



BRITISH SOCIETY FOR
ECOLOGICAL MEDICINE
allergy environment nutrition

Reply to Health Protection Agency

In compiling the BSEM report we took into account two important facts. One is that science is continually evolving and research studies are revealing toxicity at progressively lower exposures for many toxic substances (1). This trend is certain to continue. Secondly there is the historical fact that regulators have consistently and repeatedly underestimated the risk of pollutants and toxic chemicals. This has been true for asbestos, lead, DDT, PCBs, dioxins and CFCs. Often it has taken decades for regulators to acknowledge these risks and ban these substances.

In addition recent evidence has shown alarming evidence of body burdens of chemical contamination in the general population and more worryingly shows that newborns are being born with their bodies already polluted. This again shows how present regulations are failing to protect the public from toxic exposure. The BSEM report also highlights important new evidence that pollutants can cause genetic changes that can be passed on through subsequent generations – the implications of this research are as yet unknown but demonstrate how little we understand about the dangers of toxic chemicals and just how serious they can be. All these facts should serve as a red flag to us all.

It is disappointing that the Health Protection Agency have not grasped these points but this is not surprising as regulators and government bodies have rarely been correct about the risks from chemical pollution in the past and have usually only acted after considerable harm has been done. Our role is different however: it is to look at emerging evidence and to warn about these dangers long before this point occurs. This we believe we have successfully done in this report.

The reply from the Health Protection Agency fails to answer nearly all of the most serious questions raised by this report. In particular they have not answered the crucial point of why they should favour a method of waste disposal which has the greatest health costs, that gives the least amount of energy (after landfill) and produces potentially the most health risks.

Incineration discourages recycling and therefore moves waste management away from the highest priorities recommended at National and European level (waste reduction, recycling, re-use) and towards the lowest priorities (landfill, incineration). This is a retrograde step.

They have not responded to abundant evidence that there are very serious inadequacies in the present monitoring system, as outlined in the report.

They state that “incineration contributes little to the concentration of monitored pollutants”. They use the words “monitored” pollutants but in reality very few are monitored – perhaps a dozen out of several hundred. For instance, the concentrations of pollutants as dangerous as polybrominated diphenyl ethers (PBDEs) are not known for they are not being monitored. Some incinerators burn radioactive material and yet the radioactive emissions are not being monitored in the stack or using outside monitors despite the uniquely dangerous nature of this material. This lack of knowledge about the vast majority of pollutants makes it foolish to assert that incinerators are safe.

But if we look at the situation with “monitored” pollutants the situation is no more reassuring. Dioxins are considered one of the most dangerous pollutants and there are now significant levels of dioxins in the body of every man, woman and child. During a critical period of development the foetus is exquisitely sensitive to hormone fluctuations of a few parts per trillion, and yet dioxins and other organochlorines are found at just this concentration in the serum. PCBs and dioxins at these levels in utero have been shown to affect thyroid hormones and also to affect long term neurological development and intellectual function. Preventing any further increase is therefore of the utmost importance.

The Health Protection Agency say incineration contributes little to their concentration and yet a modern incinerator in Rotterdam was found to be bypassing its air pollution control 10% of the time producing emissions of dioxins that were 5 times the limit set for the whole country. This could just as easily happen in the UK for dioxins are only measured every 3 to 12 months and then only for 7 hours. In other words for over 99% of the time levels of dioxins are unknown. To regard this as safe practice is preposterous.

Levels of dioxins from an incinerator near Nottingham were recently found to be nine times above the upper limit. Potentially this high level could have been present for 3 to 12 months polluting an entire area and an entire population. Even this figure may be a considerable underestimation of the risk. Recent research has indicated that spot monitoring can underestimate the levels of dioxin by 30-50 times. It should be as obvious to the Health Protection Agency as it is to everybody else that without continuous monitoring of dioxins there will always be a serious risk to nearby populations from incinerators. The foetus is especially vulnerable. And for this reason BSEM consider that continuous monitoring of dioxins from all incinerators should be mandatory.

Many would consider that after dioxins, heavy metals emissions represent one of the most dangerous emissions from incinerators. Some are known carcinogens. Here again we find the same unsatisfactory situation where pollutants are typically measured every 6 months, concentrations are unknown 99% of the time and populations can be exposed to dangerous levels for prolonged periods of time.

