FRIENDS *of the* earth
for the planet for people

"Sustainable Production and Use of Chemicals"

Consultation Response

Friends of the Earth

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1. Introduction and overall aim of policy towards chemicals

Friends of the Earth England, Wales and Northern Ireland (FOE) welcomes the Government's decision to review policy towards chemicals. We are, however, disappointed with the published consultation document, which is much weaker than an earlier draft.

1.1 The Joint Statement

As part of the process of formulating FOE's view of the future of chemicals regulation, FOE has drawn up a 'Joint Statement on Chemicals and Health', along with other environmental and health groups. The Joint Statement is a basic set of principles and policies to move chemicals regulation into a sustainable future. The full text is in Appendix 1, along with a current list of signatories. Various Joint Statement commitments will be mentioned in the text of this response.

1.2 Key issues

In FOE's opinion, the key issues to be considered in this consultation are:

- The need to take a precautionary approach to chemicals use, involving a shift in the burden of proof whereby the onus is on the manufacturer to demonstrate that a chemical is safe beyond reasonable doubt, not on the public to prove that it is dangerous.
- A new approach to uncertainty, with a focus on reducing risks through reducing exposures and hazards, and a bias towards preventative action, rather than delaying decisions whilst looking for certainty, which is often unattainable.
- The health impacts of our current chemicals policy, and the potential financial significance of these health problems. Health impacts are described in more detail in our briefing 'Poisoning our children: The dangers of exposure to untested and toxic chemicals', which is attached in Appendix 2. Our submission to the original consultation meeting on chemicals policy in November 1997 goes into more detail on why a sustainable chemicals policy is required.
- The need for the chemical industry to consume a sustainable share of resources, and for the UK as a whole to consume a fair share of the world's resources. FOE's publication *Tomorrow's World*[1] provides a detailed analysis of what reductions in resource use are required if sustainable development is to be achieved; the key conclusion is that the UK needs to reduce non-renewable resource use by 80-90 per cent by 2050.
- The need for the UK chemical industry to transform itself into a forward-looking, leading edge industry, rather than an industry which spends its time defending unsafe chemicals and bogged down in legal arguments over liabilities.
- The crucial role of Government in transforming industry and stimulating innovation, through technology-forcing regulation, rather than voluntary agreements, which tend to reduce innovation.
- The importance of information and the right to know, as a means of informing policy makers, companies consuming chemicals, and the public.
- The need to raise money for research, regulation and information exchange, from charges on industries producing chemicals and potentially through eco-taxes on resources and waste.
- The importance of 'quality decision-making', including the use of a Government stakeholder forum to elicit views and suggest research needs.
- The need for international agreements to control the use of chemicals, and the importance of the UK playing a leading role in these.

1.3 General comments

The rest of this response is laid out in the same order as the consultation document, highlighting those questions asked in the document. Some of our comments relate to EU processes; these

comments are aimed at informing the UK's position during the EU review of chemicals policy.

The UK Government and chemical industry have an opportunity to lead the world in creating a sustainable, forward looking approach towards chemicals. Such a sustainable chemicals policy will create both economic and employment opportunities, as the industry moves to providing chemical services rather than products. The alternative is an industry trapped in the past, defending chemicals which are on the way out, and fighting liability cases, which will increase as scientific understanding of harm from chemicals improves.

2. Legislation

Most of the important legislation on chemicals is now set at an EU level, so FOE accepts that any changes in such legislation must occur by agreement within the EU. However, the UK Government can develop and promote more precautionary policies within the EU, to assist in improving EU regulation.

FOE is already participating in the European Commission's (so far limited) review of chemical policies, so the comments in this section will be broad rather than detailed.

FOE also strongly supports the development of global instruments on chemicals, as chemical hazards need to be controlled throughout the world. The chemical industry itself is now largely made up of trans-national companies, which need to be adequately regulated.

The Joint Statement (Appendix 1) expresses our belief that chemicals regulation should move to a positive licensing system:

(i) A positive licensing system

Chemicals regulation should move towards being a positive licensing system, where chemicals are licensed for different uses, in the same way as already occurs for pesticides and pharmaceuticals. Industry should have to demonstrate that these licensed applications of chemicals are safe beyond reasonable doubt, and that society has a need for them. The potential impacts on the environment of discharges of a chemical should be fully evaluated prior to licensing.

2.1 New chemicals

We would be interested to hear views on whether it would be appropriate to seek change, through the EU, to reduce burdens and to free resources for assessments of higher tonnage chemicals, and if so, what those changes might be.

FOE opposes any attempts to reduce the current assessment regime for new chemicals because this will increase the risk these chemicals pose to human health and the environment. In addition, we consider that low tonnage chemicals which will be used in high exposure applications, such as in cosmetics, should be subject to more comprehensive assessment. Implementation of the substitution principle (see Section 5.2) will provide economic incentives for the development of new chemicals.

2.2 Existing chemicals

The Existing Chemicals process is too slow and complex. Many of the delays are caused by lack of data from the chemical industry and lack of resources to carry out assessments. However, even if these problems were solved FOE does not consider that this process provides adequate protection of human health and the environment, for the reasons outlined in the Joint Statement in Appendix 1, for example the lack of any consideration of the impacts of exposure to mixtures.

The chemical industry must be put under more obligation to provide data, and more of the costs of the risk evaluation process should be borne by the industries which are profiting from the chemicals:

1) The chemical industry should be legally obliged to provide a basic set of hazard data for every chemical that the chemical industry wishes to continue producing, by a cut off date of 2005. If this data has not been supplied by this date then the chemical concerned should be removed from the market and re-classified as an applicant for approval as a new chemical.
2) The obligation on the producers of chemicals to provide exposure data must be strengthened, with the obligation carried down to those companies who use chemicals. Fines should be imposed if exposure data is not forthcoming.

3) Evaluations of risk should not be carried out by industry; risk assessment is not science, and must be independent of financial interests. The producers of the chemicals concerned should finance such risk assessments, but they should be commissioned and administered through an independent body, either the Competent Authorities, the Commission or the European Chemical Bureau.

In addition, any chemicals which are bioaccumulative or persistent should be removed from the market; these are unacceptable hazards. The only exception to this is if these hazards are an essential function for a specific application, as is stated in the Joint Statement:

(ii) The elimination of persistent or bioaccumulative chemicals

All synthetic chemicals in use should break down rapidly into harmless, natural substances. There should be no accumulation in the human body, wildlife or the environment, unless this is an essential function in a specific application. Phasing out persistent and/or bioaccumulative chemicals will reduce exposures.

The volume of work required to complete the Existing Chemicals process can be further reduced by grouping risk evaluations of chemicals by use. If one chemical is prioritised, then it should be checked if others with similar uses could be examined simultaneously. This will allow comparative assessment of the chemicals, with licensing of the least toxic - the substitution principle. There is more discussion of substitution in Section 5.2.

2.3 International regimes

The consultation document suggests the possibility of a UNEP framework convention on chemicals, under which PIC, POPs and future chemical work would fall. The UK is in a good position to lead on such a framework, given the benefits that could accrue to UK industry. In addition, the UK's chemical industry is in part responsible for the global problems caused by chemical use; the UK should now take the lead in the search for solutions.

The document asks:

We would welcome views on the need for such a framework convention, the practicalities of developing one, and the issues it might address

Most hazard data collection is now done to internationally recognised standards; some is done by international bodies such as the OECD. An international chemicals convention would be a valuable and logical way to bring together existing and under negotiation conventions such as Prior Informed Consent and Persistent Organic Pollutants with other chemicals commitments. POPs are not the only risk to the environment and human health; many other chemicals cause problems.

Such a convention could include:

1) Pollutant release and transfer registers - an expansion of work already underway in the OECD and UNECE. Such registers would highlight those chemical plants and those nations who are polluting the most, and will encourage waste minimisation and process improvement. The registers could also measure trans-national chemical transfers in wastes or products
2) A global chemicals database with hazard data and approved (or recommended/best practice) usage - a global positive licensing system. Such a database will be particularly useful for those nations with less sophisticated chemicals licensing systems.
3) Control and phase-out of dangerous chemicals which are not POPs or ozone depleters, but which give rise to similar concerns.

3. Sustainable Chemistry

3.1 Overall comments

FOE is disappointed that this chapter does not address the role of economic instruments. Having quite rightly dedicated the previous chapter to conventional regulation, given its fundamental importance in achieving the sustainable production and use of chemicals, this chapter covers other components of a package of policies to achieve sustainability with regard to chemicals - information provision schemes and negotiated agreements. The role economic instruments play in any policy package is vital and should be recognised in the White Paper. The Government has already consulted on proposals for a pesticide tax or charge and on the introduction of water pollution charges, both of which have relevance to this consultation.

Eco-efficiency itself does not necessarily lead to overall reductions in resource use, as increased consumption of products may outweigh increases in efficiency of production. We are also concerned that the chapter fails to make clear the important difference between the wider concept of eco-efficiency, described in 3.3, and applying the concept of eco-efficiency to a sector or firm. If the economy increases the efficiency with which it uses environmental resources in meeting human needs it may well significantly cut, or dispense with altogether, the products of a sector or firm, no matter how ‘eco-efficient' that sector or firm is internally. For example, FOE believes strongly that producing safe, nutritional, food sustainably requires cuts in the use of chemical pesticides and fertilisers, and their eventual removal. This is position has already been taken by several European Union member countries who have pesticide reduction policies, which aim to reduce the overall level of pesticide use, operating alongside policies aimed at encouraging the development and usage of less risky pesticides.

- ***Encouraging innovation in resource use***

3.2 Encouraging innovation

FOE believes that innovation is central to the sustainable production and use of chemicals and in developing a sustainable, competitive and dynamic chemicals sector in the UK. We therefore welcome the importance attached to innovation in the consultation paper, particularly with regard to reducing resource use and toxic impact.

