# Response to Enviros

**Enviros have made certain criticisms of the BSEM document "Health Effects of Waste Incinerators." This is our reply:**

The BSEM study takes a broad look at the issues involved with the health effects of chemical exposures. In particular it documents the long latent period that typically takes place before the dangers of many toxic substances became apparent (PCBs, dioxins, lead, CFCs, DDT). It observes the failure of regulatory authorities to foresee these occurrences. It warns that many of the substances emitted from incinerators have subtle and complex effects on the human body that are still being investigated.

Historically if one single thing characterises the story of chemical pollution it is lack of anticipation by those whose job it was to protect the public. No one expected or perhaps even dreamed that one third of male fish could be changing sex in British rivers or that the sperm count could have dropped by 50% within a few decades. No one expected incinerator emissions would produce dioxin, no one understood how toxic it was and no one thought it would lead to dioxin levels within the entire population that are high enough to be biologically active. There have been far too many mistakes over too long a time to take seriously the claim by Enviros that our fears are unfounded, particularly in view of the evidence we cite.

The comments made by Enviros make the common and serious mistake of considering emissions to air in isolation. It is certainly true that measured emissions to air are lower with modern incinerators, at least when they are operating under "standard" conditions. However it is crucial to consider the total quantity of pollutants produced. Modern incinerators perform what is little more than a technological conjuring trick, removing a significant proportion of pollutants from the air only for these to reappear somewhere else, in this case in the ash. The better the air pollution control the more toxic the fly ash. This cannot be regarded as progress.

Unfortunately, control of both bottom ash and fly ash is less regulated than emissions to air, and in some cases negligent: a particular example being the use of highly toxic fly ash in allotment paths and school fields at Byker: some of the highest levels of dioxins ever recorded were found there. Enviros point out that 80% of the ash can be used. But if we look beyond this apparently reassuring remark we find other disturbing facts. With complete disregard for public safety some of this ash has been used for house bricks. In July 2002 the Environment Agency concluded that anyone drilling numerous holes in blocks made from mixed ash could inhale significant amounts of dioxins. Ash has also been used for construction and roads ignoring the risks of releasing pollutants during construction, demolition and prolonged use. But whether reused or land-filled, thousands of tonnes of fly ash need transporting from incinerators each year requiring thousands of vehicle movements. The risks involved are self-evident and foolhardy.

As pointed out in the report, half a million tonnes of highly toxic fly ash would be produced during the operative life of a 400,000 tonne per year incinerator and there are plans for at least 20 more incinerators. This material is normally landfilled and yet it is known that all landfills, even hazardous waste landfills, eventually leak through their liners. Dioxins and heavy metals do not break down. Where will these substances be in a hundred years? Will the groundwater and aquifers be irreversibly contaminated? Would it be possible to purify the water and what will it cost? We need to know the answer to these questions. Treating this material with plasma gasification, as done in Japan, appears not to have been considered. To leave millions of tonnes of this untreated toxic material in the ground and to delegate the task of dealing with it to generations yet to be born, is gross irresponsibility.

The Stockholm Convention calls for us to stop creating persistent organic pollutants, including dioxins and furans. Given that the UK is signed up to this Convention then our policies should specifically prevent all processes that create large quantities of dioxins. As incinerators will create vast amounts of dioxins, particularly in the ash, for periods of 20 -30 years; this poses the question of whether incinerators are legal. What is certain is that incinerators are completely contrary to the spirit of the Convention and we believe it is wrong to tear up a treaty designed to make the world a safer place.

However although modern incinerators have reduced air pollution and put the toxic material into another and less regulated form it is not true to say, as implied by Enviros, that the risk of air pollution is negligible.

Enviros make the unqualified statement that the pollution is too small to be significant. How do they know this and on what do they base their evidence? Are they not aware that the health effects of the majority of the pollutants emitted are unknown or still under investigation? Has anyone measured body burdens of the local inhabitants to see what could be accumulating in their bodies? Have they looked to see if local people are forming DNA adducts that could produce toxic effects which could continue through several generations? Is anyone looking at cancer rates around incinerators or measuring levels of $PM_{2.5}$ particulates, probably the most important of all pollutants released? Are sufficient levels of monitors being set up around incinerators to measure levels of heavy metals and particulates? Are dangerous substances, known to be increasing in the waste stream, such as PBDEs being measured at all? If the answer to these questions is no then it is absurd for Enviros to claim that the pollution is too small to be significant. A more honest statement would be that they have no idea about the concentrations of most of the pollutants emitted or about their health effects and that no systems are in place to detect most health problems should they occur.

