BRITISH SOCIETY FOR ECOLOGICAL MEDICINE
allergy environment nutrition

Reply to Enviros Communication of September 2006

This is a reply to the latest communication from Enviros. To recap, Enviros initially produced an evaluation of the BSEM document "Health Effects of Waste Incinerators". This was followed by a response from BSEM and a further response by Enviros.

The key issue to consider is the impact of incinerators on public health. Firstly we would draw your attention to the fact that the building of new incinerators has virtually been stopped in the USA since the mid 1990s because the danger to health is regarded as so serious. We can add that regulations are far stricter in the USA. It is therefore obvious that the safety of building incinerators in the UK should be questioned.

We review some of the main issues involved:-

Dangers to Health

Incinerators convert waste into particulates and gas. Large quantities of fine (PM2.5) particulates are formed. It is well-established that as levels of PM2.5 particulates levels increase, mortality, morbidity and hospital admissions increase. There is no safe level at which health effects do not occur.

The BSEM, using data derived from the World Health Organisation estimated that for a population of 250,000 living near an incinerator, an increase in PM2.5 particulates of only 1mcg/m3 would lead to **a loss of 27,500 years of life over a 15 year period**. As incinerators often operate for 25 years and the populations around incinerators can be much larger and the increase in PM2.5s could also be larger, this is a very conservative estimate.

Note also that a previous report to parliament (Memorandum by Public Interest Consultants DSW 56) in 2000 estimated that incinerators would cause hundreds of deaths each year. The BSEM report discusses the study

by Elliot who found an excess of 11,000 cancer deaths around incinerators, and this may have been a considerable underestimate as the study only lasted 13 years (see below).

The bottom line is that **a decision to build an incinerator is a decision that will inevitably cost the lives of many innocent people**. Every life is important to someone. **For this reason alone we believe that incinerators can never be justified.**

Enviros suggest that there is considerably more information on waste incinerators than other waste processes. This is true and the information is of great concern. We have previously noted that at least 10 studies have shown increases in cancers around incinerators. This is all the more surprising as most of the studies were too short to detect the majority of adult cancer which are only beginning to increase 13 years after an incinerator starts operating. One long-term study demonstrated a two-fold increase at 12 years escalating to a five-fold increase at 20 years. Four separate studies have shown increases in children's cancers and leukaemias, one showing a doubling within a 5 mile radius. Quite what Enviros mean by incineration being a mature technology only they know but the data suggest it is an extremely dangerous technology that has taken the lives of many, both young and old.

Enviros state that they support efforts to reduce carcinogens. However, incinerators emit PM2.5 particulates, many heavy metals and a large number of other substances that are known carcinogens. **Operating incinerators will inevitably cause the release of multiple carcinogens into the atmosphere and is therefore incompatible with a policy of reducing carcinogens**.

Enviros state that incidents involving short-term excursions above emission limits are highly unlikely to pose a significant risk to health. This is simply not true. Numerous studies have shown that short-term increases in particulates cause rises in mortality. We are aware of modelling data, now in the possession of the Environment Agency, which has indicated that, for a person living 2 miles from an incinerator there would be a 10mcg increase in PM2.5 particulates, if the wind was blowing in the wrong direction in certain weather conditions. In a tall building the exposure was just under 20mcg/m3 at 20 kilometres. This is very significant as research by Peters et al has demonstrated that short-term 20-25mcg/m3 increases in these particulates can **double** the rate of myocardial infarctions.

Although we accept the limitations of modelling data, this study was still instructive. What does it show? It demonstrates that a vulnerable person, perhaps sitting in their own garden or working in a tall building, would be in danger of imminent death from the simple act of breathing at a time when he or she happened to be downwind from an incinerator. We should ask: what sort of nightmare world are we creating when even the air we breathe carries the risk of sudden death.

Monitoring

Enviros state that incinerators should be regulated carefully and in detail. We would certainly agree with this. Most people would consider a carefully regulated system to be one that monitors the most dangerous pollutants for the majority of the time and one where most of pollutants

emitted are monitored. They would also expect a regulatory system with frequent unannounced inspections and effective deterrents for breaches of regulations. **By all these measures incinerators are anything but carefully regulated.**

The pollutants most strongly associated with health effects are PM2.5 particulates, heavy metals and dioxins. How thoroughly are these being monitored? The answer is hardly at all. **PM2.5 particulates are not being measured** (only the far less relevant PM10s), **and for over 99% of the time dioxins and heavy metals are also not being measured.** We could also add that only a few per cent of any of the pollutants emitted are being measured. Among those not being monitored are the highly toxic PBDEs, now increasing in the waste stream. To say that the present level of monitoring is appalling would be an understatement. Many would consider it negligent.

