's definition of 'incident'. 'Bystander' exposure which may occur at levels of which people are unaware, or barely aware, when living next to sprayed fields. These are rarely reported, and yet these may have serious health impacts. It is usually only when an acute 'incident' occurs, when people are aware of having been exposed, that they are prompted to seek help from the authorities.

According to Dr Roger Rawbone, Chairman of PIAP, 'An incident in the broader [HSE] context is defined as 'an event resulting in a complaint/referral to HSE (inspectorate) which is pesticide related. In the context of PIAP, then one adds 'and where there is an associated ill health'[81]. Yet in PIAP's 2002/2003, one case (involving two people) is classified as 'not an incident'; and in the 2000/2001 report, three cases are classified as 'not an incident'.

Dr Rawbone has told us that the vast majority of cases PIAP deals with involve minor, even trivial, symptoms including headaches, nausea and breathlessness, which pass rapidly. He says[82] that very few records of chronic disease developing subsequent to repeated incidents are received. There are no fields in PIAP forms to record the fact that people live adjacent to sprayed fields, and no pro-active, long-term, medical follow-up of complainants. He indicated that there are some people, on the PIAP database, who experience and report exposures repeatedly, year after year, as separate 'incidents.'

HSE Inspectors first investigate any breach of the law in respect of the spraying operation before passing the details of the incident to PIAP. Therefore, there can be weeks or months of delay before PIAP then follows it up[83].

A detailed review of the surveillance of ill-health related to pesticides was prepared by the PSD for the ACP in March 2002[84]. It observes that, compared with a surveillance system in California which confirms around 78 of the ill-health cases reported to it, PIAP rarely classifies incidents of ill-health as 'confirmed' or 'likely' to be pesticide-related. In 2002/2003[85], PIAP concluded that, of 61 incidents where ill-health was 'alleged', none of them were 'confirmed' as pesticide-related, and only five were 'likely' to be pesticide related. In 2003/04, only one incident is classified as confirmed, with 14 as likely.

Very little information about PIAP is in the public domain. Although there is an annual report, no meeting dates, agendas or minutes are published, and no webpage is available. There is no way of tracking (anonymised) cases through PIAP. This means neither its administration of cases, nor the bases of the decisions it makes, can be scrutinised. PAN *UK* is aware of several cases where PIAP mis-classified complainants or included errors about either their exposures or symptoms[86].

Incidents and bystander exposure reported to local authorities. Summary of PAN *UK* survey – Appendix 7, page 40.

PAN *UK* Questionnaires sent to:	468 local authorities in England, Wales, Scotland and Northern Ireland
Number of responses received:	33
Number of local authority respondents reporting pesticide incidents in 2002 and 2003	11
Number of local authority respondents who reported they were not aware of the Health & Safety Executive's Pesticide Incidents Appraisal Panel	21

Differences in the role of PIAP and the HSE mandate may lead to responsibilities pulling in different directions. As Stuart Smith, HSE, has said, 'PIAP is often misunderstood.[87]'. According to Graeme Walker, HSE, there is sometimes, in investigations, not a conflict of interest between the complainant and the HSE, but a 'disjunct of interest'. In his experience, the complainant may or may not be wanting a criminal prosecution, or civil compensation and 'it's often not clear what they want'. He points out that the HSE's role is one of enforcement: if information comes to light that there have been breaches of pesticide laws, HSE inspectors can fulfil their prosecution policy, and will start to collect evidence.[88]'

PAN *UK* experience suggests it is likely there is under-reporting to PIAP, despite the publication by the HSE of an accessible leaflet[89] to the public, and its efforts to alert local authorities[90] to pass such incidents to PIAP. In our survey (Appendix 7), in which we sent a questionnaire about pesticide incidents to over 400 UK local authority Chief Environmental Health Officers, of 33 respondents, 21 were not aware of PIAP. Three local authorities indicated they did not record pesticide incidents specifically. **Over half** (11) of these local authorities had received reports of such incidents in 2002/2003, and in only three cases were they referred to the HSE.

'All of us have something called the 'blood brain barrier' that works pretty well to keep out any pesticide. Insecticides operate on the principal of chemical electrocution. They are all neurological poisons. The blood brain barrier will work pretty well to ensure that insecticide residues consumed with your dinner will not leave your blood stream and enter the brain matter where they can do some more damage. However we do not get a blood brain barrier until we are six months old. Anyone younger than six months is missing the suit of armour that surrounds the brain and offers pretty good protection against the neurological damage of insecticides. So tiny, vanishingly small exposures of insecticides to someone younger than six months can create disproportionate risks to the brain, and can be a terrible saboteur of that brain compared to similar or even much larger exposures for older humans.'

Dr Sandra Steingraber, author,
***Living Downstream* and *Having Faith, December 2003*.**

6 Conclusions

The evidence in this report indicates that long-term, low-dose exposure to pesticides, in food, water, and the environment, occurs commonly, and that the hazards are poorly understood. Although there are relatively sophisticated monitoring systems in place, they are not adequate to detect the harmful effects and chronic disease which pesticides may cause. Our surveys and analyses have identified gaps in monitoring systems which urgently need to be filled.

The government regularly reassures us that pesticides are detected at levels which are far below those that could cause harmful effects, and that risks are acceptable. PAN *UK* believes the assumptions underlying such claims are flawed and that complacency cannot be tolerated. A more precautionary approach, to reduce overall exposure to pesticides, is needed. PAN has devised strategies for pesticide use reduction both in the UK, and across Europe.

Organic agriculture produces food without the use of synthetic pesticides. This form of farming does not pollute the environment, or incur the cost of removing pesticides from drinking water. It does not create risks to health of having poisons in our food. The government should provide incentives for the expansion of the organic sector, and should encourage programmes of knowledge-transfer in non-chemical pest control.

This is the first in a series of PAN *UK* reports in which pesticide exposures through all routes will be presented. We urge the government to strengthen its monitoring programmes, and to compile its own aggregated reports, so that the actual extent of human pesticide exposure can be assessed.

7 Recommendations

The government should:

Regulation, risk assessment, and surveillance

- publish, in consultation, a national strategy for pesticide reduction, as required under the European Union's Sixth Environmental Action Plan
- review risk assessment procedures carried out by the Pesticides Safety Directorate, introducing a more precautionary approach to reduce overall exposure; integrate into the risk assessment process: biochemical data (measurements of pesticides in people); the effects of mixtures; measurements of pesticides in air and the wider environment; and focus monitoring programmes on pesticides most likely to cause harm
- provide incentives for the expansion of the organic agriculture sector, and encourage programmes of knowledge-transfer in non-chemical pest control and sustainable agriculture
- require statutory pesticide usage reporting, publishing data on the internet
- abolish the Health & Safety Executive's Pesticide Incident Appraisal Panel, and introduce, and publish reports of, a rigorous new surveillance scheme, of both reported and potential exposures, acute and chronic, to be managed by one organisation: we propose the Health Protection Agency
- require the agrochemical industry to conduct post-marketing surveillance of new pesticides; to publish a helpline and website on product labels so people can report ill-health effects directly to the new surveillance scheme above; and to register all testing and re-evaluation programmes, so that both negative and positive trial results are reported
- require and publish registers of interest for all professionals involved in the regulation of pesticides, and the surveillance of pesticide-related ill-health; with the requirement that they are updated with new information within two weeks.

Food and water

- introduce a food labelling requirement to disclose what pesticides were used in its production, if necessary via a website on the label
- encourage private sector (supermarket) retailers to publish the results of their residue testing programmes
- provide accessible information to the public about the approval status of pesticides, and about residues on both UK-produced and imported food: reports by the Pesticide Residues Committee should be electronically searchable
- expand the residue testing programme to test more food samples, more frequently, funding it via an increase in the levy paid by

agrochemical companies to the Pesticides Safety Directorate, on the 'polluter pays' principle

- revoke the approvals of pesticides repeatedly found as contaminants in raw (untreated) and treated water; apply the 'polluter pays' principle to the costs of cleaning pollutants from water
- enforce the European Commission legal limit for private drinking water supplies, removing individuals' liability for costly remedial works, via increases in the levy paid by agrochemical companies to the Pesticides Safety Directorate, on the 'polluter pays' principle
- require the Drinking Water Inspectorate to publish results of test findings when contaminants are persistently occurring at detectable levels in drinking water, in both public and private supplies.
- encourage the European Commission to adopt a new lower legal limit for pesticides in water, in line with improved analytical detection.

Exposures and poisonings

- introduce regulations giving people exposed to pesticides in their local environment, and the public, immediate access to information on the active ingredients to which they are being, or have been, exposed through spraying activities
- introduce statutory no-spray buffer zones in residential areas, to protect people living adjacent to fields
- establish, and publish, how many people live in homes directly adjacent to sprayed fields, and how many miles of public rights of way cross sprayed fields
- publish annual data on how many people are poisoned by specific pesticides, giving medical outcomes; conduct long-term medical follow-up of poisoning cases
- require pesticide companies to comply with their legal obligation to submit immediately reports of adverse health (and environmental) effects of their products; require the submission of all such reports since the legal obligation was introduced, in March 1998.

Sign the Paris Appeal!

Thousands of people, some of whom are Nobel prize winning scientists, have signed 'The Paris Appeal – an international declaration on diseases due to chemical pollution' launched by the Association pour la Recherche Therapeutique Anti-Cancereuse (http://appel.artac.info/anglais.htm). The Appeal calls upon regulators and international organisations, in particular the United Nations Organisation to:

✦ ban all substances that are certainly or probably carcinogenic, and apply the substitution principle (so that less hazardous substances are approved)

✦ apply the precautionary principle to any substances which are persistent, bioaccumulative, toxic, without waiting for the definitive epidemiological proof of a link

✦ base toxicological standards or thresholds on the assumption of risks to the most vulnerable, normally the foetus and children

✦ adopt programmes with scheduled deadlines and targets for the elimination or reduction in polluting substances

✦ use state or international judiciary powers to enforce public and private bodies' responsibility

✦ implement forceful measures to cut greenhouse gas emissions

✦ strengthen the EU Registration, Evaluation, and Authorisation of Chemicals (REACH) Initiative following strong opposition by EU and US chemical industries.

APPENDIX 1
Organisations involved in the regulation of pesticides, pesticide laws, and acronyms

REMIT	REGULATORY AUTHORITY	ACRONYM	ACTIVITIES
Registration and approvals	◆ Pesticides Safety Directorate	PSD	Registration and evaluation of agricultural etc pesticides.
	◆ Health & Safety Executive Biocides and Pesticides Assessment Unit	HSE	Registration and evaluation of non-agricultural pesticides and biocides.
	◆ Advisory Committee on Pesticides	ACP	An independent expert scientific body which advises Ministers on the approval and re-evaluation of pesticides. The Committee has three sub-committees: the Environmental Panel, the Working Party on Pesticide Usage Surveys and the Medical and Toxicological Panel.
Food	Food Standards Agency	FSA	Acts as watchdog in overseeing pesticide residue surveillance programme carried out by the Pesticide Residues Committee.
Water	Drinking Water Inspectorate	DWI	Responsible for overseeing compliance with water quality legislation by 24 water companies in the UK; and by local authorities for private water supplies.
Poisonings	National Poisons Information Service /Health Protection Agency	NPIS HPA	A representative of the NPIS sits on the Advisory Committee on Pesticides. The Health Protection Agency currently excludes pesticides from its responsibilities, unless there is an emergency incident such as a spillage.
'Incidents'	Health & Safety Executive	HSE	Investigates incidents of pesticide exposure involving people at work
	Local Authority Environmental Health Departments	LA	Investigates incidents of pesticide exposure not involving people at work
Air	National Air Emissions Inventory	NAEI	Monitors toxins in air, but only includes 3 pesticides, all obsolete: lindane (gamma-HCH), PCP (pentachlorophenol), and HCB (hexachlorobenzene)

See also:

HSE leaflet: Reporting incidents of exposure to pesticides and veterinary medicines INDG141(rev1) 2/99 CI000.

