Briefing

Friends of the Earth

Incineration and Health Issues

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Introduction

Friends of the Earth primarily campaigns against incineration because burning materials is a waste of valuable resources. However we also recognise that there are valid concerns about the impacts on health. We are especially concerned when incinerators are proposed in areas where levels of pollution are already high. Unfortunately, assessing health risks is not easy and there are many uncertainties about the exact effects of air pollutants. For example, there are no formal air quality standards for many of the chemicals released.

This briefing is aimed at helping campaigners ensure that health issues are fully considered in any assessment of incineration. It first looks at the pollutants released into the air from municipal waste incinerators, it then outlines further information on dioxins (often a controversial issue), and finally it looks at the production of formal "health impact assessments" for proposed new incinerators. This briefing is by no means an exhaustive review or guide, but it hopes to give some idea of the scope of the issues. For those wishing to go into more detail, references in the footnotes will help to find further information.

We also advise that campaigners keep on using all the other arguments against waste incineration, such as the destruction of valuable resources, increases in traffic, inconsistencies with any waste plans, and councils getting locked into long-term contracts to supply waste to incinerators[1]. In the end, even if everyone agrees about the measurable health impacts (and inevitably there will be many areas of uncertainty), official opinions and decisions may still declare (as has happened in the past) that the impacts are "acceptable" or "not significant" so it is important that health considerations are only one part of the campaign strategy.

Air pollutants

Much of the concern with respect to health impacts will hinge on air emissions. Given uncertainties about the exact effects of many chemicals, and the undisputed toxic nature of many of the substances released, it is not possible to say that emission levels are "safe". Thus a large part of the argument will be to press for a *precautionary* approach - for example, given the extreme toxicity of dioxins (see below) or the recognised impacts of particulates, any extra burden would be unacceptable. Several pollutants found in incinerator emissions cause cancer. Particulates have no known safe threshold (see Table 1).

For some major pollutants, there are air quality standards and local monitoring data is more likely to be available[2]. In these cases, it is worth checking whether the standards are ever exceeded, in which case increasing the pollution levels further through incineration will be even less desirable. For example, nitrogen oxide levels are already high in many areas (for example from traffic emissions) and an incinerator may push these levels even higher.

A further source of comparison (and likely to be used as reference points in health impact assessment studies) are "Environmental Assessment Levels" (EALs). These are reference environmental concentrations which have been drawn up for a number of substances by the Environment Agency for each medium (air, land, water). In certain cases, different short-term and long-term values may be given. Many of the values are derived from occupational exposure standards (with a factor applied), and are subject to revision and interpretation. Predicted ground level concentrations of a substance from a process such as incineration can be compared with the EALs.

Table 1 shows a number of air pollutants which can be found in incinerator emissions. The hazard shown is usually very much related to the dose so it cannot be assumed that emissions of low levels of the substances will result in measurable health effects, although a precautionary approach would mean that increases in levels of persistent toxic chemicals should be avoided[3,4].

We have not listed the actual air quality standards or EALs in Table 1 because there are a number for each pollutant varying with the time-span of the measurement. Also the Environment Agency is currently revising the EALs and setting out guidance for their use. A new document on this should be available by mid-2002[5]. Friends of the Earth can help provide further information if necessary, and the footnotes also show how to obtain the information.

Calculations of premature deaths and hospitalisation

A report for the Department of the Environment (DEFRA) has assessed the health benefits (as far as was possible) of reducing emissions from incinerators in the light of new EC legislation which will tighten standards[6]. The figures in Table 2 show the expected benefits of reducing emissions in terms of reducing premature deaths and decreasing hospital admissions. Thus, avoiding production of 1 tonne of nitrogen oxides avoids 0.0003 premature deaths (or 3 deaths per 10,000 tonnes of NOx). There is considerable uncertainty with these figures - the authors note that the range might be plus or minus one order of magnitude (i.e. from 0.00003 - 0.003 deaths per tonne of NOx), although they expected it to be narrower. Thus if the estimated emissions from an incinerator are known, these health impacts are relatively simple to calculate. Table 3 below shows a set of worked figures.

