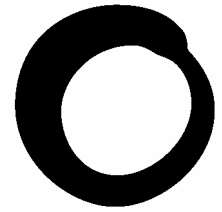


November 2002



**Friends of
the Earth**

Briefing

The safety of incinerator ash

A review of an Environment Agency Report

Introduction

In May 2002, the Environment Agency published a report on the safety of incinerator ash.¹ This followed well publicised problems about the use of ash from incinerators at Edmonton, North London, and Byker, Tyneside.

The report completely ignores problems at Byker caused by using incinerator ash for paths in allotments. It does address some of the problems caused by Edmonton ash. It also considers more general questions of handling and use of incinerator residues. It is mainly concerned with potential health risks associated with dioxins. Friends of the Earth has a number of concerns on the reports findings (see below).

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Outline of Environment Agency conclusions

- Handling of air pollution control residues (mainly fly ash plus activated carbon and lime) is adequate to keep risks within permitted limits.
- Bottom ash can safely be recycled as secondary aggregate – e.g. for construction blocks, asphalt, or bulk fill – because dioxin levels are similar to those typically found in urban soils.
- By 2000, over 40% of bottom ash from England's 11 municipal waste incinerators was being recycled as aggregate – this is over 200,000 tonnes p.a.
- Up to August 2000, fly ash from Edmonton was mixed with bottom ash and used to produce building blocks which could now be in around 3,400 homes. This practice has ceased and did not occur elsewhere.
- Houses constructed of mixed Edmonton ash will not normally suffer increased levels of dioxin. If blocks made from mixed ash are drilled continuously the dust will be hazardous if breathed in – but this will not pose a significant risk because people would be exposed only for short periods.

Outline of Friends of the Earth's concerns with the report

- The report does not consider the implications of heavy metals, organic carbon, and other toxic material apart from dioxins. It also does not adequately consider the variability of ash which could make a small proportion of ash much more toxic than the average.
- It does not acknowledge that the natural level of dioxins in soil is close to zero, so comparisons to levels of dioxins currently found in some urban soils is inappropriate. We ought to be looking to reduce levels of dioxins in soils. Reductions in dioxin emissions over recent years should lead to reduced levels of dioxins in soils over coming years.
- It does not acknowledge that human consumption of dioxins (mainly from food) is already above the government's 'tolerable daily intake' for a third of the population so any extra dioxins from any source should be considered significant. A precautionary approach would be to allow no further increases in exposure until levels for all the population are well below "tolerable levels".
- The report says that the government should issue guidance on acceptable contamination levels in construction materials. Until this happens, and for reasons outlined above, Friends of the Earth cannot support the use of bottom ash as secondary aggregate
- A number of anomalies were found in ash from the Sheffield incinerator – these should be investigated.
- Three facilities burning refuse derived fuel, including Byker, were not included in the report.
- The report argues that improvements are needed in regulation of ash handling and processing. This should be addressed urgently.
- Fly ash is not currently designated as hazardous, even if it has very high levels of dioxin,

unless it contains lime which makes it alkaline. All fly ash should be treated as hazardous.

The Environment Agency report in more detail

The report was mainly designed to address concerns about the use of mixed ash from the Edmonton incinerator, containing fly ash, for building blocks used in housing. The report considered:

- management of ash produced by 11 municipal waste incinerators in England;
- safety of handling air pollution control residues;
- safety of using bottom ash as a secondary aggregate;
- safety of houses built out of mixed ash blocks;
- safety of two piles of ash stored in Dagenham and Rochester.

Background

The report reviewed figures for production and disposal of ash from England's 11 municipal waste incinerators over five years from 1996 to 2000. It didn't include three plants burning refuse derived fuel, including Byker. Ash residues were sampled between September 2001 and February 2002.

Bottom ash is around 25-30% by weight of the waste put into incinerators. Air pollution control residue, which includes carbon and lime together with fly ash, is around 3% by weight.

Until 2001, processed bottom ash was defined as product not waste, and not regulated by the Agency. It is now regulated as waste until actually incorporated into a product.

Air pollution control residue is defined as hazardous waste because of alkalinity from the lime content. Although it contains around 1,000 ng dioxin TEQ/kg it would need a million times more dioxin (1g TEQ/kg) to be defined as hazardous on dioxin content.²The report found that figures for production of ash and receipt of ash at landfill or processing tallied (within 10,000 tonnes out of 2.87m tonnes bottom ash, and within 6,000 tonnes out of 314,000 tonnes air pollution control residue). They therefore have no concerns about ash going missing.

Bottom ash

Bottom ash is mainly glass and ceramic-like materials, also containing heavy metals and some organic carbon material. Dioxins were measured in the range 0.64-23ng TEQ/kg apart from two results from the Sheffield incinerator at 122 and 150 (described as anomalous, but Sheffield also had high readings for organic carbon in both bottom ash and air pollution control residue, and unexplained variations in ratio of air pollution control residue to bottom ash).

Typical measurements for dioxins in soil, taken from a German study, are 10ng TEQ/kg in rural areas, 10-30 urban, and 100-8,000 near major sources. The report therefore argues

The safety of incinerator ash

that bottom ash contains levels of dioxin similar to those found in urban soil.

During the five years of the study period, 79% of bottom ash went to landfill and 21% for bulk fill or substitute aggregate in construction blocks or asphalt. By 2000, 42% of bottom ash was being processed.