A guide to pesticide regulation in the UK and the role of the Advisory Committee on Pesticides, ACP 14 (299/2003), Department for the Environment, Food and Rural Affairs, and the Health & Safety Executive, June 2003 www.pesticides.gov.uk, ACP homepage.

Pesticide Laws

The use, supply, storage and advertisement of pesticides is regulated by a number of pieces of legislation including, for Great Britain, the Control of Pesticides Regulations (COPR) and Plant Protection Products Regulations (PPPR). PSD is responsible for agricultural pesticides; most non-agricultural pesticides are the responsibility of Health and Safety Executive (HSE). PPPR is the newer legislation and implements a European Directive (91/414/EEC) which regulates 'Plant Protection Products'; these include agricultural pesticides and growth regulators.

The use of pesticides is also regulated by COSHH (the Control of Substances Hazardous to Health).

For a full guide to the legislation see the UK Pesticide Law section on the PSD website www.pesticides.gov.uk

APPENDIX 2 The regulatory testing and assessment of pesticides

According to the official guidance* pesticide legislation aims to ensure that

- Pesticides are only approved for use if they are effective;
- No-one develops any serious illness through the use of pesticides;
- No-one is harmed or made ill by the presence of pesticide residues in food or drink;
- When pesticides are used according to the conditions of their approval, any adverse effects on wildlife or the environment are sufficiently small to be deemed acceptable.

At the approval stage, regulators make a careful scientific assessment of the pesticide, based mainly on laboratory animal experiments. In 2002, 40,104 procedures on animals relating to 'general agriculture' were carried out, involving the same number of animals**. This excludes tests done on animals for non-agricultural pesticides, biocides, and household products.

Human toxicity data is used when occupational health and epidemiological studies are available, but before a substance is registered there has been very little, if any, human exposure.

Regulators periodically review pesticides in use and carry out the surveillance of pesticide-related ill-health via a number of schemes, aiming to detect adverse effects which were not anticipated at the approval stage.

For a pesticide to be registered, the agrochemical company has to submit to the regulators a 'dossier' comprising an extensive range of data, broadly falling into seven areas:

1. Physico-chemical properties
2. Potential toxicity in humans
3. Dietary intake
4. Exposure to operators, other workers and 'bystanders'
5. Environmental fate and behaviour
6. Ecotoxicology
7. Efficacy and risk to following crops

To assess the potential toxicity in humans of the pesticide, the scientists aim to establish a 'No Adverse Effect Level' (NOAEL) for any ill-effects that might occur. A NOAEL is the highest dose administered to laboratory animals in an investigation that does not cause them 'observable' ill-effects. Non-observable effects, such as subtle changes in neurological function, pain, dizziness, numbness and psychological symptoms, are not included in this value.

The data that are required to assess potential human toxicity cover:

- How the active ingredient is metabolised and excreted in mammals.
- The 'acute' toxicity of a single high dose of the active ingredient and of the product by oral, dermal and inhalation exposure, usually in rats.
- The 'sub-acute' and 'chronic' toxicity of the active ingredient when administered to animals over periods of several weeks or longer (in two species, typically rats for up to two years and dogs for up to a year).
- The potential of the active ingredient to cause cancer when it is administered over a lifetime (in two species, usually in rats for a minimum of two years and in mice for 18 months).
- The genotoxicity of the active ingredient, ie its potential to damage the genetic material in cells, potentially causing cancer. Genotoxicity is (exceptionally) treated as a hazard trigger. Genotoxic pesticides are now not registered.
- The developmental toxicity of the active ingredient, ie whether it can cause birth defects when administered to female animals during pregnancy.
- The toxicity of the active ingredient when it is administered to at least two successive generations of animals over the course of their lifetime. This provides further information on the chronic toxicity of the pesticide and aims to detect its potential to impair fertility and the ability to rear young.
- The potential of the active ingredient and product to irritate the skin or eyes.
- The potential of the active ingredient and product to cause skin allergies (sensitisation).

- Further tests may be required if there is a need to understand effects better, for example on particular organ systems such as the nervous, immune or endocrine systems.

On the basis of these data, regulators decide whether the product needs to be labelled as a hazard (for example, irritant, harmful, toxic). 'Acceptable' levels of exposure are also defined, expressed as the Acceptable Daily Intake (ADI), Acute Reference Dose (ARfD), Acceptable Operator Exposure Level (AOEL) and others.

Acceptable Daily Intake (ADI)

This is the amount of a chemical which can be consumed every day for a lifetime in the practical certainty, on the basis of all known facts, that no harm will result. It is expressed in milligrammes of the chemical per kilogramme bodyweight of the consumer. The starting point for the derivation of the ADI is usually the lowest 'no adverse effect level' (NOAEL) that has been observed in animal studies of toxicity. This is then divided by an uncertainty factor (most often 100) to allow for the possibility that animals may be less sensitive than humans and also to account for possible variation in sensitivity between individuals. The studies from which NOAELs and ADIs are derived are supposed to take into account any impurities in the pesticide active ingredient as manufactured, and also any toxic breakdown products (metabolites) of the pesticide, but can only do so if and when these have been identified.

Acute Reference Dose (ARfD)

The definition of the ARfD is similar to that of the ADI, but it relates to the amount of a chemical tha can be taken at one meal or on one day. It is normally derived by applying an appropriate uncertainty factor to the lowest NOAEL in studies that assess acute toxicity or developmental toxicity.

Acceptable operator exposure level (AOEL)

This is intended to define a level of daily exposure that would not cause adverse effects in operators who work with a pesticide regularly over a period of days, weeks or months. Depending on the pattern of use, a short-term AOEL (ie for exposures over several weeks or on a seasonal basis), or long-term AOEL (ie for repeated exposures over the course of a year) are defined. AOELs are normally derived from a short-term laboratory animal toxicity study or a multi-generation study.

Maximum Residue Level (MRL)***

Pesticide residues in food are controlled through UK regulations which lay down maximum residue levels. MRLs are not safety limits for residues in food. They are designed to check that pesticides are being used correctly, according to good agricultural practice (GAP). In order to avoid serious inconsistencies in MRLs between countries, the Codex Alimentarius Commission (a United Nations body) has established the Codex Committee on Pesticide Residues, which bases its work on the scientific approvals made by the Food and Agriculture (FAO)/World Health Organisation (WHO) Joint Meeting on Pesticide Residues****. Where there is no approved use of a pesticide nor an 'import tolerance' a residue level is set at the limit of determination (LOD) (an affective 'zero' reflecting the lowest level at which reliable quantitative analysis can be performed).

Sources

* A guide to the regulation of pesticides in the UK and the role of the Advisory Committee on Pesticides, ACP 14 (299/2003), Department for the Environment, Food and Rural Affairs and Health & Safety Executive, June 2003 www.pesticides.gov.uk

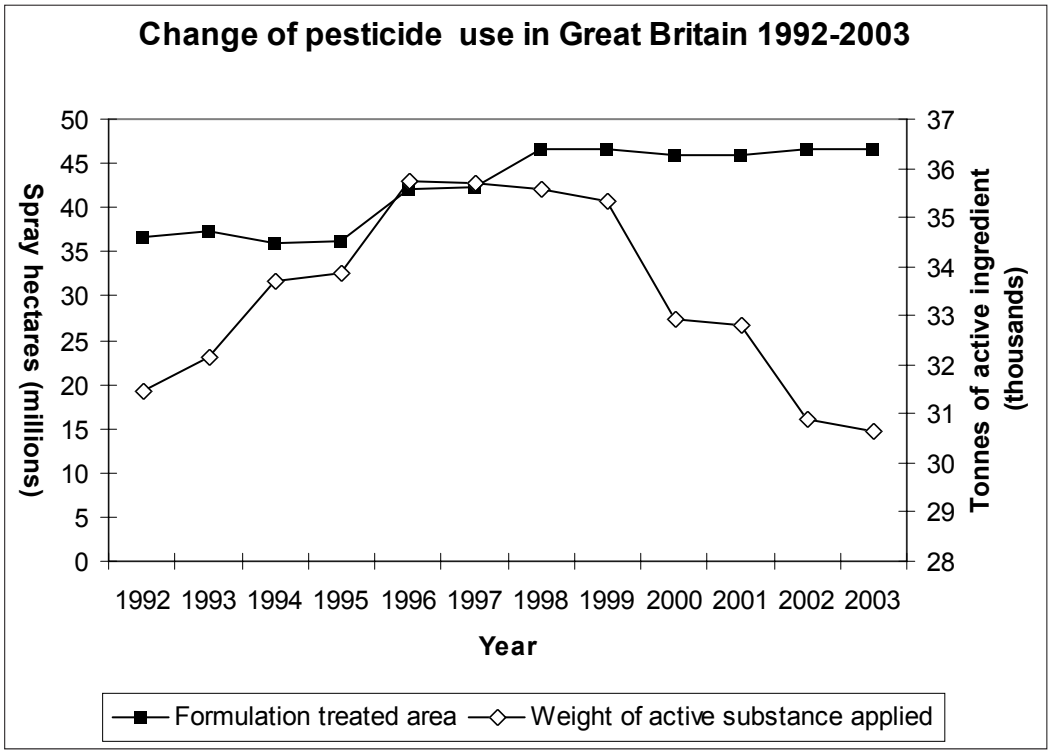
** Home Office, Statistics of Scientific Procedures on Living Animals in Great Britain, 2003, Stationery Office.

*** Annual report of the Pesticide Residues Committee 2002.

**** Control of pesticides and IPM, Implementation of Farmer Participatory Integrated Pest Management and Better Chemical Management in ACP States, Directorate-General for Development, Commission of the European Communities, Pesticides Trust, June 1998.

For concerns about the regulatory testing and assessment of pesticides see Are government-approved pesticides safe? page 4.

APPENDIX 3
Pesticide usage trends in the UK 1992-2003



Source: Central Science Laboratory Pesticide Usage Survey Group (PUSG) http://pusstats.csl.gov.uk/
All the recent PUSG survey reports are available as pdf documents at:
http://www.csl.gov.uk/science/organ/pvm/puskm/pusg.cfm

APPENDIX 4a
Food residues (UK testing programme)

Results reported in Pesticide Residues Committee monitoring reports, 2002

How to read this table

First column – Consumption data: M = Male, F = Female.

Third column - Approvals issues: ×= not approved on this crop in the UK, ××= not approved in the UK, ××× banned in the UK and other countries and date given. Pesticides not approved in the UK may be approved elsewhere among OECD (Organisation for Economic Co-operation and Development) countries, or elsewhere. Pesticides approved in the UK are not necessarily any safer than those approved elsewhere; sometimes less hazardous alternatives are approved in other countries. Approvals data from PSD website 13 Oct 2004 – Pesticides Register Database. NL = food item not listed as UK crop on PSD database. NA = Not available. * = not classified as a pesticide on PSD database.

Fourth column – Hazard to health issue: see key on page 31.

Fifth column – Positive residues: all positive residues included whether above or below the maximum residue level (MRL). For food items in which residues above the MRL were detected see page 31.

