SEPA Guidance

Composting and Bioaerosols: Distance from Sensitive Receptors

Background

There has been a steady growth in the composting of biodegradable waste in Scotland since the introduction of the National Waste Strategy in 2003. This practice is further encouraged by measures in Scotland's Zero Waste Plan of 2010 which sets further targets for the recycling and composting of waste and introduces the requirement for the separate collection and treatment of food waste.

Commercial composting is an enhanced natural aerobic process that makes use of soil microorganisms to break down the organic content of plant and animal waste to harmless degradation products. Whilst composting is a natural process, it has the potential (if not operated properly) to cause pollution, harm to human health, and public nuisance through the generation of bioaerosols, odour, leachate, flies, dust and vermin. In addition, where composting activities are largely conducted outdoors (e.g. open air windrows) there is the potential for bioaerosols to disperse some distance from the source. Consequently, there is concern that people living or working in the vicinity of composting sites may be exposed to bioaerosols, dust and odour emissions[i].

SEPA has a duty to take account of the potential risks to human health posed by environmental hazards in our regulatory decision-making. SEPA exercises its pollution control function to prevent the releases of substances which are capable of causing harm to human health and the environment.

Several studies[ii] have shown that, under most atmospheric conditions, bioaerosol concentrations should be at or below background levels beyond a distance of 250 m from the source. A comprehensive study by the Health and Safety Executive (HSE 2010) found little evidence to suggest that composting operations made a major contribution to bioaerosols levels at a distance of more than 250 m from the source[iii].

Since 2007, Scottish planning policy has stated that a 250m buffer zone may be appropriate around certain waste treatment operations such as outdoor composting operations. The most appropriate buffer zone will depend upon the characteristics of the individual site[iv]. SEPA will now take a similar precautionary approach when determining applications for composting operations[1] which are located within 250m of sensitive receptors. "Sensitive receptors" are classed as people who are likely to be within 250m of the composting operation for prolonged periods (normally regarded as over 6 hours). This term therefore applies to dwellings and associated amenity ground e.g. gardens (including those occupied by an operator's family) and many types of workplaces. SEPA will not normally regard a place where people are likely to be present for less than 6 hours at one time as being a sensitive receptor. This definition does not include the operators of composting facilities, their staff or visitors to the site as their health is covered by Health and Safety legislation.

New Applications for Composting Operations

For new applications for composting operations within 250m of a sensitive receptor:

- Where the quantity of waste handled exceeds the relevant exemption threshold, SEPA will expect the operator to put in place all measures necessary to restrict the emissions of bioaerosols outwith the site boundary unless the operator can demonstrate that such measures are not required. Such measures may include negative aeration or enclosure of the process.
- Where the quantity of waste handled is below the relevant exemption threshold and the appropriate requirements of paragraph 12 of Schedule 1 to the Waste Management Licensing Regulations 2011,

[1] For the purpose of this position, "composting operations" covers the composting process itself (whether open windrow or enclosed in-vessel systems) and all associated waste storage and treatment operations carried out at the composting site.

are met, then, unless it appears to SEPA that the in carrying on the activity the operator will not be able to comply with the relevant objectives[2] SEPA will register an exemption.

Where the proposed composting operation is to be located on or near an existing site that handles biowastes (such as a landfill, wood processing or other composting facility), SEPA will take account of this in its consideration of the application. The applicant should demonstrate that the cumulative emission of bioaerosols in the area does not present an unacceptable risk of harm to existing sensitive receptors.

For new composting operations that are located within 250m of a sensitive receptor, applicants should discuss with SEPA the information which they should submit with the application in order for SEPA to determine the application. This will be based on the individual circumstances of the particular site.

Variation of existing authorisations

SEPA will consider the impact from bioaerosols as part of the determination of any application for variation, taking into account the scale and nature of the variation. If an operator wishes to vary an existing site licence or permit that relates to a site located within 250m of a sensitive receptor and the change to the process may result in an increase in the emission of bioaerosols, they should discuss with SEPA the information which they should submit with the variation.

Existing Sites

SEPA will carry out an assessment of existing composting operations which are located less than 250m from sensitive receptors. The results of the assessment will allow us to consider the need to evaluate existing controls and if necessary consider imposing additional measures to restrict the emission of bioaerosols such as negative aeration or enclosure.