In section 10 Enviros accuse the BSEM of discussing the dangers of pollutants without reference to dose, and they repeat this again later. If Enviros would care to reread the report they would observe that the it highlights that there is absence of data on concentrations of major pollutants whose adverse health effects have been established in other contexts. In fact it is precisely because levels of so many key pollutants around incinerators are unknown that we are so concerned. We have drawn attention and do so again to the lack of data on PM2.5 particulates and other

pollutants. It is just because we need some reference to dose that the BSEM report calls for a comprehensive system of monitors around all incinerators measuring $PM_{2.5}$ particulates and heavy metals (producing independently verifiable data), and for continuous dioxin monitoring in the stack. However, if new incinerators are built and prove with adequate monitoring to give rise to dangerous levels of pollutants, as the data suggests that they will, it will prove to be a very expensive mistake.

We are aware, and the Environment agency are aware, that independent modelling data has found that one large incinerator could, in certain conditions, cause an increase of $PM_{2.5}$ particulates of 20mcg/$m^3$, (which alone would breach American Air Quality Standards) and would be enough to cause a 50% increase in myocardial infarctions. This is extremely worrying and shows yet again that the public are being put at grave risk because key pollutant levels are not being measured. Levels of chronic exposure are also unknown. Sadly, and in spite of all the data from the USA showing the importance of $PM_{2.5}$ monitoring, especially for major sources of combustion, we have no monitoring of $PM_{2.5}$ levels around incinerators but only the far less relevant $PM_{10}$ levels. Even for $PM_{10}$ particulates we have pointed out that there are inadequate numbers of monitors around incinerators and we have argued that minimum of 25 would be required around each incinerator for emissions to be safely monitored.

In addition we are concerned about the absence of any reliable data on dioxins and heavy metals. Dioxins and heavy metals are typically measured twice yearly for a period of 7 hours. This means that for 99.7% of the time levels are unknown. Worse still what is known is unreliable. A study by De Fre and Wevers in 1998 has demonstrated that spot monitoring does not give a representative indication of actual emissions and that continuous monitoring found actual emissions could be 30 to 50 times higher. Recently spot monitoring of dioxins in Nottingham found concentrations 9 times over the limit. A worst case scenario here, if we combine the data, could be dioxin levels that were at times 450 times the upper limit. Perhaps more importantly, levels could have remained nine times over the limit for six months until monitoring was repeated, putting an entire population at risk.

Given that recent data from the US Environmental Protection Agency and the National Academy of Science suggests that health effects with dioxins are more serious than originally thought and occur at near to current background levels, this is of great concern. Enviros rightly ask for proper consideration of dose. We ask for exactly the same and this is precisely why continuous measurements of highly toxic substances like dioxins and heavy metals should be an absolute requirement, as should a comprehensive system of monitoring of $PM_{2.5}$ particulates both in the stack and around the incinerators.

Enviros have used the wholly fallacious argument that just because large amounts of particulates are produced from electricity generation and from cars that this somehow justifies the increase in pollution caused by incinerators. They put this argument forward in Sections 7, 8 and repeat it again in Section10. This is like saying that just because over 50 million people were killed in the Second World War that it hardly matters that a few hundred are killed in Iraq. It is simply not true and it is grotesque. In fact BSEM would strongly support efforts to reduce pollution from all

these sources but this report was about incinerators. This argument has been used to obscure the well-established fact, cited in the report, that increasing levels of particulates are associated with increasing levels of mortality (and morbidity). This is true over both the short-term and the long-term and the effect is far more marked with $PM_{2.5}$ particulates, than with $PM_{10}$s. To put it plainly you cannot build a major source of $PM_{2.5}$ pollutants, such as an incinerator, without condemning some people to a premature death. This can never be justified. This loss of life would continue for the working life of the incinerator, probably at least 25 years. No one has the right to take other peoples' lives or to endanger their health.

Enviros imply that the BSEM report suggests that the increase in cancer in recent decades is due to incinerators and point out that this increase has occurred while emission levels have decreased. The report did not say this. Cancer is caused by many factors and what the report clearly states is, that at a time when cancer is at an all-time high and increasing, a it is foolish, if not negligent, to expose whole populations to yet more carcinogens. Many of these substances have no safe levels. The BSEM is not alone in voicing this concern. Michael Meacher, as Minister for the Environment stated "I repeat that emissions from incinerators are extremely toxic. Some of these emissions are carcinogenic. We know that there is no safe threshold below which one can allow such emissions". Common sense dictates that we should be reducing carcinogens not increasing them.