Food. Average quantities (grams) of the food consumed per person in seven days (National Diet and Nutrition Survey data), when known.	Pesticide	Approvals issues	Hazard to health issue (See key on page 31)	Number of positive residues per samples tested
APPLES	Azinphos-methyl	××	Acutely toxic WHO Ib, OP	2 of 75
Consumption data:	Bromopropylate	××		1 of 41
apples and pears	Bupirimate			1 of 20
	Captan			17 of 103
1.5-4.5 years: M231; F206	Carbaryl	××	Acutely toxic WHO II, suspected carcinogen C3	3 of 75
4-18 years: M282; F294	Carbendazim		Suspected carcinogen C, suspected	
19-64 years: M437; F390			endocrine-disrupting chemical Ger EA	16 of 103
65 years and over: M440; F405	Chlorpyrifos		Acutely toxic WHO II, OP, suspected	
			endocrine-disrupting chemical Ger EA	28 of 103
	Dimethoate		Acutely toxic WHO II, OP, suspected carcinogen C,	
			suspected endocrine-disrupting chemical UK EA,	
			Ger EA, WWF	2 of 41
	Diphenylamine			21 of 75
	Dithianon			2 of 34
	Dithiocarbamates	NA		4 of 70
	Dodine			11 of 71
	Fenazaquin		Acutely toxic WHO II	1 of 41
	Metalaxyl			4 of 28
	Phosalone	××	Acutely toxic WHO II, OP	4 of 75
	Phosmet	××	Acutely toxic WHO II, OP, suspected carcinogen C	3 of 41
	Pirimicarb		Acutely toxic WHO II	1 of 41
	Propargite	××		12 of 75
	Pyrimethanil			1 of 20
	Thiabendazole		Suspected carcinogen L2	16 of 75
Apricot	Azinphos-methyl	××	Acutely toxic WHO Ib, OP	1 of 30
	Captan		Suspected carcinogen B2, 3	13 of 44
	Carbaryl	××	Acutely toxic WHO II, suspected carcinogen C, 3	1 of 14
	Carbendazim		Suspected carcinogen C, suspected	
			endocrine-disrupting chemical Ger EA	5 of 44
	Chlorpyrifos		Acutely toxic WHO II, OP, suspected	
			endocrine-disrupting chemical Ger EA	1 of 14
	Dithiocarbamates	NA		4 of 44
	Iprodione			15 of 44
	Phosmet	××	Acutely toxic WHO II, OP, suspected carcinogen C	1 of 14
	Tebuconazole		Suspected carcinogen C	5 of 30
	Thiabendazole		Suspected carcinogen L2	1 of 30
Aubergine	Chlorothalonil		Suspected carcinogen L2, 3, 2B	1 of 13
	Propamocarb			1 of 4
Bananas	Azoxystrobin	NL		3 of 102
1.5-4.5 years: M245; F222	Bitertanol	NL		9 of 120
4-18 years: M234; F199	Imazalil	NL	Acutely toxic WHO II, suspected carcinogen L2	45 of 75

Food. Average quantities (grams) of the food consumed per person in seven days (National Diet and Nutrition Survey data), when known.	Pesticide	Approvals issues	Hazard to health issue (See key on page 31)	Number of positive residues per samples tested
19-64 years: M363; F344 65 years and over: M298; F300	Thiabendazole	NL	Suspected carcinogen L2	33 of 69
Bread, ordinary 1.5-4.5 years: M670; F636 4-18 years: M1096; F877 19-64 years: M1276; F857 65 years and over: M1618; F1131	Chlormequat			86 of 145
	Glyphosate			26 of 137
	Pirimphos-methyl			6 of 71
Bread, part-baked	Chlormequat			25 of 48
	Pirimiphos-methyl		OP	3 of 42
Bread, savoury	Chlormequat			28 of 71
	Glyphosate		Suspected endocrine-disrupting chemical Ger EA	2 of 31
	Pirimiphos-methyl		OP	7 of 64
Butter 1.5-4.5 years: M28; F27 4-18 years: M42; F33 19-64 years: M64; F46 65 years and over: M118; F99	DDT	××× 1986	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B, suspected endocrine-disrupting chemical UK EA, DEFRA, EU, OSPAR, WWF	20 of 51
Carrots (consumption data raw carrots only) 1.5-4.5 years: M62;F63 4-18 years: M92; F70 19-64 years: M78; F62 65 years and over: M87; F150	Aldicarb		Acutely toxic WHO Ia, Poisons Law listed	1 of 29
	Chlorfenvinphos		Acutely toxic WHO Ib, Poisons Law listed	3 of 20
	Iprodione	×	Suspected carcinogen, L2, 3	11 of 55
	Trifluralin		Suspected carcinogen C, suspected endocrine-disrupting chemical UK EA, WWF	2 of 64
	Vinclozolin		Suspected carcinogen C, 3, suspected endocrine-disrupting chemical DEFRA, confirmed Ger EA, suspected EU, OSPAR, WWF	1 of 15
Celery	Acephate	××	OP, suspected carcinogen C	1 of 32
	Azoxystrobin			1 of 16
	Carbendazim		Suspected carcinogen C	2 of 32
	Chlorothalonil		Suspected carcinogen L2, 3, 2B	18 of 70
	Chlorpyrifos		Acutely toxic WHO II, OP, suspected endocrine-disrupting chemical Ger EA	1 of 5
	Dicloran			1 of 32
	Dithiocarbamates	NA		4 of 47
	Fenitrothion	××	Acutely toxic WHO II, OP	4 of 33
	Inorganic bromide	*		36 of 54
	Lambda-cyhalothrin		Acutely toxic WHO II	1 of 32
	Malathion		OP, suspected carcinogen S	2 of 37
	Methamidophos	××	Acutely toxic WHO Ib, OP	1 of 32
	Pirimicarb		Acutely toxic WHO II	2 of 18
	Tebuconazole		Suspected carcinogen C	3 of 32
Cheese (UK and imported) 1.5-4.5 years: M71; F67 4-18 years: M100; F99 19-64 years: M 146; F113 65 years and over: M140; F102	DDT	××× 1986	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B, suspected endocrine-disrupting chemical UK EA, DEFRA, EU, OSPAR, WWF	1 of 67
	Gamma-HCH-lindane	××× 2002	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B, suspected endocrine-disrupting chemical UK EA, DEFRA, EU, OSPAR, WWF	1 of 72
Chicken nuggets/breaded chicken 1.5-4.5 years: M127; F104 4-18 years: M234 (chicken and turkey [C&T]); F156 (C&T) 19-64 years: M207 (C&T); F183 65 years and over: M235/F196	Chlormequat			1 of 61
Chips, fast food (see also potatoes) 1.5-4.5 years: M209; F192 4-18 years: M 415/F351 19-64 years: M401/F294	Aldicarb		Acutely toxic WHO Ia, Poisons Law listed	2 of 48
	Chlorpropham			16 of 48
	Maleic hydroxide			10 of 48
	Tecnazene	××		2 of 48

Food. Average quantities (grams) of the food consumed per person in seven days (National Diet and Nutrition Survey data), when known.	Pesticide	Approvals issues	Hazard to health issue (See key on page 31)	Number of positive residues per samples tested
65 years and over: M339/F261				
Chocolate, white	Gamma-HCH-lindane	×× 2002	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B, suspected endocrine-disrupting chemical UK EA, DEFRA, EU, OSPAR, WWF	6 of 47
Cream	None found			0 of 71
Cucumber	Azoxystrobin			1 of 19
	Carbendazim		Suspected carcinogen C, suspected endocrine-disrupting chemical Ger EA	5 of 38
	Dithiocarbamates	NA		7 of 30
	Imazalil		Acutely toxic WHO II, suspected carcinogen L2	2 of 35
	Iprodione		Suspected carcinogen L2, 3	2 of 27
	Metalaxyl			2 of 14
	Oxadixyl	××	Suspected carcinogen C	4 of 30
	Procymidone	××	Suspected carcinogen B2, confirmed endocrine-disrupting chemical Ger EA	7 of 27
	Propamocarb			12 of 72
	Prothiofos	××	Acutely toxic WHO II, OP	1 of 3
Dried fruit: currants, raisins, sultanas	Bromopropylate	××		7 of 25
	Carbendazim	NL	Suspected carcinogen C	27 of 69
	Ethylenethiourea ETU	××		1 of 22
	Inorganic bromide	*		13 of 47
	Iprodione	NL	Suspected carcinogen L2, 3	15 of 69
	Lambda-cyhalothrin	NL	Acutely toxic WHO II	1 of 22
	Malathion	NL	OP, suspected carcinogen S	4 of 22
	Metalaxyl	NL		1 of 15
	Procymidone	××	Suspected carcinogen B2	17 of 47
	Triadimenol	NL		1 of 22
Fish, fast food	None found	NL		0 of 48
Fish, sea 1.5-4.5 years: M187/F188 4-18 years: M282/F264 19-64 years: M442/F410 65 years and over: M552/F469	DDT	××× 1986	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B, suspected endocrine-disrupting chemical UK EA, DEFRA, EU, OSPAR, WWF	9 of 67
Flour	Chlormequat			51 of 71
	Glyphosate		Suspected endocrine-disrupting chemical Ger EA	7 of 24
	Pirimiphos-methyl		OP	9 of 48
Grapes	Azoxystrobin	NL		3 of 36
	Bromopropylate	NL		6 of 36
	Captan	NL	Suspected carcinogen B2, 3	8 of 36
	Carbaryl	NL	Acutely toxic WHO II, suspected carcinogen C, 3	5 of 36
	Carbendazim	NL	Suspected carcinogen C, suspected endocrine-disrupting chemical Ger EA	7 of 72
	Chlorpyrifos	NL	Acutely toxic WHO II, OP, suspected endocrine-disrupting chemical Ger EA	3 of 36
	Chlorpyrifos-methyl	NL	OP	1 of 30
	Dicofol	NL	Suspected carcinogen C	1 of 30
	Dimethoate	NL	Acutely toxic WHO II, OP, suspected carcinogen C, suspected endocrine-disrupting chemical UK EA, Ger EA, WWF	3 of 36
	Dithiocarbamates	NA		6 of 36
	Ethion	NL	Acutely toxic WHO II, OP	1 of 30
	Iprodione	NL	Suspected carcinogen L2, 3	8 of 58
	Metalaxyl	NL		3 of 30
	Procymidone	NL	Suspected carcinogen B2, confirmed endocrine-disrupting chemical Ger EA	13 of 64
	Propargite	NL	Suspected carcinogen B2	1 of 30
	Pyrazophos	NL	Acutely toxic WHO II	1 of 30
	Pyrimethanil	NL	Suspected carcinogen C	1 of 30
	Vinclozolin	NL	Suspected carcinogen C, 3, suspected	