Note that these are by no means the entire scope of possible health effects, and it has been estimated that maybe 60 times as many people will consult a doctor as are admitted to hospital with respiratory problems[7]. The report itself notes that:

Pollutant	Standards	Health hazard	Precedents
Nitrogen oxides	AQS	Respiratory effects (and is a pre-cursor of ozone, which also contributes to respiratory problems)	IEH, MVDC, NPT
Sulphur oxides	AQS	Respiratory effects	IEH, MVDC, NPT
Particulates/PM10s	AQS	Respiratory effects; no known safe threshold[8]	IEH, MVDC, NPT
Dioxins	EAL	Class 1 Carcinogen *(as TCDD[9]).* Affects development and reproduction; Highly toxic, persistent, bioaccumulative. Can contaminate the food chain.	IEH, MVDC, NPT
PAHs (polycyclic aromatic hydrocarbons)	EAL	Some are carcinogens[10]	IEH, NPT
PCBs[11]	EAL	Properties similar to dioxins	IEH
Carbon monoxide	AQS/ EAL	Reduces oxygen in the blood	NPT, MVDC
Hydrogen chloride	EAL	Acid, irritant to tissue including respiratory tract	NPT, MVDC
Hydrogen fluoride	EAL	Irritant, affects bone formation	NPT, MVDC

Cadmium	EAL	Class 1 carcinogen	IEH, MVDC, NPT
Chromium III Chromium VI	EAL	Type VI is a Class 1 Carcinogen	IEH, MVDC,
Thallium	EAL	May affect several organs and nervous sytem	MVDC
Mercury	EAL	Kidney function	IEH, MVDC, NPT
Arsenic	EAL	Class 1 carcinogen	IEH, MVDC, NPT
Cobalt	EAL	Class 2B carcinogen	MVDC
Lead	AQS	Class 2B carcinogen	MVDC, NPT
Manganese	EAL	Neurological effects	MVDC
Nickel	EAL	Class 1 carcinogen (as compounds of nickel)	IEH, MVDC
Vanadium	EAL	Respiratory effects	MVDC
Antimony	EAL	A number of effects, including respiratory	MVDC

Table 1: Some air pollutants in incinerator emissions

The substances included in this table are included because they are clearly of major importance or have been recognised as having possible health impacts in one or more of the reports named below. However this is by no means the full extent of incinerator emissions. Up to 250 individual organic compounds have been identified[12].

IEH – Institute for Environmental Health (1997). Health Effects of Waste Combustion Products (IEH, Leicester)[13].
MVDC – considered in the Mole Valley DC health assessment report on the proposed Capel (Surrey) incinerator[14].
NPT – considered in the health impact assessment for the proposed Neath Port Talbot incinerator[15].
Class 1 – proven human carcinogen; Class 2B – possibly carcinogenic to humans[16].

> *"...limitations in the availability of sufficiently robust data meant that it was not possible to quantify with sufficient confidence a number of other significant health effects (e.g. chronic effects of particulates, NOx, SO2 and ozone; direct effects of NOx; other morbidity effects in addition to RHAs [respiratory hospital admissions]; carcinogenic effects of metals and dioxins etc.). Therefore the true health benefits [of reducing emissions] could be significantly higher than the benefits that can be quantified."*

It is also be worth mentioning here that further *non-health* benefits noted in the report are "*reductions in ecosystem damage due to acidification (long range effects of SO2 and NOx)*; and that "*the impacts of air and water emissions on the North Sea would be reduced...*"[17].

Substance	Deaths not brought forward per annum per tonne reduced:	Respiratory hospital admissions avoided per tonne reduced:
Nitrogen oxides as a precursor to ozone	0.0003	0.0004

Sulphur dioxide	0.005	0.006
Particulates	0.002	0.003

Table 2: Health benefits of reducing incinerator emissions[18].