Innovation is a double-edged sword for the environment, having created many of the environmental and health threats we now face but offering the potential to both solve those problems, and to meet human needs more effectively, within the environmental limits of the planet.

We welcome the recognition in the consultation document of the fundamental role that regulation has in encouraging, enabling and focusing innovation in chemicals production and use. To date it has failed to play that role effectively. At the heart of the White Paper must be a strategy for correcting that, because, although it is industry that delivers the innovation, it is public policy that sets out the boundaries and guides its nature and direction. The current situation has a combination of technology-based process regulation that is effective at defining what is the least that is expected, but far less effective at encouraging improvements in the best, combined with negative product regulation and a tax system that has encouraged productivity savings from reduced labour inputs, but not from reduced raw material and energy inputs. This has led to society feeling both sides of the sword. The White Paper offers the opportunity to correct this by offering a comprehensive and integrated package of measures that set out a clear direction for change. Below are some of the ways it can do so:

- Clear, certain, longer-term targets will have a positive impact on innovation in terms of both a stimulus and guidance. The 20% CO_2 cut is an example. For chemicals several options exist - pesticide reduction targets, reduction/phase-out of chlorine-based chemicals (In FOE’s analysis of sustainability, ‘Tomorrow’s World’[1], the chlorine chemical industry is considered to be not sustainable; an example of a sector that will require transformation), and elimination of bioaccumulative or persistent chemicals. Such environmental challenges to industries have

been shown to stimulate higher levels of innovation in previously mature industries and businesses, as well as directing efforts in those with already high levels of innovation. Targets allow a more innovative and cost-effective response. Certainty is crucial, as the experience of replacing ozone-depleting chemicals has shown (see Friends of the Earth's report 'A Superficial Attraction' for more details[2]).

- Positive licensing and the substitution principle to ensure that economic benefits will flow from development of the most environmentally benign products.
- Enforcement of Best Available Technology to create technology-forcing standards.
- Improved transparency through provision of a Comprehensive Chemical Database (see Section 6.2) to allow increased scrutiny from the public, investors and companies consuming chemicals.
- Economic instruments to provide an important foil to technology based regulations by providing a continuous incentive to improve, and by installing environmental considerations at the heart of the innovation decision-making process via cost. We welcome the Government's commitment to increasing the use of economic instruments to send clear signals on what actions should be encouraged and discouraged, and its initiatives on applying them to waste disposal (landfill tax increase), resource use (aggregates tax), greenhouse gas emissions (Business Use of Energy Task Force) and unnecessary and damaging products (pesticide tax). We urge that this White Paper reflects on the implications this has for chemicals production and use.
- We agree that best practice schemes have an important part to play. Encouraging the use of environmental management systems to better equip UK firms to respond to the package of public policies is sensible, but it is important that this distinction between enabling to respond, as opposed to being a response in itself, is made clear in the White Paper. The Environmental Technology Best Practice Programme is also a good example that can be built upon, particularly in terms of addressing key policy targets such as phasing out bioaccumulative chemicals. However, the issue of the sustainability of the actual products themselves, as opposed to the processes to manufacture them, is not adequately dealt with by this approach.

FOE also expects that the risk of legal action over liability for harm from chemicals will increase as research into the effects of chemicals increases (see Section 4.2). Forward-looking companies will reduce their chances of such exposure by moving out of persistent or bioaccumulative chemicals, and by ensuring that all chemicals are safe beyond reasonable doubt for their application.

- ***The indicators we might use for measuring progress***

3.3 Indicators for measuring progress

More research and consultation will be required to determine the best indicators for determining progress. FOE would initially suggest the following:

- Volume of persistent and bioaccumulative chemicals produced, with the aim of reducing this indicator to zero by 2010, after excluding any application where these properties are essential to a specific application; see the Joint Statement in Appendix 1.
- Emissions of Greenhouse gases.
- General emissions (from chemical release inventory), including waste.
- The number of chemicals which do not have basic toxicity data.

- ***The scope for voluntary action by individual companies - adopting public performance indicators, environmental management systems and engaging in increased dialogue with stakeholders***

3.4 The scope for voluntary action

There is enormous scope for individual companies to take action in making progress towards the sustainable production and use of chemicals. Companies can make decisions to eliminate the use of persistent chemicals in all their processes, pull out of the production of certain types of chemicals, such as pesticides or install an on-going dangerous chemicals substitution programme. These actions are may only be considered voluntary because they are not specifically prescribed in public policy (as yet) but they are still a response to public policy because business decisions must take into account what is on the policy horizon. All the usual examples of 'voluntary' action by individual firms or sectors are clearly business responses to public policy debates or proposals; the example in the paper of the Chemical Industry Association's (CIA) negotiated agreement to cut CO_2 emissions is a case in point.

FOE therefore believes that the White Paper needs to answer two questions with regard to voluntary action. The first has been dealt with in Section 3.2 - what combination of policies is most likely to maximise its impact by encouraging significant 'beyond compliance' actions in industry. Information provision and encouraging firms to improve their own environmental management are part of this, as are taxes. Second, to what extent should the Government itself become involved in the development of 'voluntary' schemes? On this second question we would make several points:

1) Government involvement in encouraging voluntary schemes can reduce the effectiveness of public policy. For example, the failure of the previous Government's attempts to use voluntary methods to encourage the implementation of environmental management system, and the protracted negotiations involved in implementing the Packaging Directive.

2) Where the Government gets involved in a limited scheme as part of a broad issue it can undermine public policy. The CIA energy agreement is an example; The Marshall Task Force is likely to recommend a business energy tax, but this scheme is being presented as allowing the chemical industry some type of special treatment. However, to give chemical firms an exemption from a tax that is liable on sectors that are often in direct competition with it, on the basis of a negotiated agreement with no sanctions, raises serious competition problems.

3) To date, Government involvement in voluntary schemes in environmental policy in the UK has been a catalogue of problems and failures[2]. The central reason has been that such schemes just do have strong enough or broad enough motivations for compliance. In all cases the motivation for a small minority of firms has been enough, and these firms are often are used as exemplars for other firms, whilst overall the schemes have failed to deliver. In Holland, voluntary covenants are backed by legal sanctions, thus providing stronger motivation for compliance.

4) The only potential for the Government to embrace a voluntary scheme is where it is attempting to move environmental performance on well ahead of public policy, but with the clear understanding that such a scheme does not prejudice future policy development. There are examples in the US where a small number of firms have been challenged to make commitments to improve by the Government as a precursor to public policy measures, not as an alternative to them. Even here, the Government needs to be wary of locking itself into a process that, in the end, may well be a brake on progress rather than a benefit.

Of course industry should have good environmental management, but this does not replace strong regulation, in the same way that good financial management does not replace the Inland Revenue and Customs and Excise. Environmental performance must be regulated, and these regulations must be policed. FOE considers that EMAS, despite its inadequacies and limitations, is a far better scheme than ISO 14001, as it incorporates public information, external verification, regulatory compliance and a commitment to improve. ISO 14001 is not adequate; it is not transparent, doesn't include a commitment to regulatory compliance or a commitment to improve.

FOE considers that , although the chemical industry should talk to stakeholders, this does not substitute for Government-run fora for considering issues that are the responsibility of

Government.

- ***The scope for dialogue with sectors of industry to speed innovation, reduce toxic impact and develop eco-efficient products***

The Government should initiate a research project to investigate how a specific chemical industry sector could become sustainable. This research could then act as a model for other sectors.

In addition, the chemical industry should improve dialogue with its customers, moving towards being a supplier of services not products, and developing innovative service-orientated contracts and contracts where both parties benefit from reductions in the use of chemicals.

4. Effects on Human Health and the Environment

Some of FOE's concerns about the dangers of our current use of chemicals are described in our briefing in Appendix 2. We consider that reduction of exposure to chemicals is essential, and that all synthetic chemicals that persist in our bodies or in the environment should be phased out. As the Government stated in its 'Opportunities for Change' consultation paper on sustainable development 'our objective must be for everyone to live in a clean and safe environment'.

4.1 Mixtures

We would be interested to hear of other approaches which might be used?

Direct toxicity assessments e.g. Microtox clearly have some value in establishing the effects of mixtures. However, they will never be able to replicate the full range of toxicological impacts. The most effective method of coping with the problems created by our exposure to mixtures is by reducing these exposures by phasing out persistent and bioaccumulative chemicals, and by reducing hazards by substitution and a positive licensing policy.

It is important to characterise the mixtures present in our bodies and the environment better, as this will assist in determining priority chemicals for action (see below)

4.2 Research needs

Are these the right areas for research into human and environmental effects? Does the programme address the main priorities for research? We would welcome information about other programmes.

FOE would broadly support the research suggested. FOE would also suggest that the following areas need particular consideration:

(i) Determining real contamination

FOE consider that too little priority has been given towards determining which chemicals are contaminating our bodies and the environment:

- Research has shown that many industrial chemicals contaminate our bodies and the wider environment. Such contamination includes impurities in chemical products, by-products discharged from facilities manufacturing chemicals and degradation products of chemicals.
- Most of this contamination has been detected by chance, or by scientists searching for specific chemicals. Surveillance of such contamination must be more systematic.
- Surveillance of all contaminants detectable in environmental samples should be a routine part of the surveillance of the effectiveness of chemical regulation. The results will point out problem chemicals or problem metabolites or impurities in chemicals, which may not be picked up by other regulatory processes.
- Samples that should be examined include: human breast milk, fat, blood and other tissues; cow's milk; shellfish; fish liver oils; effluents; sewage sludge; rivers and estuaries; sediments; urban air and indoor air.
- Once these mixtures are elucidated, the data can be used to devise chemical mixtures which should be used for toxicity testing, for example in *in vitro* tests of endocrine disruption potential. The data will also be useful when designing and assessing epidemiological studies.