Food. Average quantities (grams) of the food consumed per person in seven days (National Diet and Nutrition Survey data), when known.	Pesticide	Approvals issues	Hazard to health issue (See key on page 31)	Number of positive residues per samples tested
			endocrine-disrupting chemical DEFRA, confirmed Ger EA, suspected EU, OSPAR, WWF	1 of 28
Green beans	Bifenthrin		Acutely toxic WHO II, suspected carcinogen C	1 of 22
1.5-4.5 years: M27/F50	Carbendazim		Suspected carcinogen C, suspected endocrine-disrupting	
4-18 years: M76/F66			chemical Ger EA	1 of 33
19-64 years: M113/F103	Chlorothalonil		Suspected carcinogen L2, 3, 2B	1 of 33
65 years and over: M177/F169	Chlorpyrifos		Acutely toxic WHO II, OP, suspected endocrine-disrupting	
			chemical Ger EA	1 of 22
	Dicofol	××	Suspected carcinogen C, suspected endocrine-disrupting	
			chemical OSPAR, WWF	1 of 33
	Dimethoate		Acutely toxic WHO II, OP, suspected carcinogen C,	
			suspected endocrine-disrupting chemical UK EA,	
			Ger EA, WWF	1 of 3
	Dithiocarbamate	NA		1 of 33
	Lambda-cyhalothrin		Acutely toxic WHO II	1 of 33
	Vinclozolin		Suspected carcinogen C, 3, suspected	
			endocrine-disrupting chemical DEFRA, confirmed Ger EA,	
			suspected EU, OSPAR, WWF	4 of 8
Herbs: basil, coriander, parsley	Azoxystrobin			1 of 9
	Cypermethrin	×	Acutely toxic WHO II, suspected carcinogen C	2 of 16
	Dimethoate		Acutely toxic WHO II, OP, suspected carcinogen C,	
			suspected endocrine-disrupting chemical UK EA,	
			Ger EA, WWF	1 of 15
	Dithiocarbamates	NA		3 of 15
	Imidacloprid		Acutely toxic WHO II	3 of 7
	Inorganic bromide	*		17 of 48
	Iprodione	×	Suspected carcinogen L2, 3	1 of 9
	Pirimicarb		Acutely toxic WHO II	9 of 28
	Propamocarb			1 of 4
	Quintozene	××	Suspected carcinogen C	2 of 15
	Toclofos-methyl			1 of 15
Infant food (cereal based)	Chlormequat			4 of 52
	Hydrogen phosphide	××		9 of 115
	Pirimiphos-methyl		OP	5 of 76
Juice, blackCurrant	None found			0 of 72
Consumption data: fruit juice				
1.5-4.5 years: M690/F756				
4-18 years: M 821F 750				
19-64 years: M797/F697				
65 years and over: M706/F638				
Lamb	DDT	××× 1986	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B,	
1.5-4.5 years: M94/F92			suspected endocrine-disrupting chemical UK EA,	
4-18 years: M224/F162			DEFRA, EU, OSPAR, WWF	30 of 72
19-64 years: M253/F197	Diazinon	NL	Acutely toxic WHO II, OP	1 of 56
65 years and over: M270/F204				
Leeks	None found			0 of 48
Lettuce	Azoxystrobin			1 of 27
	Cypermethrin		Acutely toxic WHO II, suspected carcinogen C	1 of 27
	Dithiocarbamates	NA		18 of 72
	Imidacloprid		Acutely toxic WHO II	2 of 19
	Inorganic bromide	*		10 of 68
	Iprodione		Suspected carcinogen L2, 3	6 of 49
	Metalaxyl			1 of 16
	Pirimicarb		Acutely toxic WHO II	2 of 25
	Procymidone	××	Suspected carcinogen B2, confirmed	
			endocrine-disrupting chemical Ger EA	7 of 62
	Propamocarb			7 of 68
	Propyzamide		Suspected carcinogen 3	1 of 27
	Quintozene	××	Suspected carcinogen C	6 of 33
	Toclofos-methyl			6 of 50

For how to read this table see page 25

Food. Average quantities (grams) of the food consumed per person in seven days (National Diet and Nutrition Survey data), when known.	Pesticide	Approvals issues	Hazard to health issue (See key on page 31)	Number of positive residues per samples tested
	Vinclozolin	×	Suspected carcinogen C, 3, suspected endocrine-disrupting chemical DEFRA, confirmed Ger EA, suspected EU, OSPAR, WWF	4 of 22
Melon	Acephate	××	OP, suspected carcinogen C	3 of 70
	Chlorothalonil		Suspected carcinogen L2, 3, 2B	1 of 33
	Diazinon		Acutely toxic WHO II, OP	1 of 33
	Dithiocarbamates	NA		6 of 72
	Endosulfan		Acutely toxic WHO II, Poisons Law listed	23 of 70
	Heptenophos	××	Acutely toxic WHO Ib, OP	1 of 37
	Imazalil		Acutely toxic WHO II, suspected carcinogen L2	9 of 70
	Iprodione		Suspected carcinogen L2, 3	1 of 33
	Methamidophos	××	Acutely toxic WHO Ib, OP	3 of 70
	Permethrin		Acutely toxic WHO II, suspected carcinogen C, suspected endocrine-disrupting chemical UK EA, WWF	1 of 33
	Procymidone	××	Suspected carcinogen B2, confirmed endocrine-disrupting chemical Ger EA	4 of 70
Milk	None found			0 of 216
Mince	DDT	××× 1986	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B, suspected endocrine-disrupting chemical UK EA, DEFRA, EU, OSPAR, WWF	7 of 84
	Gamma-HCH-lindane	××× 2002	Acutely toxic WHO II, suspected carcinogen B2, 3, 2B, suspected endocrine-disrupting chemical UK EA, DEFRA, EU, OSPAR, WWF	1 of 35
Oranges	2,4-D	NL	Acutely toxic WHO II	35 of 69
Consumption data: citrus fruit	2-phenylphenol	NL		25 of 98
1.5-4.5 years: M187/F209	Bromopropylate	NL		10 of 96
4-18 years: M215/F233	Carbendazim	NL	Suspected carcinogen C, suspected endocrine-disrupting chemical Ger EA	7 of 70
19-64 years: M299/F327				
65 years and over: M474/F384	Chlorfenvinphos	NL	Acutely toxic WHO Ib, OP, Poisons Law listed	1 of 48
	Chlorpyrifos	NL	Acutely toxic WHO II, OP, suspected endocrine-disrupting chemical Ger EA	29 of 96
	Diazinon	NL	Acutely toxic WHO II, OP	1 of 48
	Dicofol	NL	Suspected carcinogen C, suspected endocrine-disrupting chemical OSPAR, WWF	8 of 48
	Dithiocarbamates	NL		4 of 35
	Ethion	NL	Acutely toxic WHO II, OP	1 of 48
	Fenitrothion	NL	Acutely toxic WHO II, OP	1 of 48
	Imazalil	NL	Acutely toxic WHO II, suspected carcinogen L2	96 of 100
	Malathion	NL	OP, suspected carcinogen S	2 of 48
	Methidathion	NL	Acutely toxic WHO Ib, OP, suspected carcinogen C	29 of 98
	Parathion-methyl	NL	OP	1 of 48
	Pirimiphos-methyl	NL	OP	1 of 48
	Profenofos	NL	Acutely toxic WHO II, OP	1 of 48
	Propargite	NL	Suspected carcinogen B2	1 of 48
	Tetradifon	NL		2 of 96
	Thiabendazole	NL	Suspected carcinogen L2	61 of 100
	Trifloxystrobin	NL		1 of 48
Peaches and nectarines	Acephate	××	OP, suspected carcinogen C	1 of 24
	Azinphos-methyl	××	Acutely toxic WHO Ib, OP	4 of 65
	Buprofezin		Suspected carcinogen S	1 of 16
	Captan		Suspected carcinogen B2, 3	2 of 31
	Carbaryl	××	Acutely toxic WHO II, suspected carcinogen C, 3	10 of 51
	Carbendazim		Suspected carcinogen C, suspected endocrine-disrupting chemical Ger EA	7 of 65
	Dithiocarbamates	NA		2 of 20
	Endosulfan		Acutely toxic WHO II, Poisons Law listed	1 of 18
	Iprodione		Suspected carcinogen L2, 3	32 of 68
	Methamidophos	××	OP, suspected carcinogen C	3 of 46
	Methomyl	××	Acutely toxic WHO Ib, Poisons Law listed	5 of 20
	Phosmet	××	Acutely toxic WHO II, OP, suspected carcinogen C	5 of 20

Food. Average quantities (grams) of the food consumed per person in seven days (National Diet and Nutrition Survey data), when known.	Pesticide	Approvals issues	Hazard to health issue (See key on page 31)	Number of positive residues per samples tested
	Procymidone	××	Suspected carcinogen B2, confirmed endocrine-disrupting chemical Ger EA	4 of 52
	Propargite	××	Suspected carcinogen B2	4 of 55
	Tebuconazole		Suspected carcinogen C	2 of 18
Pears	Azinphos-methyl	××	Acutely toxic WHO Ib, OP	1 of 30
Consumption data:	Bromopropylate	××		2 of 66
apples and pears	Captan		Suspected carcinogen B2, 3	36 of 156
1.5-4.5 years: M231/F206	Carbendazim		Suspected carcinogen C, suspected endocrine-disrupting chemical Ger EA	11 of 64
4-18 years: M282/F294				
19-64 years: M437/F390	Chlormequat	×		36 of 150
65 years and over: M440/F405	Chlorothalonil		Suspected carcinogen L2, 3, 2B	4 of 66
	Chlorpyrifos		Acutely toxic WHO II, OP, suspected endocrine-disrupting chemical Ger EA	3 of 66
	Diazinon		Acutely toxic WHO II	2 of 125
	Dicofol	××	Suspected carcinogen C, suspected endocrine-disrupting chemical OSPAR, WWF	1 of 66
	Diethofencarb	××		3 of 55
	Dimethoate		Acutely toxic WHO II, suspected carcinogen C, suspected endocrine-disrupting chemical UK EA, Ger EA, WWF	8 of 76
	Dithiocarbamates	NA		37 of 72
	Folpet	××	Suspected carcinogen B2, 3	13 of 135
	Imazalil		Acutely toxic WHO II, suspected carcinogen L2	10 of 61
	Iprodione		Suspected carcinogen L2, 3	14 of 150
	Lambda-cyhalothrin		Acutely toxic WHO II	1 of 65
	Methidathion	××	Acutely toxic WHO II, suspected carcinogen C	1 of 59
	Omethoate	××	Acutely toxic WHO Ib	1 of 6
	Phosalone		Acutely toxic WHO II	2 of 125
	Phosmet	××	Acutely toxic WHO II, suspected carcinogen C	28 of 141
	Procymidone	××	Suspected carcinogen B2, confirmed endocrine-disrupting chemical Ger EA	7 of 125
	Tebuconazole		Suspected carcinogen C	1 of 59
	Thiabendazole		Suspected carcinogen L2	5 of 55
	Tolyfluanid	×		21 of 150
Popcorn/polenta	Deltamethrin	NL	Acutely toxic WHO II, suspected endocrine-disrupting chemical Ger EA, WWF	1 of 15
	Glyphosate	NL	Suspected endocrine-disrupting chemical Ger EA	6 of 22
	Hydrogen phosphide	NL		3 of 22
	Pirimiphos-methyl	NL	OP	4 of 8
Potatoes (see also chips)	Aldicarb		Acutely toxic WHO Ia	2 of 34
1.5-4.5 years: M374/F373	Chlorpropham			59 of 234
4-18 years: M645/F590	Dithiocarbamates	NA		5 of 28
19-64 years: M893/F736	Imazalil		Acutely toxic WHO II, suspected carcinogen L2	5 of 160
65 years and over: M1166/F959	Maleic hydrazide			12 of 68
	Oxadixyl	××	Suspected carcinogen C	25 of 219
	Tecnazene	××		6 of 144
	Thiabendazole		Suspected carcinogen L2	5 of 144
Sausages	Gamma-HCH-lindane	××× 2002	Acutely toxic WHO II, B2, 3, 2B	1 of 144
1.5-4.5 years: M123/F114				
4-18 years: M156/F117				
19-64 years: M170/F124				
65 years and over: M190/F173				
Soup, vegetable	None found			0 of 47
Spinach	Azoxystrobin			1 of 22
	Cypermethrin		Acutely toxic WHO II, suspected carcinogen C	15 of 67
	Deltamethrin		Acutely toxic WHO II, suspected endocrine-disrupting chemical Ger EA, WWF	1 of 8
	Methomyl		Acutely toxic WHO Ib, Poisons Law listed	6 of 32
Spreads, low fat				0 of 96
1.5-4.5 years: M28/F27				
4-18 years: M49/F40				

For how to read this table see page 25

Food. Average quantities (grams) of the food consumed per person in seven days (National Diet and Nutrition Survey data), when known.	Pesticide	Approvals issues	Hazard to health issue (See key on page 31)	Number of positive residues per samples tested
19-64 years: M82/F53 65 years and over: M111/F107				
Sweet peppers	Endosulfan		Acutely toxic WHO II, Poisons Law listed	1 of 25
Sweet potato	Dicloran	NL		19 of 47
Tomatoes 1.5-4.5 years: M75/F83 4-18 years: M84/F95 19-64 years: M159/F170 65 years and over: M227/F200	Chormequat			2 of 12
Yam	Carbendazim		Suspected carcinogen C, suspected endocrine-disrupting chemical Ger EA	1 of 14

Notes

Samples of UK, imported, and unknown provenance food items added together.