However, probably the most dangerous pollutant of all is the PM_{2.5} particulate, partly because of its known strong association with heart attacks and lung cancer and partly because it is produced in such large quantities by

incinerators. Extraordinarily it is not monitored at all. It is not monitored in the stack and it is not monitored in the outside air.

The key issue of PM_{2.5} particulates has not been addressed. It is now beyond question that increasing levels of these particulates are associated with increased mortality and also increased deaths from cardiovascular diseases. The data derived from the WHO Air Quality Guidelines, as indicated in the report, suggests that there would be 27,500 years of life lost every 15 years around incinerators for each 1µg/m³ rise in PM_{2.5} particulates. This loss of life is from particulates alone and does not take into account loss of life from other pollutants. A previous report to parliament in 2000 (Memorandum by Public Interest Consultants DSW56) also estimated that incinerators would lead to hundreds of deaths each year. Put simply it is not possible to build a major source of PM_{2.5} particulates, such as an incinerator, without lives being lost. Taking lives like this can never be justified. Every life matters to someone.

We repeat the quote from Schwartz, one of the leading researchers in this field “The magnitude of the association between fine particulates and mortality suggests that controlling fine particulates would result in saving thousands of lives each year (2)”. For the HPA to promote a method that does the exact opposite and leads to an increase in the levels of these particulates, in the full knowledge that early deaths will occur, is cynical, irresponsible and at odds with current scientific knowledge.

Another question that needs answering is why the government is deferring the decision to bring in PM_{2.5} monitoring when this has demonstrated to have such huge health benefits and savings in health costs in the USA. The old argument that PM_{2.5}s particulates are just a fraction of PM₁₀ and measurements are equivalent is no longer tenable (see Note 1).

The Health Protection Agency should therefore qualify their original statement. It would be far more accurate and far more honest for them to state “we believe that incineration contributes little to the concentration of monitored pollutants but unfortunately we have very little idea what those concentrations really are because most of the time they are not being monitored. In addition, we have no knowledge of the concentrations of hundreds of other unmonitored pollutants (although we are well aware that some are dangerous). In the absence of this knowledge it follows that it is not possible to make any assumptions about the safety of incinerators.”

In addition, the Health Protection Agency have remained completely silent about the fact that pollution offences have been found to be widespread and prosecutions virtually non-existent which makes a complete nonsense of the little monitoring that is being done. The Health Protection Agency prefers to come up with bland and untrue statements such as “provides strict operating conditions and robust monitoring programmes”. All these questions need serious and specific answers rather than meaningless spin.

The Health Protection Agency have failed to state plainly that any improvement in air emissions with modern incineration leads to an equivalent increase in those pollutants in the fly ash (air pollution residues). In other words toxic material is simply being transferred from one medium to another

and worryingly to a less regulated medium. This danger is very real and yet we understand that risks assessments are being done for Directors of Public Health by the Health Protection Agency without warning them or even mentioning this increasingly important danger.

Fly ash contains very high concentrations of dioxins (over 98% of dioxins produced by an incinerator) and heavy metals making it some of the most toxic material on the planet. A modern 400,000 tonne per annum incinerator can produce half a million tonnes of this fly ash during its operative life. The dioxins and heavy metals do not break down over time. They are typically stored in hazardous waste landfill sites. But it is known that all landfills leak through their liners over time. This can lead to contamination of underground waters and aquifers. Once these are contaminated little can be done about it. Unlike surface water, groundwater and aquifers have no oxygen to speed up the breakdown of toxic chemicals nor open air to help the evaporation of pollutants. It is absolutely crucial to consider the serious consequences that this material could have in 50 to 100 years time or more and the impact on future generations. The foolishness of producing huge quantities of fly ash in this way is hard to comprehend.

But the high toxicity of this material is by no means the only concern – there is also the lack of regulation. Fly ash, which contained some of the highest concentrations of dioxins ever recorded, were used on allotment paths at Byker, near Newcastle-upon-Tyne showing that regulation is virtually non-existent. In addition, and with complete disregard for safety, mixed ash has been used making house bricks. In reality there is simply no safe place to put this material.