(ii) Immune system effects

The list of research topics doe not explicitly mention investigation of the potential role of chemicals in damage to the immune system, both damage causing reduced effectiveness, and damage causing over-activity and allergy, as for example in asthma.

(iii) Nervous system effects

Research should also investigate the role of low doses of chemicals on the developing brain and

nervous system, including effects on behaviour and intelligence.

(iv) Genetic sensitivity

The Human Genome Project will have sequenced the human genome within the next few years, whilst in the USA an Environmental Genome Project has been initiated[3]. This project will, with others around the world, identify substantial differences (greater than 100-fold in some cases) in the susceptibility of different parts of the population to chemical hazards. Not only will this mean that environmental standards will need to be adjusted to allow for the most sensitive part of the population, but genetic testing will enable these individuals to identify themselves, and they will, rightly, call on the Government to protect them, and/or sue the industry which creates the hazard. The Government must initiate research into the effects of genetic susceptibility on existing regulatory standards. It is not acceptable for these individuals to be told to avoid exposure - it is not possible for anyone to avoid exposure to widespread environmental contaminants, including air pollution, and it is very difficult to control one's exposure to chemicals in the home and workplace.

(v) Biomarkers of exposure

FOE considers that the development of improved biomarkers of exposure, for example antibodies and DNA-adducts, is important in improving epidemiological surveys, workplace safety and the establishment of liability for chemical injury.

5. Reducing Chemical Risks

5.1 Self assessment

What is the likely scale of these costs?

We welcome views on what forms this mechanism might take - for example, whether it might be incorporated into our proposals for selective action

We would welcome views on the value of such a scheme, how such a scheme might be brought into effect in the UK or the EU, whether it should be voluntary or backed in some way by legislation, and the scope of any legislation

FOE consider that a self assessment scheme could be beneficial, however, without easily accessible information on what chemicals are available and their hazard properties, it is unlikely that the scheme would generate any appreciable substitution. The creation of a comprehensive chemical database (see Section 6.2) could provide this information. The combination of an environmental self assessment with the existing Health and Safety Assessment would reduce costs of self assessment; a comprehensive database with Health, Safety and Environmental data would simplify the system even further.

Such a scheme should be mandatory, and consideration should be given to incorporating it into the existing Health and Safety self assessment scheme. This scheme alone will not solve the current problems with chemicals; substantially more action will be required.

5.2 Substitution

We would be interested to hear of ways in which the substitution of hazardous chemicals with ones of lower hazard might be expedited without stifling innovation and competition.

FOE strongly supports the substitution principle, as we state in the Joint Statement:

(iv) Substitution of toxic chemicals

Where a less toxic chemical is available for an application, it should be substituted for the more toxic chemical. This is the 'substitution principle'.

The principle was also supported by the Royal Commission on Environmental Pollution (RCEP) in their recent report on Setting Environmental Standards[4]:

> *"We consider that the criterion of comparison with the risk presented by other available substances should be introduced into all regulatory procedures for the marketing and use of chemicals, including those covering reactants and intermediates."*

FOE agree with RCEP that substitution should be enshrined in all regulatory procedures, rather than left to the vagaries of a voluntary approach. Methods of enforcing substitution include:

- Creating a comprehensive chemical database (see Section 6.2) so that industry is able to see what chemicals are available for an application, and what are their hazards.
- Using Best Available Technology and Best Practicable Environmental Option to set technology-forcing standards to generate substitution in industrial processes already regulated by these principles.
- Black listing and phase out timetables for chemicals such as those which are bioaccumulative or persistent. Phase out timetables will stimulate innovation. Products containing such chemicals should be labelled to encourage substitution by consumers.
- Prioritising assessment of Existing Chemicals in usage groups, with comparative assessment determining which chemical(s) are approved for use (see Section 2.2).
- Positive licensing of chemicals for uses (see Section 2), using comparative assessment to license only the least hazardous chemicals (as now enforced in the Biocides Directive), which

are safe beyond reasonable doubt for the application concerned. Substitution may mean the use of no chemical at all for an application.

Enforcing the substitution principle will not be a block to innovation and competition, in fact it will be a spur to both, forcing the development of new products. Contrary to the views stated by the chemical industry representative at the consultation meeting on October 12th, the market will not usually ensure substitution; in general older chemicals will be cheaper than newer ones, as the latter will often require new capital investment and research, whilst the capital investment for the former may have already been paid off.

5.3 Selective action on chemicals

We invite views on the practicality and value of such a scheme, and would welcome suggestions about how it might operate, and what targets and indicators might be used to measure its effectiveness. In particular, we welcome views on:

- ***What evidence is necessary before taking regulatory action to ban or control a chemical (for example, evidence of persistence, bioaccumulation or toxicity);***

As stated in the Joint Statement, FOE believes that persistent and bioaccumulative chemicals should be phased out by 2010 at the latest, so any chemical that falls within these categories should be prioritised. In addition, any chemical which is found as a frequent contaminant of the environment or our bodies should be prioritised, If it appears that a chemical is not safe beyond reasonable doubt for an application then action should be taken to prevent its use. FOE supports the use of well-designed in vitro tests and quantitative structure activity relationships as methods of assessing the hazards posed by chemicals. Chemicals which are implicated in interacting with the complex control systems of the body, such as hormone disrupters or immune toxins would be particular candidates for prioritisation. Such prioritisation should consider the possible impacts of additive or synergistic effects.

The suggestion in the consultation document that selective action should only occur if ‘the initial risk assessment indicates that the chemical is very hazardous, for example that it is a genotoxic carcinogen, and that it is likely to be released to the environment in significant quantities’ (Paragraph 5.7) is ridiculous; in such circumstances there should be immediate regulatory action. This is not a precautionary approach.

- ***How should we decide what degree of action is needed (and the possible role of the stake-holder forum in taking such decisions);***

We discuss the possible structure and role of a stakeholder forum in Section 6.1 below. Initial action taken should include:

- Listing suspect chemicals to send a soft signal to both the producers to start developing alternatives, and to consumers (industrial and general public) to start looking for alternatives. Chemicals would also be listed as suspect on the Comprehensive Chemical Database (see Section 6.2).
- Placing such chemicals on the chemical release inventory, to enable use and exposure to be better understood.
- Phasing out those chemicals that are persistent or bioaccumulative or not safe beyond reasonable doubt.

- ***What information is necessary to ensure that the action taken is proportionate to the problem;***

The protection of public health and the environment must be of the highest priority; the short term financial interests of the chemical industry should not control policy. The degree of action should depend on the societal need for the product and the extent of exposure and hazard.

FOE opposes the use of simplistic financial cost-benefit analyses when considering the cost of replacing a chemical; the health and environmental costs are rarely quantified or quantifiable, and the potential benefits of replacement with another product are rarely considered.

- ***To what extent can safe management be ensured by voluntary rather than regulatory measures.***

As described in Section 3.4, FOE does not consider that a voluntary approach is adequate either to protect human health or to promote innovation. Regulatory action is necessary to protect health; some individual companies may go further than this voluntarily, but regulation is essential.

6. Transparency

6.1 Stakeholder fora

We would welcome your views on how advice and input in these other areas might be obtained?

FOE supports the use of a Government-led stakeholder forum to help develop a precautionary policy on chemicals. However, this stakeholder forum cannot be a decision-making body; its function should be to provide an opportunity for the Government to hear views. It may sometimes reach consensus, but if the body is truly representative it will frequently not achieve agreement. Note that FOE will only support a Government-led stakeholder forum, not one led by, for example, the chemical industry.

Friends of the Earth would suggest that the following elements are important:

(i) Members and chairing

The stakeholder forum should not be dominated by any one interest group, and should cover a wide range of concerns. NGO representation should, if possible, cover health, consumer groups and unions as well as environmental NGOs. Academic representation should also be broad, including medical, environmental, chemical and risk-related expertise. Industry representation should include chemicals consuming industries, for example supermarkets, and those involved in investing in industry. Several Government departments and agencies should be present. The forum should be chaired by a Government representative.

(ii) Making of recommendations

The stakeholder forum will not always be able to reach consensus. In such circumstances, the differing opinions must be reflected in any reporting to Government. The forum should not be a decision making body; that is the role of Government, as our elected representatives. The stakeholder forum will also not be a mirror of society, as the RCEP report on setting environmental standards[4] stated (in paragraph 7.7):

"People's values are not the same thing as the interests of stakeholders. Rather than seeking to articulate and challenge values, the stakeholder model places the emphasis on negotiation between interested parties with the aim of reaching an expedient compromise....Valuable as the concept of 'stakeholder' is in other contexts, we do not believe it is useful or appropriate to stretch it to cover the concerns ordinary citizens have about the environment"

(iii) Participation costs

A serious concern for NGO participation in a stakeholder forum is resourcing. Most NGOs operate on tight budgets and many may find participation in such a forum difficult. In addition to the costs associated with attending meetings, any participant will have to have the expertise and time to ensure adequate understanding of all the issues being discussed. We would therefore strongly suggest that grants be available to assist NGOs with these participation costs. Without full NGO participation the forum will not be able to perform its role adequately. The costs of the stakeholder forum could come from a levy on chemical manufacturers.

(iv) Budget for research

For maximum effectiveness the forum should be able to make recommendations for research funding to Government. Such research could include the employment of a consultant for a few months to discover whether a chemical is really essential, or if replacements are available. Research could also be useful to establish Society's values with respect to particular products or risks, for example by using a citizen's jury, as suggested by RCEP in their latest report[4].