Categories of consumption data added together: eg for potatoes: fried/roast poatoes, other potato products, other potatoes.

Maximum Residue Level (see page 23) exceedances

These were detected in: 3 samples of apricots, 4 samples of green beans, 2 samples of celery, 1 sample of herbs, 3 samples of infant food, cereal-based, 3 samples of lettuce, 4 samples of melon, 5 samples of peaches and nectarines, 1 sample of pears, 3 samples of potatoes, 5 samples of spinach, 2 samples of tomatoes, and 4 samples of yams.

References

Pesticide Residue Committee

Sources of consumption data (latest available figures):

National Diet and Nutrition Survey: children aged 1.5 to 4.5 years, July 1992 – June 1993, ISBN 0-11-691611-7

National Diet and Nutrition Survey: young people aged 4 to 18 years, January – December 1997, ISBN 0-11-621265-9

National Diet and Nutrition Survey: adults aged 19 – 64 years – types and quantities of foods consumed, July 2000 – June 2001, ISBN 0-11-621566-6

National Diet and Nutrition Survey: people aged 65 years and over, October 1994 – September 1995, ISBN 0-11-243019-8

Hazard to health issues

World Health Organisation classifications

Class		*LD_{50} for the rat (mg/kg body weight)*			
		Solids {Oral}	*Liquids*	*Solids {Dermal}*	*Liquids*
Ia	*Extremely hazardous*	*5 or less*	*20 or less*	*10 or less*	*40 or less*
Ib	*Highly hazardous*	*5-50*	*20-200*	*10-100*	*40-400*
II	*Moderately hazardous*	*50-500*	*200-2000*	*100-1000*	*400-4000*
III	*Slightly hazardous*	*Over 500*	*Over 2000*	*Over 1000*	*Over 4000*
U	*Unlikely to present acute hazard in normal use: 'WHO Table 5'*				
O	*Active ingredients believed to be obsolete or discontinued for use as pesticides*				

The terms 'solid' and 'liquids' refer to the physical state of the active ingredient. The LD_{50} value is a statistical estimate of the number of mg of toxicant per kg of bodyweight required to kill 50% of a large population of test animals.

Endocrine disrupting chemicals

UK EA – on the UK Environment Agency's list of target EDCs, Strategy for Endocrine disrupting chemicals, http://www.environment-agency.gov.uk/commonda-ta/105385/139909

DEFRA – identified as associated with endocrine disruption by the UK Department for Environment, Food and Rural Affairs, web site: Hormone Disrupting Substances in the Environment http://www.defra.gov.uk/environ-ment/hormone/index.htm

Ger.EA – potential and confirmed EDCs by the German Federal Environment Agency column, Pesticides suspected of endocrine-disrupting effects by Germany's Federal Environment Agency, ENDS Report 290, March 1999.

EU – considered as high concern EDC by the European Union, Commission moots priority list of endocrine chemicals, BKH/TNO report, June 2000.

OSPAR – identified as a potential EDC under Oslo and Paris Commission, Endocrine disrupting pesticide: Gwynne Lyons. Pesticides News 46, December 1999.

WWF – World Wide Fund for Nature list of pesticides reported to have reproductive and/or endocrine disrupting effects. There are a number of other pesticides WWF suspect of being EDCs, but they are not listed if no other authority above cited them.

Definitions of cancer categories

US Environmental Protection Agency

The US EPA has changed its classification systems in recent years. Some categories have similar definitions:

Weight-of-evidence categories developed during the 1980s

Group B = Probable Human Carcinogen: B1 indicates limited human evidence; *B2* indicates sufficient evidence in animals and inadequate or no evidence in humans.

Group C = Possible Human Carcinogen:

Weight-of-evidence categories developed during the 1990s

Known/Likely available tumour effects and other key data are adequate to demonstrate convincingly a carcinogenic potential for humans.

L1 = Likely at high doses but Not Likely at low doses

L2 = Likely to be carcinogenic to humans, available tumour effects and other key data are adequate to demonstrate carcinogenic potential for humans.

S = Cannot be Determined-Suggestive evidence from human or animal data is suggestive of carcinogenicity, but is not sufficient to conclude as to human carcinogenic potential.

Source: Office of Pesticide Programs List of Chemicals Evaluated for Carcinogenic Potential, US EPA, [see details at www.epa.gov/pesticides/carlist/ although list not available on website], August 2000.

European Union

There is no single EU list available denoting carcinogenic pesticides. EC Directive 67/548 and subsequent amendments provide the classification of dangerous substances, including pesticides. The cancer classifications are:

Category 2 (denoted as R45 on the pesticide label) = *May Cause Cancer*

Category 3 (denoted as R40 on label) = *Possible Risk of Irreversible Effects (Cancer*, as cited in table)

Sources: EC Directive 67/548 EEC and subsequent amendments; Chemicals (Hazard Information and Packaging for Supply) [CHIP2] Regulations 1994, Health and Safety Executive, UK.

International Agency for Research on Cancer

Group 1 = Carcinogenic to Humans

Group 2A = Probably Carcinogenic to Humans (limited evidence of carcinogenicity in humans and sufficient evidence in experimental animals).

Group 2B = Possibly Carcinogenic to Humans (limited evidence of carcinogenicity in humans and less than sufficient evidence in experimental animals).

Source: http://193.51.164.11/monoeval/grlist.html [Note: lists cited include many non-pesticides]

Appendix 4b
Food residues (Europe)

Monitoring of pesticide residues in products of plant origin in the European Union, Norway, Iceland and Liechtenstein, European Commission Health & Consumer Protection Directorate-General, SANCO/17/04, April 2004

Results of the eighteen monitoring programmes for pesticide residues on fresh (including frozen) fruit, vegetables and cereals, sum of surveillance and enforcement samples.

Country	Number of samples analysed	No of different pesticides found	% of samples without detectable residues	% of samples with residues below or at the MRL	% of samples with confirmed residues above the MRL	% of samples with multiple residues
Belgium	1028	45	55	40	2.5	15.2
Denmark	1977	78	60	38	2.4	17.7
Germany	7035	182	46	45	5.1	31.1
Greece	1661	46	56	42	1.9	7.8
Spain	4049	76	62	35	3.5	8.6
France	3721	99	47	44	6.2	29.9
Ireland	617	45	52	44	4.2	18.2
Italy	8095	137	70	28	1.1	14.0
Luxembourg	118	28	60	36	1.7	11.9
Netherlands	3042	117	46	38	8.2	31.1
Austria	1637	97	46	38	8.2	29.2
Portugal	722	40	74	23	2.8	9.6
Finland	1985	89	49	46	4.1	27.7
Sweden	2073	89	58	37	4.0	17.7
United Kingdom	2087	76	56	43	1.6	20.7
Norway	2280	64	66	30	3.4	15.5
Iceland	278	26	53	45	2.5	23.7
Liechtenstein	47	3	81	17	0.0	0.0

MRL = Maximum Residue Level (legal trade limit, not safety limit)

Exceedances of Acute Reference Dose levels

Exposure assessment for acute risk from the pesticides investigated in the EC 2002 coordinated programme for the products with the highest residues found in a composite sample in the EU. The calculation was performed with the UK Consumer Exposure Model for an adult (70.1 kilograms) and a toddler (14.5 kilograms) and only for those pesticides which have acute toxicity, and where an Acute Reference Dose has been set.

Pesticide	Food item sampled	Exceedances: intake in percentage of the Acute Reference Dose
Acephate	Peach	160% (toddler)
Aldicarb	Carrots	134% (toddler)
Aldicarb	Potatoes	151% (toddler)
Diazinon	Carrots	103% (toddler)
Methamidophos	Beans	477% (toddler)
Methidathion	Oranges	125% (toddler)
Methiocarb	Beans	381% (adult), 441% (toddler)
Methomyl	Spinach	116% (adult), 351% (adult), 456% (toddler)
Oxydemeton-methyl	Spinach	102% (adult), 310% (adult), 404% (toddler)
Parathion	Peaches	161% (toddler)
Triazophos	Oranges	393% (toddler)

Appendix 5a – Pesticides in the public drinking water supply

From Drinking Water Inspectorate Annual Report, 2002

From PAN Questionnaire Survey, November 2003
NA = not available as no questionnaire returned.

Water company	No of consumers supplied	No of tests carried out for pesticides	No of samples breaching EC limit of 0.1 micrograms per litre, and substance (levels not given in DWI annual report)	Number of pesticides found above 0.01 micrograms per litre		Data on the basis of which pesticides are selected for testing	Pesticide removal costs: 1) capital cost to date 2) operational cost for 2002	Estimated cause of pollution
				Found in raw water	Found in drinking water			
Albion	474	4, plus other pesticides 323	0	NA	NA	NA	NA	NA
Anglian	4,100,000	2244, plus other pesticides 33,369	0	NA	NA	NA	NA	NA
Bournemouth & West Hampshire	432,000	75, plus other pesticides 2277	0	NA	NA	NA	NA	NA
Bristol	1,086,000	313, plus other pesticides 1394	0	NA	NA	NA	NA	NA
Cambridge	291,700	27, plus other pesticides 496	0	NA	NA	NA	NA	NA
Cholderton	2,100	13, plus other pesticides 68	0	NA	NA	NA	NA	NA
Dee Valley	258,500	72, plus other pesticides 1,441	0	NA	NA	NA	NA	NA
Dwr Cymru	2,800,000	2291, plus atrazine MCPA 623, mecoprop 623, simazine 755, other pesticides 26,243	1 (not specified); 1 mecoprop.	NA	NA	NA	NA	NA
Essex & Suffolk	1,700,000	2,058, plus c arbetamide 1,949, other pesticides 65,166	11, carbetamide	NA	NA	NA	NA	NA
Folkestone & Dover	163,300	24, plus simazine 26, other pesticides 254	1, simazine	NA	NA	NA	NA	NA
Hartlepool	91,000	4, plus other pesticides 76	0	NA	NA	NA	NA	NA
Mid Kent	574,700	593, plus other pesticides 6516	0	NA	NA	NA	NA	NA
Northumbrian	2,600,000	2492, plus carbophenothion 2412, chlortoluron 2547, isoproturon 2576, MCPA 2446, propyzamide 2446, other pesticides	3 (not specified); 2 chlortoluron; 9 isoproturon	53	52	Commercial usage data commissioned and developed into GIS system.	Not separated out.	Diffuse pollution due to agricultural usage

From Drinking Water Inspectorate Annual Report, 2002				From PAN Questionnaire Survey, November 2003 NA = not available as no questionnaire returned.				
Water company	**No of consumers supplied**	**No of tests carried out for pesticides**	**No of samples breaching EC limit of 0.1 micrograms per litre, and substance (levels not given in DWI annual report)**	**Number of pesticides found above 0.01 micrograms per litre**		**Data on the basis of which pesticides are selected for testing**	**Pesticide removal costs: 1) capital cost to date 2) operational cost for 2002**	**Estimated cause of pollution**
				Found in raw water	**Found in drinking water**			
		110,696						
Portsmouth	647,000	122 plus other pesticides 1112	0	NA	NA	NA	NA	NA
Severn Trent	7,360,000	861 plus other pesticides 54,794	0	50	14	In-house historic data, EA data, ADAS predicted usage data; in-house risk model	1) £100 million 2) £2 million	90% usage in agriculture
South East	1,400,000	702 plus prochloraz, plus other pesticides 9022	0	NA	NA	NA	NA	NA
South Staffordshire	1,200,000	562 plus 1204	0	NA	NA	NA	NA	NA
South West	1,500,000	1534 plus 2,4-D 1457, plus other pesticides 62,885	0	NA	NA	NA	NA	NA
Southern	2,220,000	497 plus other pesticides 4906	0	27	15	Software package detailing usage of pesticides in area.	1) £46 million 2) £220,000	Not given.
Sutton & East Surrey	637,000	186 plus other pesticides 1656	0	NA	NA	NA	NA	NA
Tendring Hundred	145,000	16 plus other pesticides 320	0	0 (<LOD)	0 (<LOD)	i-map supplied by Kynetec Ltd; DWI reports; survey on use of non-agricultural pesticides; advice from ADAS and EA; those above 50% of the Prescribed Concentration Value [0,1 mg/l] in the last 3 years in raw water or supply zones.	1) £2 million 2) £50,000	Not given.
Thames Utilities	7,900,000	27,391, plus diuron 16,792, other	0	Not given – see note at end.	Not given – see note at end.	Central Science Laboratory	Not given.	Not given.

