

Review of sludge treatment and disposal techniques

The aim of Project P2-064 *Review of sludge treatment and disposal techniques* was to provide a review of the techniques for the treatment, transportation, recycling and disposal of sewage sludge. The project is intended to provide an overview rather than a detailed description of the Agency's duties and statutory requirements.

Information about sludge treatment and disposal processes is collated together in two reports covering both legislative regimes and the environmental implications to which they give rise. The report provides the information required by Agency staff to carry out their duties relating to sewage sludge, in particular with respect to IPC and BPEO, planning consultation responses and the Sludge (Use in Agriculture) Regulations 1989. The report is an update and reformat of a 1989 HMIP publication entitled '*review of sludge treatment and disposal techniques*' (Frost, Powlesland, Hall, Nixon and Young). The present review in particular adds comprehensive information on the environmental impacts of each technique covered.

A detailed introduction to sewage sludge is provided, describing the origins, production rate and characteristics of various sludge types and includes a brief history of sludge disposal practises in the UK (in particular emphasising the impact of legislation in the last 20 years). For completeness, a review of the current (and likely future) legislation concerning sludge management in the UK and Europe is also provided.

The following methods of sludge treatment and disposal are covered:

- *sludge pre-treatment* (i.e. removal of grit, screening and scum)
- *reducing sludge volume*; these include gravity thickening, mechanical thickening, mechanical dewatering and thermal drying. A number of alternative, less widely practised volume reduction technologies are also briefly discussed (ultrasound, freeze-drying etc.).
- *sludge stabilisation*; anaerobic digestion, thermophilic aerobic digestion, composting and lime treatment. This section also includes a review of the methods of sludge storage (for both cake and liquid).
- *sludge destruction*; (incineration, gasification, wet oxidation); Incineration is widely practised in the UK and is likely to expand in the coming decade. The first large-scale gasification plant is due to be commissioned at Bran Sands, Teeside in 1999. Wet oxidation is not practised in the UK at present although a full-scale plant is operating in Appledorn, Holland.
- *sludge transportation* (road, rail, barge, pipeline, etc.)
- *sludge recycling and reuse*; in particular the uses of sludge in agriculture, forestry, land reclamation and dedicated land. The recycling of sludges to amenity areas, horticulture and domestic outlets is relatively minor but is also briefly outlined.
- *sludge disposal*; the dumping of sludge to sea is banned in the UK from 31 December 1998 and is therefore not discussed in detail. Landfill disposal, for both sewage sludges and incinerator ashes, is likely to continue for many years despite an increasingly stringent regulatory framework and rising disposal costs.

Within each distinct section of this review each methodology was reviewed to a common format:

- The objective of the technique
- A brief process summary (including cost implications where appropriate)
- The operational, legal and political constraints
- The environmental impacts and, where appropriate, methods of remediation, amelioration and monitoring: and
- Current status and future development possibilities

This is a live document and regular updates and reviews are anticipated in order to ensure that all developments in the field of sludge processing, treatment, transportation and disposal are fully addressed. The use of key Agency contacts will ensure that staff who need access to information in the report will be able to check with relevant Agency staff to establish key changes to relevant legislation.

The outputs from Environment Agency Project P2-064 are:

R&D Technical Report P125 – A review of sewage sludge treatment and disposal techniques

This report summarises the main sections to be covered in detail in the Project Record and includes sections on relevant legislation and environmental impact.

R&D Project Record P2/064/1 – A review of sewage sludge treatment and disposal techniques

This report provides a more detailed summary of sludge processing and disposal techniques, legislation, and environmental impacts.

Both documents are Released to Regions and Released to Public Domain.

Project Manager: Dr Nina Sweet
Research Contractor: WS Atkins

January 1999

Copies of the documents are available internally from the Regional Information Centre (Library) and externally from WRc, Frankland Road, Blagrove, Swindon, Wiltshire SN5 8YF (Tel: 01793 511711; Fax: 01793 511712).

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- *sludge conversion processes*; this includes the use of sludge in construction materials and its conversion energy (in particular via pyrolysis to low grade oils).
- *sludge transportation* (road, rail, barge, pipeline, etc.).
- *sludge recycling and reuse*; in particular the use of sludge in agriculture, forestry, land reclamation and dedicated land. The recycling of sludges to amenity areas, horticulture and domestic outlets is relatively minor but is also briefly outlined.
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