Contrary to the comments of Enviros the BSEM report does not contain inaccurate information on incinerator emissions. As was correctly stated in the report, the Greenpeace publication "Criminal Damage: A review of the Performance of Municipal Waste Incinerators in the UK" found that 10 incinerators committed over 553 pollution offences during 1999-2000. In all but one case they escaped prosecution by the Environment Agency confirming the fact that toxic crimes are virtually never punished and that there is no effective deterrent for this sort of offence. The figure for breaches of emission limits during the period 1996-2000 was also huge at 899. The figures quoted by Enviros of 56 breaches in 2003 are slightly better but still extremely high including 4 emissions of known carcinogens – cadmium, dioxins and furans. However this figure only tells half the story. As these substances are only monitored every 3 -12 months, the important question is not just what breaches were found but what was happening whilst these substances were not being monitored. Obviously the real figure for breaches of emission limits is likely to be far, far higher.

In addition to known breaches of emission limits there were also fires at Swansea, Dundee and Newcastle and malfunctions at Kent and Derby. These would lead to uncontrolled emissions again threatening the health of the local population. High levels of emissions can also occur during start-ups, and for a long period during commissioning. To give an idea of the threat posed by these huge modern incinerators we could look at the case of an incinerator in Rotterdam. This cost $240 million and was fitted with modern air pollution control (APC) equipment. It was found to be by-passing the APC equipment 10% of the time and putting out 5 times as much dioxin as the total allowable for all Dutch incinerators in 2000. This shows how a single fault can have extremely serious consequences for people living around incinerators. Sadly these faults appear only too common with modern incinerators. No one can have any

confidence in a system where breeches of emissions are commonplace, the consequences for the waste operator are negligible and the effects on the health of the local population, particularly the children and unborn child, are likely to be serious.

Unsurprisingly Enviros do not believe that incineration violates the Precautionary Principle. The Precautionary Principle is summed up in the 1998 Wingspread statement: "When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context, the proponent of the activity, rather than the public, should bear the burden of proof." As pointed out in the BSEM report, a recent review of health effects found that two thirds of studies showed a positive exposure-disease association with cancer (mortality, incidence and prevalence) and some studies pointed to a positive association with congenital malformations – this should be reason enough to invoke the Precautionary principle. In addition without knowledge of what pollutants are produced by incinerators, their quantities, their environmental fate or their health effects it is impossible to assure their safety – this again violates the principle. It is also clear that the second part of the statement, that the proponent of the activity, should bear the proof, is not happening. On every count the principle is being ignored.

Enviros wrongly suggest that the report has a basic misunderstanding of modelling. In fact modelling is inherently inaccurate and the Environment Agency's own data confirm that different modelling methods give widely different results. Only about half of predictions are within a factor of two of actual (observed) pollutant concentrations and the remaining proportion are even less accurate. They are particularly inaccurate in modelling scenarios with low wind speeds meaning they cannot accurately represent worse case scenarios. They underestimate pollutant concentrations by not taking into account secondary particulates which can double the total quantity of particulates. It has proved very convenient to the waste industry to use a method that underestimates pollutant concentrations and this is why the BSEM calls for far more monitoring and less reliance on modelling. Or to use the terminology of Enviros: we need more reference to actual dose and less reference to theoretical dose of pollutants.

We note that Enviros have failed to comment on the present callous policy of building incinerators in deprived areas and areas of high mortality where their health effects are likely to be greatest. They have also failed to comment on the high health and environmental costs of incineration which are passed on to the tax-payer and the health service.

The BSEM's report was primarily about health effects of incineration rather than alternatives waste strategies, however it did consider this issue. BSEM would again emphasise that it favours waste prevention combined with re-use and recycling as the best way forward. This is in keeping with the widely accepted waste management hierarchy which puts these methods at the top with landfill and incineration at the bottom. Diversion rates for waste of 50% have been achieved in many parts of the world with some areas reaching over 80%. Far higher rates could be achieved in the UK.

Incineration actively discourages the use of the best available techniques that emphasize the highest priorities, namely waste prevention, re-use and recycling. Hence it goes against recommendations set at national and European levels. It competes for high calorific resources such as paper and plastic which would be better recycled.

Although the BSEM report discusses plasma gasification it would never see this as a direct replacement for incineration, as implied by Enviros, but as a safer way to remove residual and hazardous waste after a thorough process of segregation and recycling has been completed. The comment that dioxin emissions from the Thermoselect process are similar to the best incinerators is indeed correct but typically misleading. The reason it is misleading is that most of the dioxin produced by incinerators is in the fly ash but Thermoselect and plasma gasification processes produce no ash and it is total emissions that should have been compared – these are vastly different. We would add that we would not give a blanket recommendation for gasification units as their quality can vary and having good gas cleaning processes that goes through 7 or 8 stages is essential.

In summary we consider there is no substance to any of the criticisms made by Enviros and stand by all the conclusions in the report, namely that a policy of building more incinerators and cement kilns will mean that many more lives (including those of children) will be lost unnecessarily from cancer, more people will die prematurely from heart disease, there will be an increase in birth defects, there will be more incidents such as that at Byker 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 Jeremy Thompson and Honor Anthony