Before Spraying

Lined Biobeds

What is a Lined Biobed?

As developed for pesticide handling areas, this is a specially excavated and lined pit filled with a mixture of straw, soil and peat-free compost and turfed over. Research has shown that Lined Biobeds with through drainage are very effective at retaining and degrading pesticide residues which can arise from drips and splashes when filling and mixing. Lined Biobeds can also be used for the disposal of dilute pesticide material from tank washings and wash water from cleaning the exterior of the sprayer. Lined Biobeds are not the only solution to this problem and advice on other approaches is contained in the Best Practice Guide "Pesticide Handling Areas".

CAUTION
Seek regulatory permission **before** building a Lined Biobed

Benefits of Lined Biobeds

During research on Lined Biobeds, pesticides were applied to a range of handling surfaces. Volumes and concentrations were applied to simulate multiple severe pollution incidents in the pesticide handling area in one spray day. Pesticide concentrations in excess of 100,000ppb were measured in the liquid entering the Lined Biobed. The Lined Biobed performed very effectively retaining and/or degrading the pesticides and reducing the concentrations to generally below 0.5ppb and often below the 0.1ppb EU standard set for pesticides in drinking water.

Siting

The Lined Biobed must be in a place that is under your control at all times. It should be at least 10 metres away from any surface water and 50 metres from any spring, well or borehole. Avoid placing it too close to major access routes to prevent the trafficking of potentially contaminated material. As part of the Waste Exemption and EA Guidance (see below) you will need to conduct a site risk assessment which takes in to account the environmental impact if part of the Lined Biobed system failed. The site risk assessment also requires you to identify if you fall within an inner or outer ground water source protection zone (zones 1 and 2); if this is the case you will need to contact the EA to determine if the site is suitable.

General Design Considerations

There are two basic designs for Lined Biobeds (illustrated)

1 The Indirect Design uses a bunded handling area which contains and intercepts all liquids. These are then directed to the Lined Biobed usually via a holding tank.

2 The Drive-Over Design uses a robust metal grid which is installed over the Lined Biobed so that all liquids fall directly onto bed.

Basic Design

The Lined Biobed is a specially excavated and pit lined with a butyl liner (1mm thick). The recommended pit depth is 1-1.5m. A minimum of 1m is required but going up to 1.5m will safely allow for any settlement / shrinkage of the biobed mix over time. The surface area dimensions of the Lined Biobed depends on the nature and frequency of pesticide handling/ equipment wash down activities on the farm, local rainfall and expert advice should be sought for this.

Lined Biobeds and Regulation

Both EA and SEPA recognise that Lined Biobeds offer significant environmental benefits over current practice. However the regulatory situation is complex and several overlapping pieces of legislation affect their use. Arrangements also differ between Scotland, England/Wales and Northern Ireland.

England & Wales

Under the Agricultural Waste Regulations 2006, Lined Biobeds are regarded as waste treatment systems and as such all Lined Biobeds require a waste management licence. Although Lined Biobeds need to be registered with the local environment agency (see below) they **do not need** a Groundwater permit.

Farmers in England and Wales need first to read the EA Guidance and register their farm with the EA (Form WMAW 01) and then apply for Exemption 52 using Waste Exemption Pack Insert May 2007. Both registrations are free. Further advice can be obtained from the Environment Agency's Agricultural Waste Help Line on **0845 603 3113**.

Scotland and Northern Ireland

Different waste regulations apply in Scotland, exemptions for Lined Biobeds are available subject to local agreement from SEPA, in Northern Ireland seek advice from Environment and Heritage Service.

Best Practice Guide

Most pesticide breakdown takes place in the top area of a Lined Biobed so the surface area for absorption/activity is more important than depth. There should be a minimum ratio of $1m^2$ surface area per $1m^3$ of liquid. As a general rule of thumb, if using the Indirect design, the surface area of the Lined Biobed should be approximately two-thirds of the area from which it is receiving run off.