(v) Openness

The forum must be as open as possible, with an assumption that all documents and meetings are open to the media and the public. Confidentiality will only be acceptable in the most exceptional circumstances.

The structure and nature of the stakeholder forum will determine its effectiveness and acceptability. FOE would therefore suggest that it is essential that there be further consultation on options for the forum at a later date.

6.2 Publicly available information

We would welcome views on whether the current approach is sufficient and, if not, what more could be done.

FOE considers that the suggestions on publicly available information described in the consultation document do not go far enough. There needs to be more public information on all exposure to chemicals, and this information should be brought together with a detailed database of chemical properties. This Comprehensive Chemical Database (CCD) would incorporate the following elements:

(i) A comprehensive pollution inventory

The current Chemical Release Inventory is acknowledged in the consultation document to be inadequate. FOE has already submitted our opinions on improving it to the relevant consultation process. FOE believes that an effective emissions inventory should include:

- A plant's emissions to land, air, water
- Chemicals in waste arisings
- Chemicals leaving the plant in products
- Chemicals and other resources brought into the plant

This inventory should be accessible through an easy-to-use internet front end, incorporating links to descriptions of the chemicals concerned (see (iv) below). It must be updated regularly and be as up to date as possible.

Such an inventory will provide pressure on dirtier companies to clean up their emissions, as has occurred in the USA with their Toxics Release Inventory (TRI). Including chemicals leaving the plant in products enables a proper mass-balance to be constructed, and assists in establishing what chemicals are used for, and hence provides valuable information for exposure assessments.

(ii) Product right to know

Consumers are also exposed to chemicals through products they buy and use. The chemicals may be present as ingredients or in packaging, Consumers should have a right to know what is in any product they buy. Such a right to know would allow personal precautionary action, which can contribute to a more sustainable use of chemicals but is not currently possible, for example:

- Many, but not all, food cans contain lacquers incorporating the oestrogen-mimic bisphenol a. It is currently impossible to find which cans are affected, as food manufacturers and supermarkets either don't know themselves or claim commercial confidentiality. Many people would rather avoid exposure to this chemical, but currently we have no right to know in which cans it is present.
- Various household products and perfumes contain artificial musk scents, which are persistent and bioaccumulative, and accumulate in human tissue. These are listed on ingredients lists under 'scent' or 'perfume', again denying the consumer the option of avoiding exposure.

A product right to know is one of the demands of the Joint Statement (Appendix 1):

(vii) The right to know

The public should have a right to know what chemicals are present in any product they use, including in the packaging of the product. The public should also have access to information on the safety of all chemicals. This information will help individuals to make informed choices.

A product right to know would not necessarily mean that all ingredients have to be listed on the label, but the information would have to be available on demand. FOE would suggest that the CCD should incorporate a database of products and their ingredients. Such a computerised database would have the added benefit of providing more exposure data for the assessment of chemicals.

Product Right to Know does not substitute for a strengthening of the regulations covering the safety of ingredients in products. Consumers usually do not have the time to investigate all the ingredients in products they are intending to buy. The Government should regulate to protect human safety by ensuring that all ingredients are safe beyond reasonable doubt for all consumers.

(iii) Environmental monitoring

As mentioned in Section 4.2 above, many chemicals contaminate breast milk, human fat, food and the wider environment, and FOE believes that far more surveillance of such contamination is required. The public is currently generally unaware of this contamination, and unaware of the way their purchasing habits may be adding to contamination of their bodies and the environment. It is therefore important that the results are made more available to, and understandable by, the public. Such monitoring could easily be incorporated into the CCD, with results listed in a section on *What contaminates the environment and our bodies?*, The database on chemical properties should mention which chemicals contaminate the environment or our bodies.

(iv) A comprehensive database of chemical properties

A key part of the CCD is a database of the effects of chemicals. FOE would suggest that this database incorporates the following:

- Various levels of information about each chemical, from very easy to understand, to information useful for a scientist.
- Information on all chemicals that appear on the linked exposure databases, including degradation products and impurities.
- The information on each chemical should include known hazard data (clearly indicating where tests have not been done) and whether it is found as an environmental contaminant. Inclusion of Health and Safety and classification and labelling details for each chemical, will make the CCD into a full Health, Safety and Environmental database.
- Uses and non-hazard properties of the chemical could also be listed. This would allow industry to use the database to select products - particularly if positive licensing has been introduced. For example, a search could be made for a white pigment, licensed for food contact uses. This search would generate a list of licensed chemicals, together with their hazard characteristics - facilitating the substitution principle. The manufacturer could then select the least hazardous chemical, and maybe follow a link to the manufacturer or distributor.

The CCD on the Web would be accessible from libraries, schools, universities, many businesses and

a growing number of homes. It would provide a authoritative source of information on chemicals, and an effective method of promoting risk reduction. The database would require resources to set up and maintain, but much of the information is already being gathered in an electronic form - for example HEDSET data in the existing substances process - so, to some extent, it is a question of putting together existing databases. The US Environmental Defence Fund have already demonstrated several elements of such a database at their Scorecard site (www.scorecard.org).

6.3 Your views

In the meantime, we would welcome your views on these approaches to increased transparency. Is there more that we should be doing?

In addition to those suggestions we have made above, it is important that as much information about chemicals as possible is in the public domain. Commercial confidentiality is not acceptable where human and environmental health is at risk. Substantial financial penalties must be imposed on any companies that fail to make publicly available all information they possess relevant to the safety of chemicals that they produce or use.

7. Conclusions

There is a bright future for society as a whole, including the chemical industry, if the industry is prepared to look forward to the opportunities created by a sustainable society. The chemical industry must accept that the days of using chemicals that are untested, or bioaccumulative, or persistent, or unsafe, are now over, as are the days of unsustainable resource use and secrecy. A sustainable chemicals strategy will benefit UK industry, by ensuring that it is at the leading edge of technology, not trapped in the past. As Mr Meacher said in a recent article in Chemistry and Industry[5]:

"I want an environmental policy in the UK that keeps the UK chemicals industry at the fore and not fighting rearguard actions on sunset chemicals"

The Government, also, has a crucial role in protecting human health and the environment, and in driving innovation in the chemical industry. Government can do this by developing and enforcing regulations, creating a comprehensive chemical database, funding research, and setting up and running stakeholder fora.

Friends of the Earth considers that a sustainable chemicals policy, guided by our Joint Statement on Chemicals and Health, is achievable and desirable. We look forward to the Government's White Paper on chemicals in the hope that the Government is prepared to make this shift to a sustainable future.

7.1 References

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[3] "The Environmental Genome Project: Functional Analysis of Polymorphisms", F.P. Guengerich, Environmental Health Perspectives, 106, p 365-368, 1998.

[4] "Setting Environmental Standards", Royal Commission on Environmental Pollution, 21st Report, October 1998.

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8. Appendix 1. Joint Statement on Chemicals and Health

'Sustainable Production and Use of Chemicals' Consultation

Joint Statement on Chemicals and Health

September 1998

We welcome the UK Government's review of the 'Sustainable Production and Use of Chemicals' and the review of chemical legislation within the European Union. The following statement has been agreed by the signatories named below:

We are concerned that:

(i) the majority of chemicals in current use have not had adequate toxicity testing. The European Environment Agency has stated that about 75% of the approximately 2500 chemicals in large scale use (whose production in the EU exceeds 1,000 tonnes) have not got sufficient toxicity data publicly available for even a preliminary toxicity assessment;

(ii) chemicals which bioaccumulate and persist in the human body and the environment are still in routine use;

(iii) increasing numbers of chemicals are being shown to disrupt the function of the endocrine, immune and nervous systems of both humans and animals;

(iv) most exposures to chemicals occur as mixtures, rather than individual chemicals, but little consideration is given to this in the regulation of chemicals;

(v) some parts of the human population are far more susceptible to chemical exposures, including developing foetuses, babies, children and those with certain genetic variants. Animals show similar variation in susceptibility;

(vi) the incidences of breast cancer, testicular cancer and asthma have increased dramatically over the past few decades and there is concern that these increases may be linked to exposure to chemicals.

We believe that a more sustainable chemicals policy is both necessary and possible. It should include policies which will more adequately protect both the public's health and the health of the environment.

A sustainable chemical strategy should focus on reducing the risks posed by chemicals, and it should be guided by the precautionary principle. The complexities described above mean that uncertainty is pervasive when evaluating the effects of chemicals, even if considerable resources are spent on research. We propose that a new strategy should include the following elements:

(i) A positive licensing system

Chemicals regulation should move towards being a positive licensing system, where chemicals are licensed for different uses, in the same way as already occurs for pesticides and pharmaceuticals. Industry should have to demonstrate that these licensed applications of chemicals are safe beyond reasonable doubt, and that society has a need for them. The potential impacts on the environment of discharges of a chemical should be fully evaluated prior to licensing.

(ii) The elimination of persistent or bioaccumulative chemicals

All synthetic chemicals in use should break down rapidly into harmless, natural substances. There should be no accumulation in the human body, wildlife or the environment, unless this is an essential function in a specific application. Phasing out persistent and/or bioaccumulative chemicals will reduce exposures.

(iii) The phase out of dangerous chemicals

Those existing chemicals that do not fulfil the above requirements should be phased out as soon as possible, and at least by 2010. The Government should ensure that all Persistent Organic Pollutants (POPs) covered by the United Nations Economic Commission for Europe protocol on POPs are phased out well before this deadline.

(iv) Substitution of toxic chemicals

Where a less toxic chemical is available for an application, it should be substituted for the more toxic chemical. This is the 'substitution principle'.

(v) Minimising the quantity of chemicals used

The minimum necessary quantity of chemicals should be used for any application.

(vi) Producer liability

Liability for the effects of chemicals should rest with the producer of the chemicals concerned, not with the general public.