Substance	Tonnes released (per annum)	Deaths brought forward (over 25 years)	Respiratory hospital admissions (over 25 years)
NOx	260	1.95	2.6
SO_2	24	3	3.6
Particulates	3.5	0.175	0.26

Table 3: Calculations for specified health effects using sample data for releases from a municipal waste incinerator

For example: an incinerator released 260 tonnes of nitrogen oxides in 2000. If we assume this figure holds for a 25-year operating period, then, based on these figures, we can estimate that 1.95 deaths (260 x 25 x 0.0003) will be accelerated by the NOx emissions. This calculation also assumes that the numbers of people at risk in the local area of the incinerator is similar to that assumed in the original report for DEFRA[19].

Dioxins

Dioxins are produced during combustion and are, by all accounts, extremely toxic with a wide range of possible effects. The unborn and infants are the most susceptible groups. They are also extremely long-lived and can be deposited (including on food sources) over a very wide geographic area. They move through the food chain and have been detected for example at the extreme ends of the earth and in sea fish. Thus dioxins generated will have a long-term and wide-spread impact – the effects are not confined to local impacts.

A "tolerable daily intake" standard (including dioxins ingested with food) has been proposed (see below for details). The standard is marginally lower than the current intake of the average citizen – thus we are already exposed to more dioxin than desirable. We would argue for elimination of further sources. But dioxin emissions from incinerators are still controversial, and the following points set out some of the background to the issues.

- It is estimated that total national dioxin emissions have fallen considerably since the early 1990s. All current and new incinerators (since 1996) operate to much higher emission standards for dioxins than did the previous generation of incinerators. Older incinerators either had to be improved or were closed down in 1996. In 1995, it was estimated that municipal waste incinerators released to air around 500 g of dioxins (England and Wales) - that figure is now around 3 g[20]. However there is some controversy over the accuracy of the figures[21].
- An emission standard of a maximum of 1 ng/m^3 is now required in the UK, but this will become tighter (to 0.1 ng/m^3) in 2003 for new incinerators and in 2006 for existing incinerators at the latest[22].
- Individual steel works and power stations report higher emissions of dioxins than do modern

incinerators. For example, the Pollution Inventory (2000 data) reports 9.8 grammes for the Corus steel works at Port Talbot (the largest emission), 1.57 g for Ferrybridge C power station, 0.326 g for the Onyx Sheffield waste incinerator, and 0.038 g for the SELCHP incinerator in South East London.

- It is not clear that reported emissions of dioxins are the true total: data is hard to come by, but "spot" measurements (samples taken for relatively short periods of time) are suspected to give a very incomplete and underestimated picture of emissions. One study (in Belgium) showed that 2-week continuous monitoring resulted in 30 - 50-fold increases in the measurements. It is possible that "off-normal" operating circumstances may cause temporary peaks which are not normally monitored and so are missed out by the annual totals quoted[23].
- The bulk of our exposure to dioxins is through the food chain (around 98%) rather than through breathing[24].
- There are no air quality standards set for dioxins, although new standards propose a "tolerable daily intake" (TDI) of 2 picogrammes (2000 nanogrammes) per kg bodyweight per day (pg/kg/bw[25]) - and a large proportion of the population already exceeds this TDI. It is worth noting that the 2 pg/kg/bw is actually a rounded-up figure from the calculated TDI of 1.7 pg/kg/bw, and that the "average consumer" in the UK is estimated to have an intake of 1.8 pg/kg/bw[26]. The US has set a much more stringent TDI of 0.1 pg/kg/day.
- Epidemiology studies that look at illness around incinerators are complicated by people's exposure to earlier, higher emission levels and to other sources of dioxins.

	Tyseley MWI	**Stoke MWI**
Capacity	350,000 tonnes	200,000 tonnes
IPC Authorisation Reference	AS9216	AG7903
NOx	518 tonnes	260 tonnes
SO_2	19 tonnes	24 tonnes
Particulates	10 tonnes[27]	3.5 tonnes
Dioxins	0.16 grammes	0.095 grammes

Table 4: Recent emissions for selected air pollutants from two operating municipal waste incinerators (as reported to the Pollution Inventory[28]).