From Drinking Water Inspectorate Annual Report, 2002				From PAN Questionnaire Survey, November 2003 NA = not available as no questionnaire returned.				
Water company	**No of consumers supplied**	**No of tests carried out for pesticides**	**No of samples breaching EC limit of 0.1 micrograms per litre, and substance (levels not given in DWI annual report)**	**Number of pesticides found above 0.01 micrograms per litre**		**Data on the basis of which pesticides are selected for testing**	**Pesticide removal costs: 1) capital cost to date 2) operational cost for 2002**	**Estimated cause of pollution**
				Found in raw water	**Found in drinking water**			
		pesticides 311,480				Pesticide Usage Surveys Group data; in-house surveys of non-agricultural pesticide usage; assessment of the physical characteristics of the pesticides used in catchment to decide whether or not they are likely to reach water.		
Three Valleys	2,900,000	344, plus atrazine 317, plus chlortoluron 213, isoproturon 209, plus other pesticides 3,748	1, isoproturon	NA	NA	NA	NA	NA
United Utilities	6,800,000	2933, plus atrazine 1866, MCPA 1951, MCPP (mecoprop) 1952, simazine 1866, 2,4,5-T 1923	2 (not specified); 3 MCPA; 1 MCPP; 1 simazine; 1 2,4,5-T	15	17	The monitoring strategy reflects the pesticides used in significant quantities within a catchment and the likelihood of a particular pesticide reaching the raw water source.	'Not allowed to put that data in'.	It is likely that pesticides in water (either in raw or final water) originate from the agricultural sector.
Wessex Water Services Limited	1,200,000	735, plus atrazine 490, simazine 490, other pesticides 3936	2, atrazine	NA	NA	NA	NA	NA
Yorkshire Water Services Limited	4,710,000	1321, plus clopyralid 1054, 2,4-D 1138, isoproturon 1039, MCPA 1131, mecoprop 1078, simazine 971, other pesticides 75,331	1, clopyralid; 17, 2,4-D; 14, MCPA; 1, simazine	NA	NA	NA	NA	NA

Note re Thames Utilities:
Reasons given for not supplying data on raw water: '(a) What constitutes raw water will vary from one supply area to another: eg river water, groundwater, reservoir water or a mixture of these. The results from these different raw waters will vary, for example, some pesticides dilution and degradation will occur within the large raw water storage reservoirs. This makes it impossible to draw sensible conclusions about pesticides in the catchment as a whole from just reviewing the data generated by the raw water monitoring. (b) The degree of raw water monitoring across the Thames Water supply area is not uniform (eg with respect to what pesticides are looked for, where we look for them, and how frequently). The most intensive monitoring of raw water tends to occur where we have established that there is a pesticide problem. The data we generate for raw waters is therefore skewed and not representative of the catchment as a whole'.

Reason given for not supplying data on treated water: 'Treated water results above the limit of detection have not been provided. As a water supplier we are legally obliged to meet the standards contained within the Drinking Water (Water Quality) Regulations ….. Reporting results that comply with a standard that is itself based on politics rather than science is not meaningful'.

LOD = Limit of Detection

Appendix 5b
Pesticides in the environment also found in drinking water

Pesticide	Hazard to health issues	EQS failure[i]	Tested for by one or more water companies[ii]	Pesticides found in breach of the EC drinking water limit[iii]
2,4,5-T			X	X United Utilities
2,4-D	Acutely toxic WHO II	X	X	X Yorkshire
a\b\g\d\e_hch		X		
Aldrin	Suspected carcinogen, B2, suspected endocrine-disrupting chemical UK EA, WWF	X		
Atrazine	Suspected carcinogen C, suspected endocrine-disrupting chemical UK EA, EU, OSPARp, WWF		X	X Wessex
Carbetamide			X	X Essex & Suffolk
Carbophenothion	OP		X	
Chlortoluron			X	X Northumbrian
Clopyralid			X	X Yorkshire
Cyfluthrin	Acutely toxic WHO II	X		
Cypermethrin	Acutely toxic WHO II, suspected carcinogen C	X		
Diazinon	Acutely toxic WHO II, OP	X		
Dichlorvos	Acutely toxic WHO Ib, OP, suspected carcinogen S, 2B	X		
Dieldrin	Suspected carcinogen B2, suspected endocrine-disrupting chemical UK EA, OSPARp, WWF	X		
Diflubenzuron		X		
Diuron	Known carcinogen, 3	X	X	
Endrin	Suspected endocrine-disrupting chemical UK EA, WWF	X		
Fenitrothion	Acutely toxic WHO II, OP	X		
Isoproturon	Suspected carcinogen 3		X	X Northumbrian, Three Valleys
Linuron	Suspected carcinogen, C, 3, suspected endocrine -disrupting chemical UK EA, EU, WWF	X		
Malathion	OP, suspected carcinogen S	X		
MCPA		X	X	X United Utilities, Yorkshire
Mecoprop		X	X	X Dwr Cymru, United Utilities
Permethrin	Acutely toxic WHO II, suspected carcinogen C, suspected endocrine-disrupting chemical UK EA, WWF	X		
Pirimicarb	Acutely toxic WHO II	X		
Ppddt		X		
Ppddt\opddt\pptde\ppdde		X		
Prochloraz	Suspected carcinogen C, suspected endocrine-disrupting chemical Ger EAp		X	
Propetamphos	Acutely toxic WHO Ib, OP	X		
Propyzamide	Suspected carcinogen C		X	
Simazine	Suspected carcinogen C, 3, suspected endocrine-disrupting chemical UK EA, WWF		X	X Folkestone & Dover, United Utilities, Yorkshire
Tributyl tin as tbt		X		
Triphenyl tin as tpt	Suspected endocrine-disrupting chemical UK EA, EU, OSPARp, WWF	X		

References:

2002 Environment Agency pesticide monitoring report, Environmental facts and figures, www.environment-agency.gov.uk

Drinking Water Inspectorate, 13th Annual Report, 2002, www.dwi.gov.uk

i. Environmental Quality Standard failure (surface freshwaters, pre-treatment, not drinking water), Environment Agency, 2002.

ii. Pesticides specifically and additionally tested for by one or more water companies in England and Wales, 2002.

iii. Pesticides found in breach of the EC drinking water limit of 0.01 micrograms per litre in water company tests, 2002.

Appendix 5c
Pesticides in private drinking water supplies

LOCAL AUTHORITY	Number of private water supplies responsible for testing	How many supplies tested for pesticides in last 10 years (since 1993)	How many pesticides tested for?	What percentage of pesticides tested were found in all tests ABOVE limit of detection (below legal limit)?	Number of 'failures' - pesticides found above EC legal limit of 0.1 micrograms per litre
Allerdale Borough Council	260	0	0	-	-
Argyll & Bute Council	1780	10 known	NA	NA	0
Blaby District Council	10	5	NA	NA	NA
Canterbury City Council	8	12	31	100	0
City of Sunderland	2	29	NA	NA	0
Clackmannanshire Council	29	12	15	100	0
Dundee City Council	1	0	0	-	-
Eden District Council	~600	75	NA	NA	1
Fareham Borough Council	1	0	0	-	-
Great Yarmouth Borough Council	62	5	54	100	0
North East Derbyshire City Council	200	76	74	100	2
North Lanarkshire Council	18	0	0	-	-
Rossendale Borough Council	~300	0	0	-	-
Sevenoaks District Council	19	78 tests	19	100	0
South Northants Council	NA	10	89	100	1
Tendring District Council	163	14 known	44	100	0
Wokingham District Council	125	9	43	100	0
Wychavon District Council	140	0	0	-	-

PAN *UK* questionnaire survey circulated in November 2003.

The results above are from respondents with private water supplies. NA = not available.

APPENDIX 6 – Pesticide poisonings

National Poisons Information Service centre	Numbers of telephone enquiries about pesticides disclosed in NPIS Combined Annual Report, 2002	Resources on pesticides
Belfast	20 of 711 telephone enquiries on 'agrochemicals' including home use.	-
Birmingham	2,114 occurrences of exposure to 'non-pharmaceutical chemicals', 5.46 per cent of total	Product data centre: provides product data on pesticides, agrochemicals, veterinary products, biocides (soap and detergents and other products) to all NPIS centres, and for TOXBASE (online database for healthcare providers). Has in-house database of Material Safety Data Sheets and current information on currently approved and marketed pesticides which 'now comprises probably the most comprehensive and up-to-date listing of pesticide products currently marketed in the UK.'
Cardiff	>10,000 enquiries, of which 35,849, about exposures to 'chemicals'	'Able to provide advice [on]: toxicity of PCBs, toxicity of lindane' etc. Cardiff Poisons Treatment Centre: eight-bedded unit for poisoned patients.
Edinburgh	Of a total of 4925 telephone enquiries, 14 were on glyphosate; 9 on permethrin; 7 on paraquat; 6 on difenacoum; 5 on deltamethrin; 5 on diquat; of groups of pesticides, 53 enquiries were on insecticides; 39 enquiries on herbicides; 13 enquiries on rodenticides; 5 enquiries on fungicides; 4 on slug pellets.	-
London	Of 89,835 telephone enquiries, 86 'occurrences' were of malathion, 84 of permethrin, 74 difenacoum, 62 paraquat, 55 bendiocarb; of pesticide groups, 249 'occurrences' were of pyrethroids, 172 of rodenticides, 157 of molluscicide, and 136 of organophosphorous insecticides.	Specialists in Poisons Information specialist group 'Biocides and Botanicals' (formerly agrochemicals). Two members are on the Health & Safety Executive's Pesticide Incidents Appraisal Panel [page 17].
Newcastle	(Insecticides): pyrethroids 46; carbamates 4; organophosphates 2; not specified 50; (herbicides): paraquat/diquat 24; sodium chlorate 8; glyphosate 7; chlorphenoxy 4; not specified 24; (rodenticides): coumarin 12; vitamin D derivative 1; alphachloralose 1; not specified 55; (molluscicides): metaldehyde 20; not specified 21; total 288	-
TOXBASE (all centres based in Edinburgh)	Pesticides and other agrochemicals account for only 3 per cent of accesses to TOXBASE . The number of accesses may indicate interest, rather than poisoning incidence. Number of accesses by pesticide group: rodenticide, 4511, insecticide 4503, herbicide 2978, wood preservative 963, slug killer 689, fungicide 297, soil fumigant 28, anti-fouling product 25, preservative 12, plant growth regulator 7, surface biocide 7; by individual pesticide: warfarin [includes warfarin tablets] 1715, paraquat 1177, metaldehyde 1071, permethrin 1059, difenacoum 608, phenols and cresols 546, glyphosate 528, bromadiolone 487, diquat 450, malathion 438.TOXBASE contains data on 4,000 products (pesticide and other).	-