The report points out that bottom ash is used for engineering purposes in the Netherlands (100% of ash), Denmark (70%), France (50%) and Germany (50%).

At bottom ash processing facilities the ash is weathered to absorb water and reduce alkalinity. Oversize objects are removed, and then it is screened for size. 38% is used for bulk fill, road construction or asphalt, and 8% for construction blocks. 38% goes to landfill and most of the rest into stockpile. The Agency would like this to be better regulated, though management of the sites observed was satisfactory.

The report estimated that dioxin levels in blocks made from bottom ash would be around 4ng TEQ/kg (compared to 1ng for blocks made out of power station ash), though one was actually measured at 23ng. As this is comparable to levels found in soil, dust from drilling these blocks should be no more hazardous (as far as dioxins are concerned) than dust from soil. Therefore the report concludes that use of bottom ash for aggregate is safe.

However, the report recommends that the government should issue guidance on acceptable contamination levels in construction materials.

Mixed ash from Edmonton

Up to 2000, bottom ash from the Edmonton incinerator was mixed with fly ash from electrostatic precipitators. This did not include air pollution control residue, so was not defined as hazardous waste because it did not contain lime. This was not done at any other incinerator and the practice ceased in August 2000.

Around 15,000 tonnes was used to make construction blocks (estimated at 5.3m blocks, enough to build 3,400 houses). Dioxin in the blocks was measured in the range 117-390ng TEQ/kg.

A house constructed of these blocks was studied. With normal air flow, no measurable difference in dioxin levels was observed.

However, continuous drilling did produce dust which could cause significant levels of dioxins for builders or people doing DIY. Figures are not given (though a more detailed report is available), but the report concludes that builders drilling would need to be exposed over long periods to put them at risk, so normal exposure would be too short lived to be a major concern.³

Ash piles

There are two piles of Edmonton ash causing concern. The Agency has ordered both to be removed, but the operators have appealed.

At Dagenham, mixed ash was left over from a contract. Dioxin content was measured at 17-1170ng TEQ/kg. Independent reports concluded that exposure for workers on a

neighbouring site, was at 'acceptable' levels. Young children would only be at risk if they were playing on the dump site.

At Strood, near Rochester, residents had complained about a pile of Edmonton bottom ash. Dioxin levels were measured at 1-30ng TEQ/kg so it is not considered to pose any significant risk to human health.

Air Pollution Control Residue (APCR)

88% of APCR is sent direct to landfill, half of this to Bishops Cleeve in Gloucestershire. The other 12% goes to treatment facilities (half of this to Castle Environmental in Derbyshire) where it is used to treat industrial waste which is then landfilled.

APCR is composed of fine dust. Samples contained dioxin in the range 200-5,800ng TEQ/kg, other organic carbon, heavy metals (particularly the more volatile metals) and chlorides.

The report reviewed handling of APCR at incinerators and found that occupational exposures were within HSE limits. However, one site had complaints of dust from the public and one example of leakage due to a fault.

For APCR at landfill sites, the report modelled dispersion of fine particles (PM10s) around the site predicting a figure of $1.8\mu\text{g}/\text{m}^3$ at the nearest property compared to the Air Quality objective of $40\mu\text{g}/\text{m}^3$. At the highest dioxin concentration of 5,800ng TEQ/kg, this would result in an adult breathing in a maximum of around 0.2pg TEQ per day [just over a thousandth of the tolerable intake from all sources], described as negligible. The report does not consider the implications for people working on the landfill site.

The report's conclusions

The main conclusions of the report are:

- Ash produced by the incinerators is properly accounted for (though some municipal waste records on waste sent to incinerators is inadequate).
- Bottom ash can be safely used as a secondary aggregate as it contains dioxin levels similar to those found in urban soils.
- There should be improvements in tracking the movement of ash.
- The government should give guidance on acceptable contamination levels in construction materials.
- Mixing of fly ash and bottom ash no longer occurs.
- Houses constructed of blocks made of mixed Edmonton ash will not normally suffer increased levels of dioxin.
- Where blocks made of mixed ash are drilled continuously, dioxin levels will be hazardous if dust is breathed in, but as this is likely to occur only for short periods it should not pose a significant risk.
- Handling of air pollution control residues at incinerators and landfill sites is adequate to keep risks within defined limits.

Endnotes

¹ Environment Agency, Solid Residues from Municipal Waste Incinerators in England and Wales, May 2002.

² Dioxins are measured as total equivalent of the most toxic dioxin. The system is changing from an international system (ITEQ) to WHO-TEQ but the difference is not significant for the arguments used in the report, and no distinction is made in this briefing. Concentrations are usually in ng TEQ/kg (ng is a billionth of a gram (10^{-9})). Daily intakes for humans are usually in pg TEQ/kg bodyweight (pg is a trillionth of a gram (10^{-12})). The government has set a Tolerable Daily Intake of 2pg TEQ/kg bodyweight from all sources.

³ Drilling and inhaling around half a gram of dust from Edmonton mixed ash blocks would give adults around 2pg TEQ/kg bodyweight – if this was done on a daily basis it would mean they were receiving double the ‘tolerable daily intake’ if they were already receiving 2pg TEQ/kg bodyweight/day from other sources.