Health Impact Assessments (HIA)

A new incinerator (or any new industrial facility) needs not just planning permission from the planning authority but also an authorisation to operate from the Environment Agency - known as an Integrated Pollution Prevention and Control or IPPC authorisation. An operator is now required to submit a "Health Impact Assessment" as part of the application for the IPPC authorisation, and campaigners should be aware of these documents. The HIA is a formal assessment of the possible health consequences of operating the incinerator.

Applications for planning permission and the IPPC authorisations tend to be submitted in parallel, so always check with both the planning authority and the local Environment Agency office when investigating a proposed incinerator, in order to collect all available information[29]. Since neither the IPPC legislation nor application form actually uses the term "health impact assessment", HIA documents may have other names such as "risk assessment" or "environmental health impacts".

The HIA itself has to be inspected by other official bodies, such as the local Health Authority. It is not the job of the Health Authority to actually do the HIA - the HIA is prepared by the applicant – but the authority should determine whether the job has been done properly and whether the conclusions are acceptable. The Food Standards Agency is also required by law to look over the HIA. The comments of these bodies will be available at the Environment Agency as part of the "public register" records so reading their views may help a campaigner to understand whether the HIA is adequate. But do not assume that they will spot all the potential flaws in an HIA – for example, an Environment Agency note has recognised that *"There are doubts whether all the health authorities will have the necessary resources and experience to deal with the expected workload."* The high profile of incinerator applications in particular may tend to give the authorities extra incentive to carefully assess the HIAs in these cases, but this cannot be taken for granted.

What should be in an HIA?

HIAs are a relatively new feature, and the scope of them is still developing. Formal guidance is being prepared, but is not available yet[30]. A recent guide for Health Authorities faced with commenting on an HIA indicates that information should be included so that all the sources of pollutants, the pathways of exposure (i.e. how the pollutants reach those possibly affected) and the "receptors" (i.e. the populations at the receiving end of the hazard or nuisance) can be appraised. The following items are mentioned:

- substances and quantities released, during both normal and abnormal and ancillary (e.g. transport) operations
- consideration of increases in air, water and land pollution (including smells, dusts, possible food contamination, biological/disease hazards, noise)
- estimations of the dispersal of pollution
- identification of routes of exposure (for example, the food chain may become contaminated by persistent and bioaccumulative toxics)
- the contribution of background pollutants
- identification of the population that will be exposed to pollutants and their quantified total exposure
- identification of particularly vulnerable populations.

The guide also mentions that consideration could be given to social and/or economic impacts that might have a bearing on community health.

However, there is no absolute standard for the assessments and this could certainly be an area where campaigners might influence the scope or acceptability of an HIA. There may well be room for improvement - the Health Authority Guide notes:

"... [Environment Agency] guidance does not provide specific advice on how to assess the impact of activities on human health. Experience suggests that the quality of applications is variable and it is likely that many applicants will not fully consider human health issues."

How to tackle the health issues

It is not necessarily an easy job to criticise an HIA, but it is worth being aware of some avenues that can be explored. If you want to get into very detailed assessment of an HIA, then Friends of the Earth can provide you with some examples as a basis for comparison. It is possible that you could spot enough questionable assumptions or uncovered areas in a particular HIA to raise questions which might lead to rejection of or further work on an HIA[31]. You should not feel that it is absolutely necessary to understand exactly the methodology and technical aspects of the HIA - quite simple things may have been missed out. Examples of HIAs may also be of help at an earlier stage if you are trying to assess health impacts *before* an HIA is produced or are seeking to head off strategic decisions which include plans for incineration.