And there is a third problem regarding the fly ash. The production of large amounts of fly ash is a direct violation of the Stockholm Convention which specifically forbids the **creation** of large quantities of dioxins and furans. This treaty, to which the UK is a signatory, was designed to make the world a safer place. BSEM strongly applaud and support the aims of this treaty and cannot condone those who are attempting to tear it up.

The Health Protection Agency quote the Elliot study as showing a “very slight increase in cancer” around incinerators. Although they may regard an excess of 11,000 cancers deaths as trivial we believe that most people would not. In addition we have pointed to evidence that this figure would be likely to be far greater if the study had gone beyond 13 years when cancer deaths around incinerators have been shown to increase in other studies. The BSEM report gives details about why socio-economic factors are not an adequate explanation for this excess and why the weight of evidence suggests that incinerators are a causative factor.

The majority of studies around incinerators have shown excesses of cancers. In view of this it is truly alarming that there are proposals to build more large incinerators without a comprehensive system to measure health effects in the local population. So we ask again – why are these huge incinerators being built without any studies being performed to monitor health effects? It is of course much easier to continue arguing that there is no evidence that incinerators cause health effects if no further epidemiological studies are sanctioned but surely this is not ethical?

The Health Protection Agency has recently organised a conference on health inequalities. So it is truly extraordinary that they have failed to comment on (so we assume they support) the present callous policy of building incinerators in deprived areas and areas of high mortality where their health effects are likely to be greatest. This must add to both health inequalities and social injustice. Again they fail to explain or justify this. We believe they must speak up on this issue.

The Health Protection Agency have omitted to comment on another key point of the BSEM report. This is that known fact that the maximum impact of pollutants will be on the foetus and newborn. To quote from a recent scientific report "The evidence is overwhelming: certain persistent toxic substances impair intellectual capacity, change behaviour and compromise reproductive capacity. Particularly at risk are developing embryos and nursing infants (3)". We believe the need to protect the foetus is paramount in a civilised society and fail to understand the HPA's stance on this.

The HPA state that only 3 of the 5 reports quoted, that found birth defects around incinerators, have appeared in peer-reviewed journals. However the key point here is that virtually all the studies that do exist demonstrate an increase in birth defects and this should be sending out alarm bells. In addition the birth defects are of the type that would be expected to occur around incinerators.

The paragraph on cement kilns is highly misleading. Cement kilns may be covered by the same EC directive as incinerators but emission limits are markedly different. Whereas the limit on particulates for incinerators is $10\text{mg}/\text{m}^3$, the limit for cement kilns is between $30\text{-}50\text{mg}/\text{m}^3$ depending on the type of fuel burned. The volume of emissions per second can be seven times higher in cement kilns and this means the amount of particulates released can be over 30 times greater.

The HPA's statement that alternative fuels can reduce emissions of metal and dioxin is also untrue. They fail to state that burning tyres will produce emissions of dioxins and zinc and burning petroleum coke will produce emissions high in vanadium and nickel. In addition mercury and arsenic are vapourised and there is no way of controlling these emissions. Most cement kilns do not have the activated charcoal needed to remove dioxins. But these problems are minor when compared to the huge dangers produced by the release of large quantities of $\text{PM}_{2.5}$ particulates. When carbon monoxide levels are high, because of the risk of explosion, the electrostatic precipitators (ESPs) are shut off and emissions continue unabated. These unabated emissions also occur during start-up and shut-down and when the ESPs are not working and these episodes have been noted to happen over four hundred times a year in some plants.

Few people realise just how serious a danger these unabated emissions are to the public. Whereas in an incinerator, particulate emissions must be kept to $10\text{mg}/\text{m}^3$, in unabated cement kilns these particulate emissions can rise to $20,000\text{mg}/\text{m}^3$ (two thousand times higher and also the highest level that can be measured). This is not just dangerous but it is insane. It is also inexcusable. The public is in very great danger from these unabated emissions and the statement that cement kilns are capable of extremely serious health consequences is absolutely accurate.

Monitoring of cement kilns is minimal with PM_{2.5} particulates not being measured at all and dioxins being sampled (not monitored) every 6 months. Before monitoring the cement kiln operators are given 2 months warning making it possible for them to change the fuel they are burning and rendering the exercise pointless.