APPENDIX 7
Local authority survey: 'incidents' and 'bystander' exposure

Local authority	Number and nature of complaints about pesticides received in 2002 and 2003	Are you aware of PIAP [HSE's Pesticide Incidents Appraisal Panel]?	Action taken	Do you, as an authority, believe people have the right to 1) advance notification of what pesticides are used near them 2) on-site information about what pesticides have been used? 3) Do you provide it?
Argyll and Bute Council	2002: allegation of ill-health in forestry use; 2003: (1) allegations of ill-health re aerial spraying for forestry use (2) alleged animal poisoning	No	(1) Aerial spraying: discussions held with operator to advise on potential risks. Investigated and samples taken. No evidence of contamination. (2) Animal poisoning – vet involved. No further action.	Yes [sic].
Camden, London Borough of	2002: 1 allegation of ill-health; 2003: allegation of animal poisoning.	No.	Referred to Streets Division to reply.	Not aware that Council has policy on this specificially, but openness implied by Environmental Information Regulations and Aarhus Convention. It would be difficult and very costly to inform every resident every time weed-killer is used on the street. We can and should,however, proactively make the information available as to why and what we use in public places. We do give people info when we treat pests on their property.
Cannock Chase District Council	2 allegations that use of pesticides in adjacent area caused ill-health to pets – not established.	No	Press release.	2) Yes. Also our pest control contractor is issuing a DEFRA leaflet on the issue of illegal poisoning.
Fenland District Council	Not recorded	No	NA	1) Yes 2) No
Great Yarmouth Borough Council	2002: 7; 2003, 2.	No	2002: 1) agricultural use – informal investigation under statutory nuisance by HSE 2) local authority use – formal investigation as landowner for public liability, but complaint not justified; 3) ditto 4) ditto – resolved informally with complainant 5) private individual – formal investigation as landowner for public liability but not substantiated 6) local authority use, formal investigation, signs erected warning of spraying; 7) agricultural use – informal investigation for statutory nuisance by HSE. 2003: 2 agricultural use incidents informally investigated for statutory nuisance by HSE.	1) Yes 2) Yes. No information at present. I believe this is an issue worth taking forward.

Local authority	Number and nature of complaints about pesticides received in 2002 and 2003	Are you aware of PIAP [HSE's Pesticide Incidents Appraisal Panel]?	Action taken	Do you, as an authority, believe people have the right to 1) advance notification of what pesticides are used near them 2) on-site information about what pesticides have been used? 3) Do you provide it?
Harrow, London Borough of	None directly relating to the pesticides we use. Some relating to vapona. One enquirer thought her dog had eaten rat poison.	No	Advised vet visit.	1) Yes 3) No
Havant Borough Council	1 allegation of ill-health re agricultural use.	No	Referred to DEFRA/ADAS	Yes, people have a right to information – our direct services will provide it.
Lewisham, London Borough of	2003: one allegation of damage to hedge by neighbour – not substantiated.	Yes	Not given.	Not answered.
North East Derbyshire District Council	Not separately recorded.	No	NA	1) Yes 2) Yes 3) Yes
North Lanarkshire Council	2002: 1 poisoning of animal after local authority pesticide use.	No	Insurance claim.	1) Yes 2) Yes.
North Somerset Council	2003: 1	Yes	Not given.	1) No 2) Yes we always leave information on site.
South Northamptonshire Council	Over last 8 years, 3-4 complaints relating to agricultural spraying, one of which was about the defoliation of a tree; 3-4 complaints relating to domestic spraying	No	Relating to agricultural sprays, referred to HSE; relating to domestic spraying, formal letter from this authority.	Governed by health and safety laws. Would not consider introducing such a policy.
Tendring District Council	Not recorded.	No	NA	Not answered.
Wokingham District Council	Not answered	Not answered	Not answered	Not answered
Wychaven District Council	Cannot give an exact figure: normally about six complaints per annum, of all kinds.	No	Usually refer to DEFRA or HSE.	1) Yes 2) Yes 3) No. Would not consider introducing it.

The following local authorities also responded to our questionnaire but had no records of incidents for 2002 or 2003:
Allerdale Borough Council, Blaby District Council, Bracknell Forest Borough Council, Canterbury City Council, London Borough of Croydon, Dundee City Council, Eden District Council, Fareham Borough Council, Flintshire County Council, Gateshead Council, London Borough of Newham, Oxford City Council, Rossendale Borough Council, Sevenoaks District Council, Southampton City Council, City of Sunderland, Surrey Heath Borough Council, Worthing Borough Council.

PAN *UK* questionnaire survey circulated in November 2003.

sic = as per original response.

APPENDIX 8 – Copies of PAN *UK* questionnaires

Local authority survey: incidents and private water supplies

QUESTIONNAIRE SURVEY TO ALL CHIEF ENVIRONMENTAL HEALTH OFFICERS, District and Unitary Local Authorities, November 03

For an e-version of this questionnaire, email alisoncraig@pan-uk.org

PAN UK survey: Pesticide incidents

1. Are you, as an Environmental Health Officer, aware of PIAP?

2. Have you, as an Environmental Health Officer, ever passed a case to PIAP?

3. Please inform us how many complaints (per complainant) about pesticide-related issues you have received in 1) **2002** 2) **2003** to date:

A. Use of pesticides in adjacent property/area has allegedly caused ill-health.
Please indicate if domestic use, agricultural use, local authority use, timber treatment or other.

B. Use of pesticides in adjacent property/area has caused damage to garden.
Please indicate if domestic use, agricultural use, local authority use, timber treatment or other.

C. Use of pesticides in adjacent property/area has allegedly caused ill-health to pets/domestic animals.
Please indicate if domestic use, agricultural use, local authority use, timber treatment or other.

D. Other complaint/concern – please describe.
Please indicate if domestic use, agricultural use, local authority use, timber treatment or other.

4. Please describe each complaint/incident received, and action taken, as below:

YEAR	COMPLAINT/ INCIDENT TYPE see A-D above	ACTION TAKEN: REFERRED TO WHICH AGENCIES?	ACTION TAKEN BY YOU (EHO) UNDER WHICH LEGISLATION eg Statutory Nuisance	OUTCOME/ COMMENTS

5. Do you, as an authority, believe people have the right to 1) advance notification of what pesticides are being used near them, or where they may walk 2) on-site information about what pesticides have been used? Do you provide it?

6. Would you, as an authority, consider introducing such a policy/practice?

PAN UK survey: Pesticides in private water supplies survey

1. How many private water supplies, in total, are you responsible for in your authority?

2. Please inform us how many samples of water (from supplies of classes C, D, E, 3, 4 and 5) have been taken for pesticide testing since 1991:

Year	No. of supplies tested for pesticides	No. tests in which pesticides found/no. of tests carried out	No. of failures (exceedance of EC limit of 0.1 micrograms per litre)
1991			
1992			
1993			
1994			
1995			
1996			
1997			
1998			
1999			
2000			
2001			
2002			

3. 31,129 tonnes of pesticides were used in Great Britain in 2002. In your view, as an Environmental Health Officer, should overall pesticide usage be reduced?

4. What was the total number of pesticide determinands tested for in the most recent tests?

5. On the basis of which data do you select the pesticide determinands to test for?

6. Please give details of any failures for pesticides in the most recent tests (please indicate year):

Pesticide	Total no of tests	No of tests not meeting limit	Level detected in each non-compliant test result
2,4,5-T			
2,4-D			
Atrazine			
Carbematide			
Clopryalid			
Isoproturon			
MCPA			
MCPP mecoprop			
OTHER (pls specify)			
Simazine			
Total pesticides			

EC Drinking Water Directive limit: 0.1 micrograms per litre

7. For these failures, what possible causes have been established?

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8. Please estimate the extent to which pesticide use in agriculture caused this pollution.

9. Do you have any agrochemical manufacturers operating in your area? Please give names and locations.

10. Please indicate what actions, including enforcement, were taken as a result of these failures. In how many cases have consumers been provided with bottled water?

11. Please indicate which of the following list, do you test private water supplies for:

DWI code	Determinand name	Test for? **Y/N**	Estimated percentage of samples above limit of detection (default 100%)	If known as a likely pollutant in your area, please indicate why.
B010	Pesticides total			
P000	Other pesticides*			
P001	Aldicarb			
P002	Aldrin			
P003	Alpha-HCH			
P004	Atrazine			
P005	Azinphos-methyl			
P006	Bentazone			
P007	Beta-HCH			
P008	Bromoxynil			
P009	Carbaryl			
P010	Carbetamide			
P011	Carbophenothion			
PO12	Chlordane			
PO13	Chlorfenvinphos			
PO14	Chlortoluron			
PO15	Chlorothalonil			
PO16	Chlorpropham			
PO17	Chlorpyrifos			
PO18	Clopyralid			
PO19	(not used)			
PO20	2,4-D			
PO21	Dalapon			
PO22	Delta-HCH			
PO23	Demeton-S-methyl			
PO24	Diazinon			
PO25	Dicamba			
PO26	Dichlorprop			
PO27	Dichlorvos			
PO28	Dieldrin			
PO29	Dimethoate			
PO30	Diquat			
PO31	Disulfoton			
PO32	Diruon			
PO33	Endosulfan Total			
PO34	Endrin			
PO35	EPTC			

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PO36	Fenitrothion			
PO37	Fenpropimorph			
PO38	Fluazifop-butyl			
PO39	Flutriafol			
PO40	Fluroxypyr			
PO41	Gamma-HCH Lindane			
PO42	Glyphosate			
PO43	Heptachlor			
PO44	Heptachlor epoxide			
PO45	Hexachlorobenzene			
PO46	Iprodione			
PO47	Isodrin			
PO48	Isoproturon			
PO49	Ioxynil			
PO50	(not used)			
PO51	Linuron			
PO52	Malathion			
PO53	MCPP (Mecoprop)			
PO54	MCPA			
PO55	MCPB			
PO56	Methiocarb			
PO57	Methoxychlor			
PO58	Paraquat			
PO59	Parathion (ethyl)			
PO60	Pentachlorophenol			
PO61	Phorate			
PO62	Phosalone			
PO63	Prochloraz			
PO64	Pirimicarb			
PO65	Pirimiphos ethyl			
PO66	Propazine			
PO67	Propham			
PO68	Propiconazole			
PO69	Propetamphos			
PO70	Prometryn			
PO71	Propyzamide			
PO72	Pirimiphos methyl			
PO73	Simazine			
PO74	2,3,6-Tba			
PO75	TCA			
PO76	2,4,5-t			
PO77	Terbutryn			
PO78	Triadimefon			
PO79	Tri-allate			
PO80	Triazophos			
PO81	Trifluralin			
PO82	2,4,-Db			
PO83	Aminotriazole			
PO84	Benomyl			
PO85	Bifenox			
PO86	Bromacil			
PO87	Carbofuran			

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PO88	Chlorbufam			
PO89	Chlordane-Alpha			
PO90	Chlordane-Gamma			
PO91	Crufomate			
PO92	Cyanazine			
PO93	Cyfluthrin			
PO94	Cypermethrin			
PO95	Deltamethrin			
PO96	Demeton			
PO97	Desmetryn			
PO98	Dichlobenil			
PO99	Difenzoquat			
PO100	Dinocap			
PO101	Endosulfan A			
PO102	Endosulfan B			
PO103	Epsilon-HCH			
PO104	Eulan			
PO105	Fenoprop			
PO106	Fenthion			
PO107	Fluazifop			
PO108	Hexachloro-butadiene			
P109	Lenacil			
P110	Macarbam			
P111	Metoxuron			
P112	Mevinphos			
P113	Monuron			
P114	Op'-DDD (TDE)			
P115	Op'-DDE			
P116	Op'-DDT			
P117	Pebulate			
P118	Pendimethalin			
P119	Permethrin			
P120	Permethrin-cis			
P121	Permethrin-trans			
P122	Picloram			
P123	Pp'-DDD (TDE)			
P124	Pp'-DDE			
P125	Pp'-DDT			
P126	Propachlor			
P127	Propoxur			
P128	Pyrethrins			
P129	Sodium chlorate			
P130	Tecnazene			
P131	Trichlorpyr			
P132	Trietazine			
P133	Asulam			
P134	PCB-Arochlor 1254			
P135	PCB Arochlor 5442			
P136	Flumethrin			
P137	PCB total			
P138	Benazolin			