- Examine the HIA to see whether estimates of annual emissions, increases in air pollution concentrations (particularly at near-by residential areas), and health impacts have been submitted. If they have not, then you can argue that the impacts have not been properly evaluated. As a starting point at least, look at the scope of the HIA to see if it has covered the following issues (and you may be able to think of other, maybe more local, issues).
- Are all the possible sources considered? Not only emissions from the stacks but transport emissions, discharges to water, ash production and disposal may all be relevant.
- Has a complete range of pollutants been considered? Briefly, an HIA should cover gases such as nitrogen oxides and sulphur oxides, volatile organic compounds, metals, particulates, and combustion by-products such as dioxins. Table 1 has a more detailed list, with further references to justify their inclusion.
- Consideration should be given to possible problems from noise, vibration, odour and dust.
- Look at local air quality data for the area and note any past breaches of the air quality standards. You may be able to argue that additional emissions will cause further (and unacceptable) breaches[32]. Table 1 shows which pollutants have air quality standards.
- Has it considered all the pathways of exposure? Dioxins and metals for example are all highly persistent, so that direct air intake may be just one pathway. Deposits of these substances onto plants (crops) in the vicinity and soil provide further pathways for exposure. Skin contact and also ingestion are possible.
- Has it considered vulnerable groups in your area? e.g. children, school and nursery locations, hospital locations, elderly residents, populations of residents suffering from occupational diseases (such as miners with respiratory problems), food/animal feed producers, those with particular diets (such as a high intake of sea-food) that might be contaminated by pollutants.
- Since socio-economic concerns are a legitimate area for discussion, a campaign group might spend some time trying to identify unfair impacts on disadvantaged groups in the community due to the location of an incinerator.

The future

Friends of the Earth does not believe that incineration is an acceptable method of waste disposal. Incinerators represent a waste of valuable resources. Also, as this briefing shows, incinerators pose a health risk. It is impossible to say that incinerators are “safe” and in some areas they will contribute to already high levels of pollution. In addition, given that the much of the UK's population are already exposed to unacceptable levels of dioxins, it is questionable whether any new sources should be allowed until there have been considerable reductions in existing sources. Instead, Friends of the Earth believes that waste minimisation, recycling and composting are the answer. Ultimately society must

aim to generate zero waste. Reaching this aspiration will require changes, including technological changes, the introduction of innovative policies and behavioural changes. If incineration is the answer, then somebody asked the wrong question.

The National Society for Clean Air report

A recent report on incineration for the National Society for Clean Air *(Municipal Solid Waste Incineration: health effects, regulation and public communication, IEEP/NSCA, 2001)* is being used by developers to support their case for incineration. However, the NSCA report has been severely criticised by other NGOs for its lack of a precautionary approach, and it is important to draw attention to its limitations.

The NSCA report looks at two lines of evidence - emission data from MSW incinerators and epidemiological studies. They generally conclude that *"the potential for impacts on the health of local populations is extremely small".*

But note that there are some important caveats in their conclusions. The report acknowledges that:

"Some uncertainties remain, e.g. in relation to pollutant mixtures and for potentially susceptible groups, such as unborn children."

Neither is the report able to discount the possibility that impacts may occur at "background levels". It states: *"While we cannot discount effects resulting from the small quantities of some pollutants emitted by MSW incinerators where impacts may occur at background levels (eg dioxins) or where current standards ("limit values"*[33]*) may be exceeded (e.g. nitrogen dioxide), the large number of other important sources of such pollutants suggest that these deserve a greater emphasis on regulatory control."*

In our view the NSCA report has some inherent limitations: epidemiological studies (as they acknowledge) are not available for recent incinerators operating to modern standards; and the report does not present any air quality data (either from modelling or from actual measurements) to show the net effects of additional air pollution from incineration. In our view, that there may be other larger and important sources of air pollutants should not mean that concerns over incineration can be discounted.

Greenpeace has also severely criticised the NSCA report[34], calling for its retraction and cataloguing a number of problems: e.g., that it does not offer a comprehensive survey of the entire literature; that the lack of evidence of health effects from modern incinerators should not be assumed to indicate an actual lack of health effects; that secondary effects from food chain contamination or handling/disposal of ash (which contains dioxins and other toxic substances) are not considered.