(vii) The right to know

The public should have a right to know what chemicals are present in any product they use, including in the packaging of the product. The public should also have access to information on the safety of all chemicals. This information will help individuals to make informed choices.

(viii) The elimination of marine pollution

The Government must adhere to its commitment to cease all discharges of hazardous chemicals to the marine environment by 2020, as agreed in the Sintra Statement arising from the Ministerial Meeting of the Oslo and Paris Commission in July 1998.

The strategy outlined above will improve protection of both human health and the environment. It will also reduce the burden of dealing with the poorly-characterised existing chemicals, as many chemicals will be withdrawn from use. Such a strategy will also improve the occupational environment by replacing more toxic chemicals with less toxic ones.

These proposals do not threaten the survival of the chemical industry, they merely call for the production of better chemicals.

We must take action now; the massive expansion of the production and use of synthetic chemicals since the 1930s has been undertaken with insufficient regard for the health of humans and the environment - now we have the chance to protect people and the environment from the effects of dangerous chemicals.

8.1 Signatories as at 21/10/1998

Friends of the Earth (England, Wales and Northern Ireland)
Friends of the Earth Scotland
World Wide Fund for Nature (WWF) UK
UNISON
Women's Environmental Network (WEN)
Scottish Wildlife Trust
Marine Conservation Society
SERA (the Labour Environment Campaign)
Association for Public Health
The Food Commission
Public Health Alliance (Scotland)
Wildfowl and Wetlands Trust
International Wildlife Coalition

9. Appendix 2:

Poisoning our children: The dangers of exposure to untested and toxic chemicals.

Published by Friends of the Earth, October 1998

[Attached]

Briefing

FRIENDS of the earth
for the planet for people

Poisoning our children: The dangers of exposure to untested and toxic chemicals

Introduction

We are exposed to industrial chemicals all the time, in our food, in household products and as general contaminants of our environment. One might think that the chemicals we are exposed to have been checked to ensure they are not toxic; unfortunately, in the majority of cases this has not been done. Due to the haphazard way in which chemicals have been brought into use, and the inadequacy of many of the regulations concerning the use of chemicals, we are exposed to a cocktail of poorly tested products.

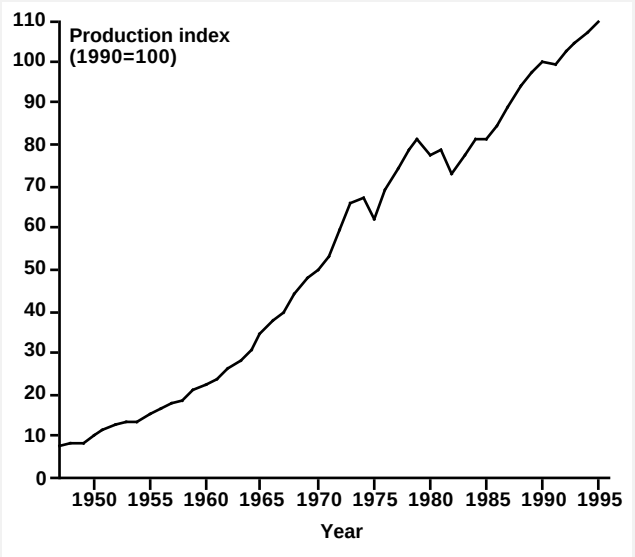
As this briefing demonstrates, there are serious concerns about what these chemicals may be doing to our health. Of particular concern are the effects that chemicals may be having during the development of our bodies, when we are in the womb and when we are children. This briefing outlines the rising incidence of several childhood and other cancers, the increasing incidence of asthma and the problem of declining sperm counts. It also describes some specific problem chemicals we are exposed to, and finally outlines what you can do to push Government and industry to clean up their act, to protect the health of children, adults and the broader environment.

The chemical revolution

In the twentieth century we have experienced a revolution in the production and use of chemicals. Figure 1 shows the vast increase in production of chemicals that has occurred since World War Two. This growth included the production of many new chemicals to which our bodies and the environment had never been exposed before. Around 100,000 different chemicals were in use in the European Union (EU) in 1981; the vast majority of these chemicals have not been adequately tested for toxicity. Several thousand other chemicals have gone on the market since 1981; these chemicals have had some level of toxicity testing before going on the market [4].

Toxicity testing is used to find out how dangerous a chemical is. It checks the effects of high doses and low doses, and what happens to the chemicals in the environment. A recent report by the European Environment Agency (EEA) demonstrates that very

Figure 1: Trends in chemical production in the USA since 1947 [1]



little toxicity testing has been done, even on those chemicals that are produced in the highest volumes (more than 1000 tonnes per year in the EU). Box 1 summarises the EEA's results.

A survey by the US Environmental Protection Agency (EPA) looked at every one of the 2,863 high volume (over 1 million pounds per year - about 450 tonnes) organic chemicals in use in the USA [2]. The EPA looked to see how much toxicity data was publicly available for these chemicals and concluded that:

"no basic toxicity information, i.e., neither human health nor environmental toxicity, is publicly available for 43 per cent of the high volume chemicals manufactured in the US and that a full set of basic toxicity information is available for only 7 per cent of these chemicals."

There is now substantial international co-operation on testing of chemicals, with the EU and the USA working together through the Organisation for Economic Co-operation and Development (OECD), who standardise the toxicity tests. In spite of this we still know very little about the toxicity of most high volume chemicals – and even less about the tens of thousands of chemicals produced in smaller amounts.

In the real world we are exposed to mixtures of chemicals, rather than just one chemical. It is much more difficult to investigate the toxic effects of mixtures, so we know very little about their toxicity. In some cases it has been shown that the toxic effects of chemicals will add together to give a much more toxic effect than each of the chemicals individually.

We are all exposed to industrial chemicals throughout our lives:

- in our food, from packaging, pesticides, additives and chemicals that contaminate the environment;
- in household products, like cleaners, air fresheners, TVs and textiles;
- in the workplace;
- from polluting factories, traffic and landfill sites.

Our bodies are contaminated too - hundreds of chemical contaminants have been found in human fat [3]. What could all these chemicals be doing to our own and our children's health?

Children's health at risk

There is increasing concern about the potential impact that exposure to some chemicals may be having on the health of children. Children are often more susceptible to the toxic effects of chemicals than adults, and there are some worrying trends in both childhood and adult illnesses. Advances in genetics are starting to find that some people are more susceptible to the effects of chemicals than others. However, it is still difficult to link exposure to a chemical with a particular health effect.

Box 1: Toxicity data available for 2,472 high production volume chemicals [4]

Test	Percent of chemicals for which data is available
Acute oral toxicity	70%
Acute dermal toxicity	45%
Acute inhalation toxicity	30%
Chronic toxicity	55%
Carcinogenicity	10%
Effects on fertility	20%
Biodegradation	30%

(NB: See the glossary for a detailed explanation of these terms)

Why children are more sensitive to toxic chemicals than adults

Children are different from adults in a number of ways which can lead to increased susceptibility to chemicals, for example:

- many parts of their bodies are developing, so are more susceptible to alterations, for example their brains and reproductive organs;
- they have a less developed ability to break down chemicals;
- they eat, drink and breathe more for their weight than adults, so take in more (relatively speaking) of many contaminants;
- they tend to be breathing air closer to the ground, which may contain more dust than that higher up;
- they are more likely to put things in their mouths and eat things they shouldn't [5].

The developing foetus is also extremely sensitive to toxic chemicals, as the development of the body depends on complex interactions of signalling chemicals, and disruption of these signals can permanently damage the body's development.

Worrying signals in children's health

There has been a general improvement in child health over the last century, due mainly to improvements in diet, hygiene and medical treatment. However, some health problems are getting worse:

- Cancer in children under 15 has risen by 10 per cent between 1974 and 1991 in the USA [6], while cases of the most common leukaemia, acute lymphoblastic leukaemia, rose by one per cent per year in the USA between 1973 and 1994. Brain tumour rates have gone up by two per cent per year [7]. Data from England and Wales suggests an increase in leukaemia incidence of around 15 per cent between 1971 and 1992 [8].

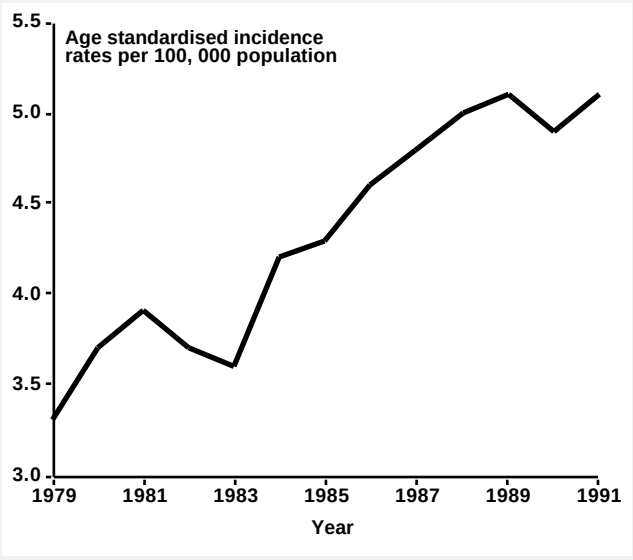
- A study which looked at the incidence of birth defects found that women living near hazardous waste landfill sites (hazardous waste dumps) were a third more likely to have babies with birth defects than those living further away [9].
- Research is suggesting that girls in the US are now entering puberty earlier than has been found by studies in the past [10]. The potential role of chemicals in this change is supported by a study which compared the onset of puberty in children with the levels of two persistent synthetic chemicals, PCBs and DDE (see next section for more information about these chemicals) in their mothers whilst they were pregnant. Girls whose mothers had the highest levels, and who were therefore exposed to the highest amounts of DDE and PCBs in the womb, entered puberty 11 months earlier than girls with lower exposures. The onset of puberty in boys was not affected. Other studies have shown that girls who enter puberty earlier are at increased risk of breast cancer [11].
- The ratio of male to female births has declined during the last 20-40 years in Denmark, the Netherlands, Sweden, Germany, Norway, Finland, Canada and the US, so fewer male babies are being born than would normally be expected. It is not clear why this is happening, though environmental pollution and hormone disrupting chemicals have been suggested as possible causes. This hypothesis is supported by data from Seveso, Italy, where an industrial accident released large amounts of dioxin (see below). In the eight years after the accident 12 daughters and no sons were born to nine couples with the highest dioxin exposure [12].
- Childhood (and adult) asthma has risen hugely in recent decades. In 1993 GPs recorded five times as many new cases of asthma in pre-school children as they had in 1979; the number of adults consulting their doctor about asthma trebled between 1971 and 1991. In England £438 million worth of asthma medicine was handed out in 1997, with the total cost of asthma being about two per cent of the health services net expenditure [13]. We know that air pollution can cause asthma attacks, but it is still not clear why so many more people are becoming asthmatic. Theories include changes in diet, increasing numbers of dust mites in poorly ventilated homes, and changes in chemical exposure, particularly in the home. One of the chemical theories is outlined below; see 'Phthalates'.