The EA Guidelines specifies that a single Lined Biobed can only treat 15,000 litres of waste water per annum. This figure excludes rainwater. However rainwater does need to be considered when calculating the surface area of the biobed. In the few situations that more than 15,000litres annual waste water needs to be treated then multiple lined biobeds may be registered with the EA by including additional grid references on the same application form.

More details on the design and plumbing of the Lined Biobed can be found in the Biobed Design Manual and in EA's Guidance Document.

Indirect Lined Biobed Case Study

A trailed 1500l sprayer is washed down 8 times a year on a $35m^2$ hard standing, this generates 3000l of washings In the East of England annual rainfall is 650mm so the hard standing generates 22,750l of rainfall. The sum of liquid to be treated 25,750l. At $1m^2$ biobed surface area per 1000l, a lined biobed with a surface area of $25.75m^2$ or overall dimensions of 4m wide 6.6m long and 1.5m deep is required.

Lined Biobed Mixture

Lined Biobed mixture consists of straw (50%), soil (25%) and compost (25%) and turfed over. After mixing the Lined Biobed constituent material it should be matured for approx. 6-8 weeks before placing it into the lined pit. Annual topping up with pre-composted mixture will also be required.
Selecting a light, or medium, loamy soil enhances performance. Clay soils should be avoided as they can be difficult to mix and may hamper drainage. Sandy soils should also be avoided as they are too free draining and will not retain the pesticide residues adequately.

Water Management

Careful management of all water entering a Lined Biobed is critical to its long-term effectiveness in degrading pesticides. Sustained periods of water saturation can damage the beneficial microbes in the system. Preventing uncontaminated surface run off and rain water from buildings entering the Lined Biobed will help significantly and reduce the volumes that need to be treated. If necessary buffer tanks (up to 1500 litres) can be installed both on the route into and/or out of the treatment system, with a view to providing a greater degree of control on the rate of liquid transfer.

Disposal

Liquids: Liquids drained from the Lined Biobed must be put to agricultural use such as cleaning the outside of the sprayer or irrigating a vegetated area provided it is neither frozen or water logged. With additional filtration to remove soil/peat particles it may be possible to use the liquid for some spray applications.

Solids: EA guidance requires that no more than $50m^3$ may be stored at any one time and that spent Biobed mixture (biomix) should be replaced every five years. Spent biomix should be stored for a minimum of 12 months, and no more than 36 months, before land spreading. Storage area should not be within 10 metres of a surface watercourse or 50 metres of any spring, well or borehole. If stored on an impermeable surface, make sure any run-off is collected and irrigated to vegetated land. If stored in the field, consider the presence of any underground drainage and conduct the same site risk assessment used for the Lined Biobed although prior approval from the EA is not required.
Spent biomix may be spread to land subject to a number of restrictions including that the land receiving treatment is at least 10 metres from a watercourse and 50 metres from a spring, well or borehole, the land has not been frozen for 12 or more hours during the 24 hours prior to application and is not waterlogged, flooded or snow-covered. The application does not exceed 50 tonnes per hectare in any period of 12 months and an allowance is made for the available nitrogen, total phosphate and potash in the waste when working out fertiliser requirements.

To find out more

A full library of information on Biobeds including links to the EA Guidance, research reports, presentations, the design manual and a list of contacts who can provide specialist advice visit: **www.biobeds.info** or EA's Agricultural Waste Help Line on **0845 603 3113**
For general advice on pesticides contact your local agronomist or crop protection distributor

Crop Protection Association

This advice was originally prepared after consultation with the UK environment agencies and leading researchers into pesticide handling areas. Research was funded by Defra, EA, CPA and SNIFFER

This Guide was produced by the Crop Protection Association as part of The Voluntary Initiative.

The Voluntary Initiative is a programme of measure agreed by Government to minimise the environmental impact of pesticides.

www.cropprotection.org.uk www.voluntaryinitiative.org.uk

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