The BSEM consider **continuous monitoring of dioxins should be an absolute requirement for all incinerators**. The study by De Fre and Wevers has shown that spot monitoring, as done at present, is unrepresentative and that continuous monitoring has found actual emissions to be 30 - 50 times higher. We previously pointed out that a worst case scenario, using recent data that has found dioxins 9 times over the limit, could mean dioxin levels remaining at over 400 times normal for a period of 6 months. This would put an entire population at great risk.

BSEM have also stated that a system of at least 24 monitors should be present around all incinerators. These are needed to measure PM2.5 particulates and heavy metals. This should be the absolute minimum standard of safety.

We are surprised to learn that Enviros believe that continuous measurement of dioxins and heavy metals is not technically feasible. This is again not true. The AMESA system for continuous measurement of dioxins has been available since 1998. Legislation requires continuous monitoring of dioxin to be used in some countries in Europe and **local authorities have every right to expect incinerators in this country to provide the same protection**. Continuous PM2.5 monitoring is available using several systems including light-scattering and gravimetric monitors. Filters in these monitors can measure levels of metals with ICP optical spectroscopy. These can be used to give hourly and weekly measurements of heavy metals. **A comprehensive monitoring system as suggested would cost less than 1% of the price of an incinerator which is a very small price to pay for people's safety. This level of monitoring should be mandatory around all incinerators.**

The effect of pollutants on the human body is incredibly complex and unpredictable. It is highly likely that other pollutants that are not monitored, and may not yet have been identified, have important and unrecognized health effects. The effect of chemicals in combinations (synergistic effects) also increases toxicity but this issue has been ignored by regulators. Monitoring gives only indirect information on the effect of pollutants as they accumulate in the body over time. **Monitoring can never be regarded as sufficient on its own** and should be backed up by comprehensive studies on the local population, including body burdens and DNA adducts.

There is little point in having good monitoring if there is poor regulation. We have previously drawn attention to the lack of regulation. Inspections are

infrequent and done with prior warning of the visit (rendering the exercise largely pointless), prosecutions are extremely rare (over 550 pollution offences led to just one prosecution in one study) and fines are minimal and have no deterrent value. In short, the public are being let down and put in danger.

Fly Ash and Dioxins

Enviros have stated that a small incinerator (100,000 tonnes a year) will produce a few grams of dioxin. The unwary reader could be easily misled into thinking that this was an insignificant quantity. However dioxins can affect the endocrine system of foetuses at unimaginably small concentrations measured in parts per trillion. Dioxins in the environment are normally measured in nanograms and within the human body in picograms (a trillionth of a gram)

Let us try to put this into perspective. The figures available to us for a 400,000 tonne a year incinerator are that an incinerator of this size would produce 440,000 nanograms of dioxins daily as emissions to air under standard operating conditions and 630,000 nanograms daily as emissions to air at the limits of the Waste Directive. It would produce 10,613,000 nanograms of dioxin daily in the bottom ash and 29,150,000 daily in the fly ash.

What do these figures mean? The best way to illustrate this is to consider how dangerous it be if all the dioxins were consumed. If we express this in terms of equivalent adult exposures using the midpoint of the WHO guidelines of 1-4 pg/kg/day, we can ask what would happen if all the dioxin was consumed and how many people would reach their daily exposure quota. For air emissions we would find that between 2 and 3 million people would reach their limits and for ash the figure would be 180 million people. That's a lot of people and a lot of toxicity being produced each day. Obviously not all the dioxin would be consumed but some of it would be and we must remember that as dioxins do not break down they would continue to contaminate the vegetation indefinitely affecting the food supply for generations.

And that's not all. The US Environmental Protection Agency's virtually safe daily dose of 0.0064pc/k/day is far lower than the WHO guidelines so the figures given are conservative. Even more importantly, sections of the population are already exceeding the WHO daily limits for dioxins (5% above 9pc/kg/day) so we can quickly see how critical it is to avoid further exposure. Let's also remember that during a critical period of development the foetus is exquisitively sensitive to hormone fluctuations of a few parts per trillion and yet dioxins and other organochlorines are already found in their serum at just this concentration.

This should illustrate how foolish it is to contaminate the environment with dioxins. BSEM, in line with the Stockholm Convention, strongly advocate we should be doing the exact opposite – reducing dioxins in the environment not increasing them.