Problems with the health of adults

Several diseases of adults are also on the increase, some of which are believed to derive from developmental problems that occurred in the womb or in childhood.

- Testicular cancer has increased in incidence by 55 per cent between 1979 and 1991 in England and Wales (see Figure 2); there were 1137 new cases of testicular cancer in 1991 [18]. Testicular cancer is believed to result mainly from problems occurring during the development of testes whilst the individual is developing in their mother's womb, and hormone disrupting chemicals (see Box 3) are hypothesised to be a cause of the increase [14].
- Sperm counts in Europe and the USA are declining [15].
- Breast cancer has been estimated to have increased in incidence by one per cent per year since the 1940s in the USA, and has increased by 50 per cent in Denmark between 1945 and 1980 [16]. It has also increased in incidence in the UK over the last few decades. Research has suggested a link between breast cancer and exposure to hormone disrupting chemicals (see Box 3) such as DDT, dioxin and PCBs; see below for more details about these chemicals [17].

Figure 2: Testicular cancer's increasing incidence (in England and Wales) [18]



- Prostate cancer has increased by 40 per cent between 1979 and 1991 in England and Wales, though some of this increase may be due to improved diagnosis [18].

Genetic susceptibility

One of the most worrying - and significant - developments in recent years has been the discovery that people have different susceptibilities to chemicals, depending on their genetic makeup [19]. Our bodies are able to break down many of the chemicals that they are exposed to, and can also, for example, repair some of the damage that chemicals can cause. However, those of us who can't break down chemicals so easily, or who have poor repair

systems, will be much more susceptible to the effects of chemicals.

A major US research project, the Environmental Genome Project, is investigating the genetic basis for this variability [20]. This project, and other research, will lead to genetic tests which will be able to indicate who is most susceptible to different sorts of chemical exposures. Such research will challenge current safety limits for chemicals, as these are generally set by considering a 'normal' member of the population, rather than the most sensitive people.

How are chemicals shown to be dangerous to humans?

A major problem with linking exposure to chemicals, or anything else, to illness is the multiplicity of other factors which could be affecting the incidence of the illness. Occasionally, making a link is easy, for example if the exposure leads to a unique illness, as for example with asbestos. However, even with links that should be easy to make, such as that between lung cancer and smoking, years of research (and exposure to the chemical) may be required. Even then the industry making money from the product may continue to fight against controls on it, arguing that the case hasn't been 'proven'.

More complex problems, like changes in IQ, behaviour or performance of the immune system, are much more difficult to link to exposure to specific chemicals.

If you are dealing with chemicals that a generation has been exposed to, who do you compare their levels of illness with? The previous generation? So many other things will have also changed in the same period, making a causal link with a particular chemical almost impossible to demonstrate. The only way such a link can be proven in humans is to expose a group, say pregnant mothers, to a known dose of a chemical, and compare their health and their children's development, with another, identical group. This observation would need to continue for many years, to pick up all possible effects. Such an experiment would not only be completely unethical; it would also require many years to generate a result. In order to *prove* human harm from a chemical you must harm sufficient humans, under controlled conditions, to demonstrate a causal link.

Other methods must therefore be used to determine if chemicals may harm human health. The use of animal-free experiments is becoming more common, examining the detailed biological mechanisms of toxicity by using cultured cells or bacteria. Chemicals are also frequently tested on animals, whose reactions to chemicals may be similar, though not identical, to those of humans.

As it is so difficult to prove links between exposure to a chemical, or certainly a mixture of chemicals, and human harm (or harm to the environment), decisions must be made upon incomplete and uncertain information. In these circumstances, the precautionary principle should be used. There are, however, many different interpretations of what the precautionary principle is, and how it should be applied. A recent editorial in the prestigious medical journal *The Lancet* defined it thus:

"We must act on facts, and on the most accurate interpretation of them, using the best scientific information. That does not mean we must sit back until we have 100 per cent evidence about everything. Where the state of the health of the people is at stake, the risks can be so high and the cost of corrective action so great, that prevention is better than cure. We must analyse the possible benefits and costs of action and inaction. Where there are significant risks of damage to the public health, we should be prepared to take action to diminish those risks, even when the scientific knowledge is not conclusive, if the balance of likely costs and benefits justifies it" [21].

However, Friends of the Earth considers that the precautionary principle should not include a balance of costs and benefits [22]. In reality it is very difficult to assess either the costs or benefits of taking a particular action – what is the price of a life? Or of a child suffering cancer? How much profit could be made from a replacement chemical or technique? With so much uncertainty as to the exact toxicological impact of a chemical on humans, by itself or in a mixture, how can the cost of this damage be calculated?

Problem chemicals

As described above, many chemicals have had little or no toxicity testing, so we know next to nothing about their potential effects on human health or their effects on the environment. In spite of this lack of testing, research is constantly revealing new chemicals to be of concern. This section contains a snapshot of some of these chemicals, particularly focusing on chemicals which are persistent and bioaccumulative (see Box 2) and those which are able to disrupt hormone control (Box 3).

1) Old chemicals that stick around

Over its lifetime so far, the chemical industry has produced many chemicals that are persistent and that bioaccumulate (see Box 2). Such chemicals stick around, so that even when they are no longer being manufactured they remain in the environment and in our bodies. Their persistence means that there is nothing we can do to remove them from the global environment once they have been released. Here are a few examples.

PCBs

PCBs, or polychlorinated biphenyls, are a group of chemicals which were first produced by the chemical company Monsanto in 1929. They had a wide range of uses including in printing inks, paints, plasticisers,

Box 2: Persistent and bioaccumulative chemicals

Some chemicals do not break down well in the environment or in our bodies. These chemicals are known as persistent chemicals. Because they don't break down easily, they tend to accumulate in the environment, even if they are no longer being used.

Some persistent chemicals also concentrate in the bodies of animals, including humans. This is called bioaccumulation, and is particularly common if the chemical is very soluble in fat. The fat then becomes the most contaminated part of an animal, so fatty products from contaminated animals or fish tend to have higher levels of bioaccumulative and persistent compounds than less fatty foods. This is why fish oils such as cod liver oil are contaminated with PCBs and dioxins [26]. Such chemicals also contaminate milk, including human breast milk. This contamination is worrying; however, breast milk is a very important source of nutrition and health for babies, and so Friends of the Earth advises that mothers should continue to breast feed where possible.

Not all bioaccumulative or persistent chemicals are known to be toxic. However, if they are found to be toxic in the future they will already be contaminating our bodies and the environment, and there is nothing that can then be done to stop exposure to them. Friends of the Earth therefore believes that all bioaccumulative or persistent chemicals should be phased out as a precautionary measure.

capacitors and in electricity transformers. They are extremely persistent and bioaccumulative, and were found in 1966 to be major environmental contaminants [23]. PCBs have been found around the world, including in human fat and breast milk, with particularly high levels at the North and South Poles (a process called "global distillation"). PCBs are hormone disrupters, and have a range of other toxic effects, including suppression of the immune system. They are no longer produced in Europe, and a global treaty is now being negotiated (the Persistent Organic Pollutants treaty) to stop their production globally, and to attempt to destroy as much of the PCBs in use as possible before they enter the environment; many nations, including all EU members, have already signed a similar treaty [24]. The UK is already committed to destroying all identifiable PCBs by 1999 [25].

DDT

DDT is a pesticide that was once used extensively, but is now used only in the developing world, particularly for mosquito control but also in general agriculture [27]. DDT is metabolised in the body to DDE, and both these compounds persist in human fat and the environment. DDT and DDE are hormone disrupting chemicals; one structural form of DDE can block the action of the male hormone in mice [28].

PCTs

Researchers examining levels of PCB contamination in a German school unexpectedly found that another group of persistent chemicals, the polychlorinated terphenyls (PCTs), were also present [29]. PCTs started being used as plasticisers and flame retardants in the 1930s. Later they were used for a wide range of applications, including inks used to print on food packaging, from where they leached into food. Around 10,000 – 12,000 tonnes were produced globally before production ceased in the late 1970s. PCTs have also been found in human blood and fat. There is little information available on how dangerous PCTs are, though some seem to be endocrine disrupters and they may be cancer-causing.

2) Persistent chemicals that are still being produced

In spite of the problems that PCBs have caused, the chemical industry continues to produce other chemicals that persist or bioaccumulate. Some examples follow.