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P139	Vinclozolin			
P140	Dichlofluanid			
P141	Methidathion			
P142	Chlormephos			
P143	Fenchlorphos			
P144	Trichloronat			
P145	Bromophos-ethyl			
P146	Dicloran (dichlorane)			
P147	Parathion-methyl			
P148	Ethion (diethion)			
P149	PCB – Arochlor 1260			
P150	Carbendazim			
P151	PCB Arochlor 1250			
P152	Metribuzin			
P153	PCT Arochlor 4465			
P154	Oxadixyl			
P155	Maneb			
P156	Alpha-cypermethrin			
P157	Diflufenican			
P158	Fenvalerate			
P159	Flusilazole			
P160	Imazapyr			
P161	Tridemorph			
P162	Chloridazon			
P163	Chlormequat			
P164	Flamprop-M-Isopropyl			
P165	Mepiquat			
P166	Isoxaben			
P167	Methabenz thiazuron			
P168	Fenpropidin			
P169	Triphenyltin (fentin)			
P170	Flucofuron			
P171	Sulcofuron			
P172	Trichlorobenzene			
P173	Terbuthylazine			
P174	Bendiocarb			
P175	Chlorthal			
P176	Heptenophos			
P177	Tebuconazole			
P178	Diflubenzuron			
P179	Quintozene			
P180	Aziprotryne			
P181	Chloroxuron			
P182	Desethylatrazine			
P183	Fenoxaprop			
P184	Fenoxaprop-P			
P185	Fenuron			
P186	Flamprop-M			
P187	Mancozeb			

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P188	Monolinuron			
P189	Tebuthiuron			
P190	Thiabendazole			
P191	PCT – Total			
P192	Captan			
P193	(not used)			
P194	Metamitron			
P195	PCB congener 101			
P196	PCB congener 118			
P197	PCB congener 138			
P198	PCB congener 153			
P199	PCB congener 180			
P200	(not used)			
P201	PCB congener 28			
P202	PCB congener 52			
P203	Metazachlor			
P204	Fonofos			
P205	Diclofop			
P206	Etrimfos			
P207	Cyproconazole			
P208	Imazaquin			
P209	Metalaxyl			
P210	Metsulfuron			
P216	Lambda-cyhalothrin			
P217	Epoxyconazole			
P218	Kresoxym-methyl			
P219	Napropamide			
P220	Fentin Hydroxides as TPTin			
P221	Ethofumersate			
P222	Ametryn			

*** Please specify which other pesticide determinands tested for, and results.**

Date of survey: December 2003

Organisation name ……

Name of person who filled in questionnaire ……

Date completed ……

Please return the questionnaire survey to: Alison Craig, Pesticide Action Network *UK*, Eurolink Centre, 49 Effra Road, London SW2 1BZ alisoncraig@pan-uk.org
Please email or ring if any queries: tel 020 7274 6611

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Water company survey

PAN UK Pesticides in water survey: data for 2002

QUESTIONNAIRE SURVEY TO ALL UK WATER COMPANIES, sent November 03

1. Please estimate your total cost to date of removing pesticides from drinking water:

Capital cost to date	
Capital cost to end-2002 (if different)	
Operational cost for year 2002	

2. 31,129 tonnes of pesticides were used in Great Britain in 2002. In your company's view, should overall pesticide usage be reduced?

3. What was the total number of pesticide determinands tested for in 2002?

4. On the basis of which data do you select the pesticide determinands to test for?

5. Please give details of any failures for pesticides in 2002:

Pesticide	Total no of tests	No of tests not meeting limit	Level detected in each non-compliant test result
2,4,5-T			
2,4-D Atrazine			
Carbematide			
Clopryalid			
Isoproturon			
MCPA			
MCPP mecoprop			
OTHER (pls specify)			
Simazine Total pesticides			

EC Drinking Water Directive limit: 0.1 micrograms per litre

6. For these failures, what possible causes have been established?

7. Please estimate the extent to which pesticide use in agriculture caused this pollution.

8. Do you have any agrochemical manufacturers operating in your area? Please give names and locations.

9. Please indicate what actions, including enforcement, were taken as a result of these failures. In how many cases have consumers been provided with bottled water?

10. Please provide the following data:

Pesticides in water, 2002, in micrograms per litre, across all Water Supply Zones in your ar

DWI code	Determinand name	Tested for, 2002? **Y/N**	Percentage samples above limit of detection (default 100%)	Minimum level found **Raw water** (total)	Maximum level found **Raw water** (total)	Minimum level found **Drinking water**
B010 P000 P001	Pesticides total Other pesticides* Aldicarb					
P002	Aldrin					
P003	Alpha-HCH					
P004	Atrazine					
P005	Azinphos-methyl					
P006	Bentazone					
P007	Beta-HCH					
P008	Bromoxynil					
P009	Carbaryl					
P010	Carbetamide					
P011	Carbophenothion					
PO12	Chlordane					
PO13	Chlorfenvinphos					
PO14	Chlortoluron					
PO15	Chlorothalonil					
PO16	Chlorpropham					
PO17	Chlorpyrifos					
PO18	Clopyralid					
PO19	(not used)					
PO20	2,4-D					
PO21 PO22	Dalapon Delta-HCH					
PO23	Demeton-S-methyl					
PO24	Diazinon					
PO25	Dicamba					
PO26	Dichlorprop					
PO27 PO28	Dichlorvos Dieldrin					
PO29	Dimethoate					
PO30	Diquat					
PO31	Disulfoton					
PO32 PO33	Diruon Endosulfan Total					
PO34	Endrin					
PO35 PO36	EPTC Fenitrothion					
PO37	Fenpropimorph					
PO38	Fluazifop-butyl					
PO39	Flutriafol					
PO40	Fluroxypyr					
PO41	Gamma-HCH Lindane					

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PO42	Glyphosate					
PO43	Heptachlor					
PO44	Heptachlor epoxide					
PO45	Hexachlorobenzene					
PO46	Iprodione					
PO47	Isodrin					
PO48	Isoproturon					
PO49	Ioxynil					
PO50	(not used)					
PO51	Linuron					
PO52	Malathion					
PO53	MCPP (Mecoprop)					
PO54	MCPA					
PO55	MCPB					
PO56	Methiocarb					
PO57	Methoxychlor					
PO58	Paraquat					
PO59 PO60	Parathion (ethyl) Pentachlorophenol					
PO61	Phorate					
PO62	Phosalone					
PO63	Prochloraz					
PO64	Pirimicarb					
PO65	Pirimiphos ethyl					
PO66	Propazine					
PO67	Propham					
PO68	Propiconazole					
PO69	Propetamphos					
PO70	Prometryn					
PO71	Propyzamide					
PO72	Pirimiphos methyl					
PO73	Simazine					
PO74	2,3,6-Tba					
PO75	TCA					
PO76	2,4,5-t					
PO77	Terbutryn					
PO78	Triadimefon					
PO79	Tri-allate					
PO80	Triazophos					
PO81	Trifluralin					
PO82	2,4,-Db					
PO83	Aminotriazole					
PO84	Benomyl					
PO85	Bifenox					
PO86	Bromacil					
PO87	Carbofuran					
PO88	Chlorbufam					
PO89	Chlordane-Alpha					
PO90	Chlordane-Gamma					
PO91	Crufomate					
PO92	Cyanazine					
PO93	Cyfluthrin					
PO94	Cypermethrin					

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PO95	Deltamethrin					
PO96	Demeton					
PO97	Desmetryn					
PO98	Dichlobenil					
PO99	Difenzoquat					
PO100	Dinocap					
PO101	Endosulfan A					
PO102	Endosulfan B					
PO103	Epsilon-HCH					
PO104	Eulan					
PO105	Fenoprop					
PO106	Fenthion					
PO107	Fluazifop					
PO108	Hexachloro-butadiene					
P109 P110	Lenacil Macarbam					
P111	Metoxuron					
P112	Mevinphos					
P113	Monuron					
P114	Op'-DDD (TDE)					
P115	Op'-DDE					
P116	Op'-DDT					
P117	Pebulate					
P118	Pendimethalin					
P119	Permethrin					
P120	Permethrin-cis					
P121	Permethrin-trans					
P122	Picloram					
P123	Pp'-DDD (TDE)					
P124	Pp'-DDE					
P125	Pp'-DDT					
P126 P127	Propachlor Propoxur					
P128	Pyrethrins					
P129	Sodium chlorate					
P130	Tecnazene					
P131 P132	Trichlorpyr Trietazine					
P133	Asulam					
P134	PCB-Arochlor 1254					
P135	PCB – Arochlor 5442					
P136	Flumethrin					
P137	PCB – total					
P138	Benazolin					
P139	Vinclozolin					
P140	Dichlofluanid					
P141	Methidathion					
P142	Chlormephos					
P143	Fenchlorphos					
P144	Trichloronat					
P145	Bromophos-ethyl					

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P146	Dicloran (dichloranc)					
P147	Parathion-methyl					
P148	Ethion (diethion)					
P149	PCB – Arochlor 1260					
P150	Carbendazim					
P151	PCB Arochlor 1250					
P152	Metribuzin					
P153	PCT – Arochlor 4465					
P154	Oxadixyl					
P155	Maneb					
P156	Alpha-cypermethrin					
P157	Diflufenican					
P158	Fenvalerate					
P159	Flusilazole					
P160	Imazapyr					
P161	Tridemorph					
P162	Chloridazon					
P163	Chlormequat					
P164	Flamprop-M-Isopropyl					
P165	Mepiquat					
P166	Isoxaben					
P167	Methabenz thiazuron					
P168	Fenpropidin					
P169	Triphenyltin (fentin)					
P170	Flucofuron					
P171	Sulcofuron					
P172	Trichlorobenzene					
P173	Terbuthylazine					
P174	Bendiocarb					
P175	Chlorthal					
P176	Heptenophos					
P177	Tebuconazole					
P178	Diflubenzuron					
P179	Quintozene					
P180	Aziprotryne					
P181	Chloroxuron					
P182	Desethylatrazine					
P183	Fenoxaprop					
P184	Fenoxaprop-P					
P185	Fenuron					
P186	Flamprop-M					
P187	Mancozeb					
P188	Monolinuron					
P189	Tebuthiuron					
P190	Thiabendazole					
P191	PCT – Total					
P192	Captan					
P193	(not used)					
P194	Metamitron					

P195	PCB congener 101					
P196	PCB congener 118					
P197	PCB congener 138					
P198	PCB congener 153					
P199	PCB congener 180					
P200	(not used)					
P201	PCB congener 28					
P202	PCB congener 52					
P203	Metazachlor					
P204	Fonofos					
P205	Diclofop					
P206	Etrimfos					
P207	Cyproconazole					
P208	Imazaquin					
P209	Metalaxyl					
P210	Metsulfuron					
P216	Lambda-cyhalothrin					
P217	Epoxyconazole					
P218	Kresoxym-methyl					
P219	Napropamide					
P220	Fentin Hydroxides as TPTin					
P221	Ethofumersate					
P222	Ametryn					

*** Please specify which other pesticide determinands tested for, and results.**

Company name ……

Name of person who filled in questionnaire ……

Date completed ……

Please return the questionnaire survey to: Alison Craig, Pesticide Action Network *UK*, Eurolink Centre, 49 Effra Road, London SW2 1BZ. alisoncraig@pan-uk.org
Please email or ring if any queries: tel 020 7274 6611.

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