Another way to consider this is to look at the experience at Byker where fly ash was put on allotment paths. Concentrations of 9500 nanograms/kg, some of the highest concentrations ever recorded, were

found. This is 0.0000095 grams. **This may put the quantities into true perspective.**

The dioxins in landfills cannot be compared with those produced by incinerators. In landfill they have already been created and are present in substances such as paper. In contrast in fly ash the dioxins are highly concentrated and combined with other dangerous substances such as heavy metals and PCBs.

To illustrate this consider a chunk of metal lying in a landfill site. In this form it is harmless. However put the same metal into an incinerator and it becomes vastly more dangerous. Firstly metals will be emitted into the air in particulate form where they can be inhaled and taken into the body. Here they accumulate and cause health effects. In the fly ash they are present in a much more leachable form and are therefore hazardous to the underground water supply. The same principles apply to other pollutants. It is for these reasons that Enviros's analysis is so misleading.

We note that Enviros have failed to answer our concerns that dioxins and heavy metals in fly ash do not break down over time and will remain for hundreds of years, posing a major problem for future generations and eventually threatening the water tables and aquifers. It is surely unethical to neglect our responsibility to leave a safe world for those that follow us.

Hidden Costs of Incineration

Enviros state the impacts of incineration should be properly understood. We would certainly agree with this and one of these impacts is the cost to the local community. The European Commission have estimated the health and environmental costs of a 400,000 tonne a year incinerator to be between £9,000,000 and £57,000,000 a year. Another report by the European Commission found the health costs to be 48,000,000 euros annually. **Any local authority considering allowing an incinerator should look very carefully at these huge hidden costs and budget appropriately.** We believe all local authorities considering having an incinerator built should not be kept in the dark about these hidden costs. We would also add that anything that creates such huge health costs also creates much human misery.

Local authorities should also look at the experience at Crymlyn Burrows at Neath, near Swansea. Here a waste company built an incinerator and then went bankrupt leaving the Council to run the incinerator and also leaving them millions of pounds in debt, a debt that continues to increase. Several towns in the USA have gone bankrupt after signing contracts with incinerator companies and then finding they could not supply enough waste.

Location in Deprived Areas

Enviros say there is no bias for placing incinerators in deprived areas. Bias or not, this is exactly what is happening. Nine out of fourteen incinerators have been placed in the most deprived 20% of wards. Enviros argue that this is not true of the incinerators they have promoted but fail to tell us how many of these are located in deprived wards. Enviros are correct to say that policy is

the wrong term for this. We would say it is common practice. Most would say it is social injustice.

Modern Incinerators

Can we say modern incinerators are any safer than older incinerators? Modern incinerators are safer than older incinerators in terms of emissions to air when operating under “standard conditions”. They are more dangerous than older incinerators in terms of the fly ash they produce both because it is more toxic and because the incinerators are bigger and produce greater quantities. Modern incinerators are also more dangerous than older incinerators when not performing under “standard” conditions because of their greater size. We have pointed out how often they do not operate under standard conditions and have given an example of a modern incinerator in Rotterdam by-passing its air pollution controls 10% of the time. This would and could lead to the poisoning of a whole population.

Enviros state that there is no convincing link between the present generation of incinerators and adverse heath effects. It would have been more honest and straightforward to say that no studies have been done. The fact is that the new generation of incinerators have not been in operation long enough to show important health effects, like adult cancers, and that no studies are in place to look for them. This puts Enviros’s statement in a truer perspective.

Deceptive Comparisons

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The BSEM have previously objected to the way Envros have used misleading comparisons with other forms of pollution. We object again and now consider this to be a deliberate attempt to mislead. We repeat: we would strongly support measures to reduce other forms of pollution whether it be from cars, from electricity generation or any other source. These are separate issues with separate solutions. **The fact that pollution occurs from other sources can never be used as a justification for creating further pollution, especially when this pollution will be concentred within a localized area.** It is especially disingenuous to mention accidental fires as there is a vast difference between an event occurring by chance and building an incinerator in the full knowledge that it generates dangerous pollutants 24 hours a day.

A more honest comparison would have been with other thermal technologies used in the waste industry. **Incinerators should have been compared with plasma gasification.** The best plasma gasification plants can produce no emissions to air and no ash.

The Precautionary Principle

It is with some disbelief that we read that Enviros consider incinerators are acting within the precautionary principle. We recap: a recent review found two thirds of studies showed a positive exposure-disease association with cancer (mortality, incidence and prevalence) and some studies showed a positive association with congenital malformations. In addition without knowledge of what pollutants are being produced, their quantities, their environmental fate or their health effects it is impossible to ensure their safety. We might add that incinerators have been estimated to cause health effects costing millions of pounds annually. It could hardly be more obvious that this violates the precautionary principle. It also violates the preventative principle that it is cheaper and more effective to prevent environmental damage than to attempt to manage or cure it.