Dioxins

Dioxins are a group of chemicals which are produced as by-products in the production of some other chemicals (e.g. production of PVC and some other chlorine-containing chemicals), and by burning chlorine-containing materials in incinerators or other fires. Dioxins are persistent and bioaccumulative, and the most researched dioxin, TCDD, is proven to cause cancer in humans [30]. Dioxins are also endocrine (hormone) disrupters, and alter the immune system [31]. The World Health Organisation is about to cut its recommended safe limit for dioxins and furans (a group of chemicals similar to dioxins) by at least 50 per cent. Research by the UK Ministry of Agriculture has shown that adults are already taking in enough dioxin (including dioxin-like PCBs) in their food to breach this new limit, and children are taking in even more [32].

Brominated flame retardants

Brominated flame retardants (BFRs) are a group of chemicals added to many products, including carpets and computer equipment, in order to reduce fire risk. However, many BFRs are persistent and bioaccumulative, even contaminating the blubber of sperm whales in the remote deep waters of the Atlantic [33]. Some show similar toxicity and behaviour to PCBs (above), and when burnt, materials containing BFRs can emit dioxin-like chemicals. The BFR tetrabromobisphenol A (TBBP-A) has been shown to have the same hormone disrupting properties as bisphenol A (below), and has been found in the blood of office workers [34]. When low levels of the BFR polybrominated diphenyl ether (PBDE) are fed to pregnant rats, their offspring show permanent disturbances in behaviour, memory and learning. Levels of PBDE in human breast milk in

Box 3: Hormone disrupting chemicals

Hormones influence many aspects of the body, regulating its metabolism, and affecting sexual characteristics. Hormone Disrupting Chemicals (HDCs, also known as 'gender benders', xenoestrogens, or endocrine disrupting chemicals) are able to imitate, or disrupt the action of, natural hormones such as the female hormone oestrogen, the male hormone testosterone or the thyroid hormones. Oestrogens are the hormones that influence the development and maintenance of female sex characteristics, and the maturation and function of the sex organs, and testosterone serves a similar function for males. Thyroid hormones are involved in the growth and development of the body, including the brain [39].

HDCs covered by this briefing include bisphenol a, dioxins, PCBs, some polybrominated flame retardants and some phthalates. Some plants, for example soya, contain natural chemicals that disrupt hormones. However, because we have been exposed to plant hormones (phytoestrogens) throughout our evolution, we are usually able to break them down rapidly in our bodies. There are, however, concerns about the use of soya-based infant foods, as these are not a natural part of our diet, and could be having a negative effect [see note 40 for details].

Hormones are particularly crucial during development in the womb and early childhood, as their signals control developing reproductive organs, growth and the development of the brain. We know something, though not much, about the potential impact of HDCs on development of the reproductive organs. We know very little about potential impacts on intelligence and behaviour [41].

Sweden have increased by 50 times over the past 25 years [35].

Musk scents

Many products have scent chemicals added, including toilet cleaners, shaving foam, washing up liquid, cosmetics and, of course, perfumes. One group of perfumes found in some products are the 'artificial musks'. Artificial musks are persistent and bioaccumulative, accumulating in our bodies, contaminating human fat, blood and breast milk. They also contaminate the wider environment, including fish [36]. Unfortunately, ingredients lists on products usually just state "perfume" or "fragrance", so it is difficult to avoid the artificial musks. There are also safety concerns about other scents (see 'Air fresheners' below).

Fluorinated organics

Concerns are now being raised about the use of fluorinated organics (also known as fluorocarbons), which have a massive range of uses, including as pesticides, refrigerants, anaesthetics and industrial surfactants. Many of these compounds are persistent, and some are known to have biological effects - others are known to contribute to global warming. However, despite their industrial importance, only a little is know about their fate in the environment and their toxic effects. Some scientists have suggested that levels of the main breakdown product of some fluorinated organics, TFA, may be high enough to threaten wildlife within 30-50 years [37]. In spite of the lack of knowledge in this field, and concerns about possible environmental effects of these chemicals, the fluorocarbons industry has abandoned its research into TFA levels in the global environment [38].

3) Some other problem chemicals

Safety concerns extend beyond persistent and bioaccumulative chemicals. Although other chemicals may not stick around in the same way as persistent chemicals, they can still cause toxic effects. They include:

Phthalates

Phthalates are a group of chemicals which are used as plasticisers (making plastic more flexible) in plastics, glues and inks. Several have been shown to be hormone disrupters, and their widespread use and poor degradability mean that they are common contaminants of the environment. Worrying research has indicated the possible importance of phthalate exposure on children's health:

- Many teethers and soft toys contain phthalate plasticisers, and research has shown that these plasticisers can leach out of the toys into the mouths of the children chewing them. The European Commission's Committee on Toxicity, Ecotoxicity and the Environment has concluded that there are "reasons for concern" about the most common phthalate used in PVC toys [42]. However, the toys have not been banned in the EU, mainly because there are currently no approved tests available to establish how much plasticiser is leaching out of the toys - even though such toys have been chewed by children for decades. However, Austria has banned the use of phthalates in toys for children under three, and both Denmark and Sweden have similar bans proposed [43].
- Tests by the UK Ministry of Agriculture, Fisheries and Food found phthalates in baby milk formula [44]. A survey of phthalate levels in UK fatty food in 1993 found phthalates to be present in every sample, including in meat, fish, eggs, milk and milk products [45].
- The phthalate diethylhexylphthalate (DEHP) is used in many PVC building materials, for example PVC floors. Researchers have found that DEHP, and other phthalates, are present on household dust, so will be inhaled by both children and adults. Infants breath twice as much air as adults (per kilo body weight), and spend most of their time indoors, so will be getting a

particularly large dose of phthalates from dust. Disturbingly, animal experiments indicate that DEHP can irritate lungs, and some evidence suggests that development of lung problems in the first two years of life is linked to exposure to plastic interior surfaces [46]. This research suggests that the increasing incidence of asthma could be partially due to the increasing household use of plastics containing phthalates over the last few decades.

Bisphenol a

Bisphenol a (BPA) is a chemical which is used to make protective coatings inside many, but not all, tin cans, and it is the main ingredient in making polycarbonate plastic bottles. It is also an endocrine disrupter, with a range of worrying toxic effects.

Researchers in the USA have found that BPA contaminates canned baby food concentrates [47], and Spanish research has found that other canned foods are also affected [48]. US research also found that some BPA could migrate from polycarbonate baby bottles [49].

BPA has been shown to imitate the female hormone oestradiol, and very low doses have been shown to enlarge the prostate in mice [50]. Research has also shown that BPA acts in the same way as female hormones in the area of the developing rat brain which regulates fertility and sexual behaviour [51].

Air fresheners

Air fresheners don't really freshen the air in your home - they just add more chemicals into the atmosphere, to mask the smell of what's already there. One study examined the effect of air freshener emissions on mice in the lab, and found that the emissions irritated their lungs, and affected their behaviour. Some of these effects were noticed at concentrations similar to those expected from normal domestic use. Several of the mice exposed to the highest amounts of air freshener actually died! Analysis of the gases released by the air freshener showed that chemicals with known irritant and neurotoxic (nervous system toxin) activities were being released [52]. The same researchers observed similar effects with four brands of cologne and a sample of toilet water [53].

Occupational exposures to chemicals

Workers in many occupations are exposed to chemicals. Occupational health standards exist to attempt to minimise risks to these workers, though given the numerous gaps in our knowledge about chemical risks, these standards are not perfect. However, in addition to risks to the workers themselves, there is worrying evidence that occupational exposure can lead to increased levels of cancer in their children. The strongest links have been found between childhood leukaemia and paternal exposure to solvents, paints and motor-vehicle related occupations, and between childhood nervous system cancers and paternal exposure to paints [54].

Pesticides

Pesticides are designed to kill things, so it's perhaps not surprising that many pesticides have been withdrawn from sale because of health worries. However, many concerns continue about pesticides that are still in use. For example:

- A study of pesticide-exposed children in Mexico found that they had less-developed mental skills than those not exposed [55].
- A range of studies suggest that exposure of parents to pesticides, use of pesticides in the home or residence on a farm are associated with increased childhood cancers [56].
- A study of domestic use of a household pesticide chlorpyrifos found that it concentrated on the surfaces of toys after spraying in a room. Children playing with these toys were estimated to be exposed to the pesticide at substantially above the safety limit. This extra exposure hadn't been predicted in the past - or taken into account when the pesticide was approved [57]. Chlorpyrifos is authorised for use in the UK in products such as Bob Martin Microshield Household Flea Killing Spray, Raid Ant Bait and Dursban 4TC [58].
- A study of births in Iowa, USA found that mothers who drank water contaminated with herbicides such as atrazine were more likely to have babies which grew less in the womb [59].

How to help make things safer for you and your children

1) Change the regulatory system

The chemical industry considers that there is nothing wrong with the present system that can't be solved with some research and more testing of chemicals. As a result of growing public and government pressure, they have begun to collaborate internationally, spending a few tens of millions of dollars – a tiny fraction of their profits – on new research and testing. Some of this research may be legitimate, but much industry-backed research is designed only to defend their products, and to delay decision making.

Friends of the Earth believes that the current system of chemicals regulation is wholly inadequate. We must move to a system where we know that chemicals are safe, and we must deal with the legacy of ten of thousands of poorly tested chemicals. Box 5 outlines Friends of the Earth's proposals on how this could be achieved, in the form of our "Joint Statement on Chemicals and Health", which has already been endorsed by a wide range of organisations.