Footnotes and References

[1] For further help, see *How to Win: Campaign against Incinerators* (FOE, 2000).
[2] Air quality standards: www.aeat.co.uk/netcen/airqual/dailystats/standards.html
Current air quality data: www.aeat.co.uk/netcen/airqual/forecast.html
Archive of air quality statistics from the local monitoring network: www.aeat.co.uk/netcen/airqual/
However, it is not particularly easy to find one's way around this website. We suggest talking to the local

authority's environmental health department, who may have local data neatly summarised already, and who may also be aware of other sources of information.

[3] One useful source of links to webpages on particular substances is the Environmental Defense "Scorecard" site. Individual chemicals can be searched for at: www.scorecard.org/chemical-profiles/.

[4] Manganese is an essential elements at low levels, although toxic at higher levels.

[5] EALs which were published in 1997 are listed in the Environment Agency's Technical Guidance Note E1 (available from the Stationery Office). The revised EALs will be in Technical Guidance Note H1 and will be available on the Environment Agency website (www.environment-agency.gov.uk).

[6] Directive 2000/76/EC on the incineration of waste.

[7] JR Stedman (AEA Technology), 1996. "Estimate of the additional hospital admissions for respiratory disorders that can be attributed to summertime photochemical ozone episodes". Published in "Health Effects of Ozone and Nitrogen Oxides in an integrated Assessment of Air Pollution" - UNECE/WHO Workshop Proceedings, Eastbourne, UK, June 1996.

[8] An increase in concentration of 10 µg/m3 (micrograms per cubic metre) is associated with a 0.75% increase in daily mortality and a 0.8% increase in hospital admissions for respiratory conditions. The increased daily mortality is estimated to bring deaths forward an average of 1.5 – 3.5 days, but it is highly unlikely that the effect is evenly spread across the population, so equivalent figures such as 3 to 7 days for 25 million people, or 1 to 2.5 months for 2.5 million people are also feasible. (COMEAP (Committee on Medical Effects of Air Pollution) (2001). Statement on Long-Term Effects of Particles on Mortality. This can be viewed at www.doh.gov.uk/comeap/statementsreports/statement.htm

[9] Dioxins are a range of similar chemicals, but with different toxicities. Dioxins are usually reported in terms of their "TEQ" weight. The weight is normalized to that of the most toxic of the dioxins, TCDD (2,3,7,8-tetrachlorodibenzodioxin).

[10] Studies may refer to benzo-a-pyrene, a carcinogenic PAH.

[11] There is no data in the Environment Agency Pollution Inventory on PCBs for any operating incinerators. According to Greenpeace, PCB data is "sparse", but PCBs have been detected in stack gases (Allsopp et al (2001): Incineration and Human Health. Greenpeace International, Amsterdam).

[12] Listed in Greenpeace (2001) (see ref. 21), quoting Jay, K. and Stieglitz, L. (1995). Identification and quantification of volatile organic components in emissions of waste incineration plants. Chemosphere 30 (7): 1249-1260.

[13] Available at www.le.ac.uk/ieh

[14] URS (19 December 2001). Final Report: Human Health Quantitative Risk Assessment of Proposed Energy from Waste Plant, Capel Landfill Site on behalf of Mole Valley District Council.

[15] Jacobs Gibb (2002). Revised Air Quality and Health Impact Assessment Final Report – Proposed Neath Port Talbot Materials Recovery and Energy Centre. (Produced for HLC Waste Management Services Ltd.)

[16] Classified by the World Health Organisation's International Agency for Research on Cancer (www.iarc.fr).

[17] Further financially quantified benefits are given: Reduction in crop damage due to ozone - £375 per tonne NOx reduced; reduction in building damage - £450/tonne SO2, reduction in soiling - £230/tonne of particulates [1998 prices].

[18] ENTEC (1999). Report for Department of the Environment: Regulatory and Environmental Impact Assessment of the Proposed Waste Incineration Directive: Final Report. (If you consult this, ensure that you have the important Corrigendum of October 2000 - the first version of this report had an arithmetical error, over-estimating the NOx figures and which were used by others until corrected.)