Enviros simply state that steps have been taken to deal with emissions of dioxins, furans and metals. We do not consider this line of argument valid but even if it was **it would only be true if incinerators were operating under standard conditions all the time and if monitoring was continuous for the most dangerous pollutants and if enforcement was effective.** In fact none of these are true.

The precautionary principle was designed by scientists to make the world a safer place and **we believe it is being cynically disregarded.**

The Stockholm Convention

This treaty calls for countries to prevent formation of 12 chemicals. Formation of four of these compounds is inevitable with incineration. We have already noted the daily releases of dioxins are considerable with incineration. The convention uses the word **formation** and this means **there is an obligation to use alternative forms of waste management.** Processes that create dioxins should be avoided. Dioxins are created by thermal methods of waste disposal.

The treaty also states that dioxins and other persistent organic pollutants (POPs) should be destroyed or irreversibly transformed. Although high furnace temperature will break down dioxins, the majority of dioxins are formed in the exhaust gases as they cool beyond the furnace. The biggest source of dioxins is in the fly ash although significant amounts are present in bottom ash. **Unless vitrification is used (and it is not) it cannot be argued that dioxins are being destroyed or irreversibly transformed in the ash as required by the convention.**

We can see no logical reason why Enviros should think that applying the Stockholm convention to incinerators should divert attention away from other sources of dioxins. On the contrary, BSEM would support the reduction of dioxin release from all sources, including incinerators.

Enviros state that incineration makes no significant difference to the production of dioxins. Is this true? Hardly. The US Environmental Protection **Agency found that medical and municipal waste incinerators were the first and second largest sources of dioxin air emissions in 1994 contributing 84% of the total emissions.** In Japan incinerators are responsible for 93% of dioxin air emissions, in Switzerland for 85% of emissions and in the UK responsible for and for 79% of emissions. The authors of the European Dioxin Inventory state **"Despite considerable effort**

having been spent during the last years to decrease emissions from municipal waste incinerators, this source still dominates the input of dioxins into the atmosphere".

They could have hardly made it more obvious how blatantly the Stockholm Convention is being disregarded.

Alternatives to Incineration

We have stated that an ideal waste policy would produce no toxic emissions, no residues that need landfilling, good recovery of by-products and be capable of dealing with all types of waste. On all these counts incineration is a poor option. However it is possible to get close to this ideal.

We also note that the policy of the European Union is on the path to Zero Waste and that the Zero Waste Charter has been launched in the UK. Zero Waste has been adopted by communities in Australia, Canada, New Zealand, USA and some in the UK. Recycling rates of 50% are being achieved and are in many cases much higher, for example 72% in Northern Belgium.

The highest priorities of waste management set at national and European level are waste minimisation, reuse and recycling. Waste separation technologies such as mechanical biological treatment (MBT) can be included as long as the residue is not burned. BSEM support these approaches.

It is critical to understand that no one will die from the use of these technologies (short of unforeseen accidents). It is also important to contrast this with incineration where deaths are inevitable.

Thermal methods do have the capacity for increasing mortality and this is why safety is of paramount importance whenever waste is burned. This is why we would strongly advocate plasma gasification for any residual waste as this can produce zero emissions to air and no ash and is therefore quite safe.

In addition incineration moves waste management to the lowest priorities (incineration and landfill) and away from the highest priorities by actively discouraging recycling and reuse as it competes for paper and plastic with its high calorific value.

To sum up, incineration is unnecessary, and should be replaced by far safer technologies. It has no place in any modern waste system that respects human life.

Summary

We have witnessed large increases in diseases linked with toxic chemicals in the last few decades (cancer, infertility, chronic fatigue syndrome). Twenty-five per cents of all chemicals are neurotoxins and many have noted that we have seen a huge increase in diseases affecting the brain (such as ADHD, autism, dyslexia in children and Alzheimer's and Parkinson's in the elderly) in the last few decades. Recent reports have shown frightening levels of toxic substances within the human body in both adults and new-born babies. Many species of wildlife are showing sex changes due to

environmental pollution. The message could not be clearer: we have grossly underestimated the danger of pollutants. Again and again we have been surprised by their unexpected effects. We need to far tighter controls.

Our stance on incinerators is very simple. We cannot endorse a technology which will inevitably lead to lives being lost. We cannot support a technology that produces environmental degradation. We have no confidence in the present monitoring and regulatory system. To repeat we see no place for incineration in a modern waste system that respects human life.

Drs J Thompson and H Anthony