Take Action!

a) Sign and return our statement on chemicals and health - see the final page of this briefing.

b) Write to the Government

Write to Michael Meacher, the Environment Minister:

> Rt. Hon. Michael Meacher,
> Minister for the Environment,
> Department of the Environment, Transport and the Regions,
> Eland House, Bressenden Place,
> London SW1E 5DU

In your letter you may want to include the following elements:

- State that you are concerned about the state of chemicals licensing, and that you support Friends of the Earth's "Joint Statement on Chemicals and Health".
- Ask for the right to know what is in all products, and a comprehensive pollution inventory to give people information on local sources of pollution.
- Call for the Government to set up health studies to determine the effects of landfill sites, factories and other sources of pollution on our health.

If you are sending your letter before (or soon after) 27 October 1998, mention that it is your submission to the Government's consultation on chemicals policy (see below).

c) **Send a copy of your letter to your MP**, so they know your concerns, and ask them to write to the Minister. Most of the regulation of chemicals is controlled at an EU level, so you could also write to your MEP to outline your concerns, and ask them to raise them with the European Commission (the civil servants who administer EU legislation).

Box 4: Some chemicals to avoid - and how to try to find out what's in products

Try to avoid buying products containing the following chemicals:

- Cosmetics or heavy-duty cleaning products containing nonoxynol or nonylphenol ethoxylate (these are hormone disrupting chemicals).
- Products made of PVC, including toys and building materials.
- Products treated with brominated flame retardants, particularly electrical goods such as TVs and household textiles.
- Canned foods with linings that contain bisphenol a.

To find out what's in products:

Some products have good ingredients lists, but even these will not usually show everything, for example they won't say if a can contains bisphenol a. Try writing to the company making or selling the product:

- Ask them if they believe that a consumer has a right to know about everything that is in a product.
- Ask them if the chemical you are concerned about is present in their product, for example if their canned food contains bisphenol a.

The Government's review of chemicals policy

The Government is reviewing its strategy towards chemicals during the second half of 1998 and the first half of 1999. They published a consultation document, "The Sustainable Production and Use of Chemicals", on 27 July 1998; you can get a copy from the Government or on the web if you are interested – see Recommended Reading for details. The consultation period on this document officially ends on the 27 October 1998, but you should still send your letters about chemical policy to the Government after this.

2) Reduce your own and your children's exposure to poorly tested and suspect chemicals

You can't avoid all exposures to poorly tested chemicals, but here are a few simple steps you can take to reduce your exposure.

- Avoid using pesticides in the house or garden
- Buy organic food where possible
- Minimise your use of unnecessary chemicals - e.g. perfumes in household products, air fresheners.
- Avoid the chemicals listed in Box 4 where possible.
- Avoid doing DIY jobs using chemicals when your child is young, or keep them out of the area for a few days.
- Keep your home well ventilated to reduce any accumulation of chemicals in indoor air. Energy efficiency doesn't require you to completely seal your home.

Glossary

Acute toxicity - toxic effects after a short, normally high dose exposure.

Bioaccumulation - accumulation of a chemical in wildlife or humans (see Box 2).

Biodegradation - the natural breakdown of a chemical or other substance; the breakdown may only be partial. If a substance is fully biodegradable then it will break down into natural chemicals.

Carcinogenicity - ability to cause cancer.

Chronic toxicity - toxic effects after a long, usually low dose exposure.

Dermal toxicity - toxic effects when the chemical is applied to the skin.

Endocrine disrupting chemical - a chemical which disrupts the endocrine or hormonal system (see Box 3).

Hormone disrupting chemical - a chemical which disrupts the endocrine or hormonal system (see Box 3).

Inhalation toxicity - toxic effects when the chemical is inhaled into the lungs.

Oral toxicity - toxic effects when the chemical is given through the mouth in food or drink.

Organic chemical - a chemical which is based on carbon (see a chemistry text book for a comprehensive definition).

Persistent chemical- a chemical that doesn't break down well in the environment, so sticks around (see Box 2).

Persistent organic pollutant (POP) - an organic chemical which is persistent and pollutes the environment.

Recommended reading

1) Friends of the Earth's Sustainable Chemicals Use web site:

http://www.foe.co.uk/camps/indpoll/suschem.htm

2) The Government's consultation paper: "The Sustainable Production and Use of Chemicals". Copies available by calling 0870 1226 236 or faxing 0870 1226 237, quoting the title and the reference 98EP0058. Also available on the web at:

http://www.environment.detr.gov.uk/sustainable/chemicals/consult/index.htm

3) *Living Downstream: An Ecologist Looks at Cancer and the Environment*, by Sandra Steingraber, 1998, Virago, £18.99 (hardback)

Written by Dr A. Michael Warhurst
September 1998

Friends of the Earth exists to protect and improve the conditions for life on Earth, now and for the future.

Friends of the Earth is:

- one of the largest international environmental networks in the world, with over 50 groups across five continents;
- one of the UK's most influential national environmental pressure groups;
- a unique network of campaigning local groups, working in 250 communities throughout England, Wales and Northern Ireland.

To join Friends of the Earth, or for more information, contact us:

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For information on our local groups, phone our Local Groups Hotline on 0990 224 488

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Box 5: Joint statement on chemicals and health

September 1998

We welcome the UK Government's review of the 'Sustainable Production and Use of Chemicals' and the review of chemical legislation within the European Union. The following statement has been agreed by the signatories named below:

We are concerned that:

(i) the majority of chemicals in current use have not had adequate toxicity testing. The European Environment Agency has stated that about 75% of the approximately 2500 chemicals in large scale use (whose production in the EU exceeds 1,000 tonnes) have not got sufficient toxicity data publicly available for even a preliminary toxicity assessment;

(ii) chemicals which bioaccumulate and persist in the human body and the environment are still in routine use;

(iii) increasing numbers of chemicals are being shown to disrupt the function of the endocrine, immune and nervous systems of both humans and animals;

(iv) most exposures to chemicals occur as mixtures, rather than individual chemicals, but little consideration is given to this in the regulation of chemicals;

(v) some parts of the human population are far more susceptible to chemical exposures, including developing foetuses, babies, children and those with certain genetic variants. Animals show similar variation in susceptibility;

(vi) the incidences of breast cancer, testicular cancer and asthma have increased dramatically over the past few decades and there is concern that these increases may be linked to exposure to chemicals.

We believe that a more sustainable chemicals policy is both necessary and possible. It should include policies which will more adequately protect both the public's health and the health of the environment.

A sustainable chemical strategy should focus on reducing the risks posed by chemicals, and it should be guided by the precautionary principle. The complexities described above mean that uncertainty is pervasive when evaluating the effects of chemicals, even if considerable resources are spent on research. We propose that a new strategy should include the following elements:

(i) A positive licensing system

Chemicals regulation should move towards being a positive licensing system, where chemicals are licensed for different uses, in the same way as already occurs for pesticides and pharmaceuticals. Industry should have to demonstrate that these licensed applications of chemicals are safe beyond reasonable doubt, and that society has a need for them. The potential impacts on the environment of discharges of a chemical should be fully evaluated prior to licensing.

(ii) The elimination of persistent or bioaccumulative chemicals

All synthetic chemicals in use should break down rapidly into harmless, natural substances. There should be no accumulation in the human body, wildlife or the environment, unless this is an essential function in a specific application. Phasing out persistent and/or bioaccumulative chemicals will reduce exposures.

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iii) The phase out of dangerous chemicals

Those existing chemicals that do not fulfil the above requirements should be phased out as soon as possible, and at least by 2010. The Government should ensure that all Persistent Organic Pollutants (POPs) covered by the United Nations Economic Commission for Europe protocol on POPs are phased out well before this deadline.

(iv) Substitution of toxic chemicals

Where a less toxic chemical is available for an application, it should be substituted for the more toxic chemical. This is the 'substitution principle'.

(v) Minimising the quantity of chemicals used

The minimum necessary quantity of chemicals should be used for any application.

(vi) Producer liability

Liability for the effects of chemicals should rest with the producer of the chemicals concerned, not with the general public.

(vii) The right to know

The public should have a right to know what chemicals are present in any product they use, including in the packaging of the product. The public should also have access to information on the safety of all chemicals. This information will help individuals to make informed choices.

(viii) The elimination of marine pollution

The Government must adhere to its commitment to cease all discharges of hazardous chemicals to the marine environment by 2020, as agreed in the Sintra Statement arising from the Ministerial Meeting of the Oslo and Paris Commission in July 1998.

The strategy outlined above will improve protection of both human health and the environment. It will also reduce the burden of dealing with the poorly-characterised existing chemicals, as many chemicals will be withdrawn from use. Such a strategy will also improve the occupational environment by replacing more toxic chemicals with less toxic ones.

These proposals do not threaten the survival of the chemical industry, they merely call for the production of better chemicals.

We must take action now; the massive expansion of the production and use of synthetic chemicals since the 1930s has been undertaken with insufficient regard for the health of humans and the environment - now we have the chance to protect people and the environment from the effects of dangerous chemicals.

Signatories include:

Friends of the Earth (England, Wales and Northern Ireland), Friends of the Earth (Scotland), World Wide Fund For Nature (WWF) UK, UNISON, Women's Environmental Network (WEN), Scottish Wildlife Trust, Marine Conservation Society, SERA (the Labour Environment Campaign), Association for Public Health and The Food Commission.

Sign up to the joint statement and join us!

I/our group (delete as applicable) would like to sign Friends of the Earth's Joint Statement on Chemicals and Health.

Name (contact name if part of a group): _____ Signed:_____

Name of the group you represent (if relevant): _____

Address:_____

_____ Postcode: _____

Phone Number:_____

Email (if available): _____

q Please tick this box if you are a member of Friends of the Earth

q If you are not a member, we may also send you other information about supporting Friends of the Earth. If you want to be excluded from this please tick box

q Please tick this box if you are under 18 years old

Send to: Chemicals and Health Campaign, Friends of the Earth, 26-28 Underwood Street, London N1 7JQ