[19] The area was based on dispersion modelling of a particular incinerator's emissions, taking the area of land where ground level concentrations were calculated to be greater than 0.2% of the Environmental Assessment Level for the substance. Note that these areas may be different for different substances. In the particular case modelled, the area for SO2 was calculated to be 95 km2, and for particulates, 75 km2 . A population density of 1859 persons per km2 was assumed. The figure for ozone is not sensitive to local population density, since ozone creation (from NOx, VOCs and sunlight) may occur very far distances from the stack release.

[20] Data reported in ENDS 292, May 1999 and 321, October 2001. But also note that the ash from incinerators contains considerable amounts of dioxins (SELCHP, Tyseley and Edmonton bottom ash has been reported as 20 - 50 ng/kg; Byker ash spread on allotments (which included more toxic fly ash) measured dioxins at an average of 1373 ng/kg.

[21] Greenpeace maintain that the dioxin figures may be "grossly inaccurate" (Allsopp et al (2001): Incineration and Human Health. Greenpeace International, Amsterdam).

[22] A nanogramme is one billionth (one thousandth of a millionth) of a gramme (10 -9 g).

[23] A Belgian study at one incinerator showed that 2-week continuous monitoring raised the emission figures by

30- to 50-fold (De Fre, R. and Wevers, M. (1998). Underestimation in dioxin inventories. Organohalogen Compounds 36: 17-20, referenced in Allsopp et al, ref 21).

[24] Incineration of Household Waste; Parliamentary Office of Science and Technology Report149, December 2000. (Available at www.parliament.uk/post/pn149.pdf)

[25] A picogramme is one thousandth of one billionth of a gramme, 10^{-12} g.

[26] Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (October 2001). Statement on the Tolerable Daily Intake for Dioxins and Dioxin-like Polychlorinated Biphenyls.

[27] The Pollution Inventory data also reports 3 tonnes PM10s, but it is not clear whether these are already reported in the "particulates" data.

[28] Complete data from the Pollution Inventory can be viewed at FOE's Factory Watch website *(www.foe.co.uk/factorywatch)* or at the Environment Agency site (*(http://216.31.193.171/asp/pi_q_simple.asp?language=English)*).

[29] Some smaller installations will be regulated by the Local Authority rather than the Environment Agency, but new municipal waste incinerator proposals are likely to be large scale.

[30] Assessment of BAT (Best Available Techniques) and environmental impact for IPPC. Contact the Environment Agency.

[31] For example, Mole Valley District Council commissioned a further report on health risk assessment, "building on" a quantitative risk assessment submitted with the IPPC incinerator application at Capel landfill site. The report is fairly candid about issues around lack of availability of data, uncertainties and limitations in the study. It finally recommended that "a review of the original air modelling data is carried out...". The Council concluded that better assessment of one of the metals should be undertaken, and also suggested that the agency should undertake work on the possible effects on pollutant movements caused by aircraft wake vortices in the vicinity of Gatwick airport. *Sources:* a) URS (19 December 2001). Final Report: Human Health Quantitative Risk Assessment of Proposed Energy from Waste Plant, Capel Landfill Site on behalf of Mole Valley District Council. b) Mole Valley DC letter to the Environment Agency of 18 January 2002.

[32] Air quality standards: www.aeat.co.uk/netcen/airqual/dailystats/standards.html
Current air quality data: www.aeat.co.uk/netcen/airqual/forecast.html
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However, it is not particularly easy to find one's way around this website. We suggest talking to your local authority's environmental health department, who may have local data neatly summarised already, and who may also be aware of other sources of information.

[33] The term "limit values" here appears to refer to ambient air quality standards rather than emission limits, since air quality can exceed the advisory limits for nitrogen dioxide in urban areas.

[34] Johnston, P. and D. Santillo (2001). Municipal Solid Waste Incineration: Observations on the IEEP Report for the National Society for Clear Air. Greenpeace. Available at www.greenpeace.org. Another recent Greenpeace report, "Incineration and Human Health", may also be of interest, but does not confine its scope to municipal waste.