This guidance applies only in Scotland. The terms of this guidance may be subject to periodic review and be changed or withdrawn in light of technological developments, regulatory or legislative changes, future government guidance or experience in its use. SEPA reserves the discretion to depart from this guidance and to take appropriate action to avoid any risk of pollution or harm to human health or the environment.

Further Information

Bioaerosols, composting and health effects

Bioaerosols consist of airborne particulate matter, microorganisms and microbial spores (generally < 10 μm). The components of bioaerosols of greatest relevance to human health (and with the potential to cause adverse health effects) include:

- Fungi – include moulds and yeasts and are of concern because they produce spores (typically 0.5 – 5 μm in diameter) and substances that are allergenic. Spores (due to their very small size) tend to remain airborne for long periods of time. The fungus, *Aspergillus fumigatus* is particularly associated with composting plant materials because it is capable of degrading cellulose and surviving at high temperatures.
- Bacteria – include actinomycetes (filamentous gram positive bacteria), and a wide range of gram-negative bacteria (e.g. coliforms). Actinomycetes produce large numbers of spores (1-3 μm diameter) which are capable of penetrating deeply into the human lung and are recognised as respiratory allergens. Coliforms are non-spore forming organisms and are destroyed by the elevated temperatures in the compost if the process is operated properly.

Commercial scale composting operations can generate large amounts of bioaerosols, particularly when the material is agitated such as during waste shredding, composting batch turning and screening of composted

[2] The “relevant objectives” are ensuring that waste is managed without endangering human health and without using processes or methods which could harm the environment and in particular without risk to water, air, soil, plants or animals; or causing nuisance through noise or odours; or adversely affecting the countryside or places of special interest

material. However, these activities are only carried out periodically which reduces the accuracy of modelling the dispersion of bioaerosols.

Respiratory ill-health and allergenic inflammations have been linked with exposure to large concentrations of bioaerosols, e.g. occupational exposure can result in allergic lung disease called "Farmers Lung Disease". In contrast, there is little information on the health of people living close to composting facilities.

Whilst it is possible to epidemiologically associate health symptoms (respiratory and allergic inflammation) to exposure to large concentrations of bioaerosols, it has not been possible to derive a dose-response relationship to inform risk assessment. There is little information on the health effects of exposure to ambient bioaerosol concentrations for people living near composting sites. The limited evidence suggests that such people with existing health conditions can be at risk and that individual susceptibility is an important factor in influencing response. There is no evidence to suggest that exposure to bioaerosols is linked with significant adverse health effects such as cancer and birth defects.

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[i] Taha *et al* (2006) Bioaerosol releases from compost facilities: evaluating passive and active source terms at a green facility for improved risk assessments. *Atmospheric Environment* 40: 1159-1169

[ii] Environment Agency (2001) Health effects of composting: a study of three compost sites and review of past data. R&D Technical Report P1/315/TR. Environment Agency, Bristol. ISBN 1 857 05680 9 and SEPA/SNIFFER (2007) Bioaerosol and Odour Monitoring from Three Composting Sites. Project UKPIR12, 2007.

[iii] Health and Safety Executive (HSE) (2010) Bioaerosol emissions from waste composting and the potential for workers' exposure. Prepared by the Health and Safety Laboratory for the Health and Safety Executive.

[iv] Scottish Planning Policy (SPP) is the statement of the Scottish Government's policy on land use planning and contains the Scottish Government's view of the purpose of planning and the Scottish Government's expectations of the intended outcomes of the planning system. It states "*Planning authorities should consider the need for buffer zones between sensitive receptors (for example, houses) and some waste management facilities.* ***A 250m buffer may be appropriate for operations such as outdoor composting****, anaerobic digestion, mixed waste processing, thermal treatment or landfill gas plant. 100m may be appropriate for recycling facilities, small scale thermal treatment or leachate treatment plant. Greater separation distance may be appropriate for landfill sites. Appropriate buffer zones will depend on the specific characteristics of individual sites"*. SEPA has been using this guidance when considering our response to planning applications for waste management facilities since 2007.