The statement that there is no evidence that cement kilns have measurable impact on human health is of course meaningless if the studies have not been performed. But we ask why haven't these studies been performed? The Select Committee for the Environment recommended studies of this kind over a decade ago. We remain deeply uneasy about the resistance of the Health Protection Agency to instigating studies on the health effects around incinerators and cement kilns, even when these are clearly needed and have been recommended by parliament.

The HPA have tried to skirt around the issue of synergistic effect by referring to the 2002 COT report. They have neglected to say that, according to our information, the 17 members of the COT committee have 50 declared interests in the chemical industry between them. It is hard to think of a group of people less likely to acknowledge the existence of synergistic effects. However we have provided ample evidence that synergistic effects do occur and will add to the danger of incineration, particularly in regard to lung cancer.

The HPA defend the present methods of risk assessment but fail to answer the questions in the report about its unsatisfactory nature. They do not answer the question about the inaccuracies of present modelling methods nor the fact that they do not take into account secondary particulates and can therefore underestimate the number of particulates by 50%. They do not explain why they favour the method of risk assessment which can have no real validity because there is lack of toxicological data for the majority of chemicals. They state that we fail to offer alternative strategies but that is not our role. Lack of alternatives is not a logical reason to keep using a method that does not work and provides no protection for the public.

The Health Protection Agency states that if some pollutants are more dangerous at low concentrations than high (and this is the case – see note 2) then risk assessment would be pointless. We would agree with this and this again highlights how little is known about pollutants and how little use risk assessment is. They comment that we offer no alternative strategy. At present there is no alternative strategy and what is needed is an honest and responsible statement that there are no currently available scientific methods that can adequately assess the risks from the majority of toxic substances and that it is therefore foolhardy to allow hundreds of these to be released into the air we breathe.

It is interesting that the HPA accuses the BSEM report of being biased. The Royal Society said of the DEFRA report – “that it gives an apparently reassuring impact of waste management options when in fact it does not present a complete or sufficiently critical summary of the evidence”. We also note the HPA's reliance on government reports to support their case. It is not therefore to the BSEM report that the accusation of bias should be directed. The BSEM report has included some of the latest scientific information which was not available for previous reports. We would like to see intelligent debate on all these critical points and attempts made to resolve them.

The BSEM stand by all the conclusions in their report and believe that a policy of building more incinerators and cement kilns will mean that many more lives will be lost unnecessarily from cancer, including those of children, more people will die prematurely from heart disease, there will be an increase in birth defects and health costs will increase. This would be a retrograde step for a civilised society as there are far better ways of dealing with waste and these methods would be cheaper, would be safer and would produce more energy.

Drs J Thompson and H Anthony

- 1) Stein J, Schettler T, Wallinga D, In Harm's Way: Toxic Threats to Child Development Dev and Behav Ped, 2002; 23:S13-S19
- 2) Schwartz J, Laden F, Zanobetti A. The concentration-response relation between PM_{2.5} and daily deaths. Environ Health Perspect 2002; 110(10): 1025-9.
- 3) International Joint Commission, Ninth Biennial Report on Great lakes Water Quality (Ottawa, Ont:international joint Commission,1998) p10
- 4) Melnick R, Lucier G Wolfe M et al. Summary of the National Toxicology Program's Report of the endocrine disruptors low-dose peer review. Environ Health Perspect 2002;110:427-31

Note 1

It is sometimes misleadingly stated that PM_{2.5} particulates are simply a fraction of PM_{10s} and for this reason monitoring of PM_{10s} is equivalent to monitoring of PM_{2.5}. However this is a fallacious argument which has been favoured by the polluting industries. For instance a high reading of PM₁₀ particulates could be due to a predominance of PM₉ sized particles. This would be of relatively minor health significance, especially as regards heart disease. However a lower reading of PM_{10s} but one which was made up of predominately PM₁ sized particles would be far more significant and might be represent a serious danger for someone with a heart condition. PM_{2.5} monitoring would demonstrate this danger but PM₁₀ monitoring would not.

Note 2

A panel set up by the US Environmental Agency have reviewed low dose environmental chemicals and found several studies have given credible evidence for low dose effects. A low dose effect is defined as one where significant effects occurred at a dose lower than the no observed effect observed by traditional animal testing models. The panel concluded that the current testing model needs to be revised (4).