LEACHATE TREATMENT

Project funding options
Feasibility studies
Complete project design
Manufacture, install and commission
Operation and maintenance

DATA SHEET ODSL00

TREATMENT OPTIONS

EVAPORATION

AMMONIA STRIPPING

ENGINEERED WETLANDS

REEDBEDS

AEROBIC LAGOONING

SEQUENCING BATCH REACTORS

REVERSE OSMOSIS

ACTIVATED CARBON FILTRATION

ANOXIC REACTORS

UV ULTRA-VIOLET

METHANE STRIPPING SYSTEMS

MEMBRANE BIO-REACTORS

PRE-REQUISITES

In order to select a leachate treatment process it is necessary to have certain basic information. This is fundamental to establishing which processes should be assessed for performance on any particular site.

The anticipated flow rate which will require treatment

Estimation of the leachate flow rate will depend upon the scope of the objective in instituting leachate treatment. Where it is deemed necessary to intercept and treat an existing leachate flow the rate will be readily available.

Where it is planned to remove leachate from the body of the site and control the full leachate potential of the landfill in question it will be necessary to carry out a water balance study.

The leachate flow rate will be based largely upon the extent of water inflow into the site and not biological activity, as is the case with landfill gas. Water inflow can be from rainfall and groundwater ingress, as well as biological activity. Obtaining a reliable estimate of leachate production rates is a considerably more difficult exercise than estimating landfill gas production rates and, unless the site is adequately contained, will require the services of a skilled hydro-geologist. It is likely to involve field studies followed by pumping trials.

The composition of the leachate at source

The composition of abstracted leachate can be monitored during the course of such trials and used to form the basis of analysis. Samples should be taken in accordance with best practice and analysed in a suitably equipped laboratory.

The discharge composition required by the regulating authority

The extent to which leachate should be treated will be determined by the discharge consent that applies. Such a consent may be necessarily obtained from the Environment Agency or the local water company, if discharge is to sewer.

There may be other bodies with regulatory powers in any one situation. It is important to determine the objective of any treatment process before chemical engineering analysis is commenced and it is essential that discharge consents be contractually agreed prior to the installation of a treatment plant. Unlike landfill gas, where combustion is the near universal solution, the range of technologies applicable are directed specifically to treatment goals. If these change in the course of planning or construction a different method of treatment is likely to be needed, possibly resulting in major changes in the proposed plant.

LEACHATE COLLECTION

There are many differing methods for the collection of leachate from landfill sites. These include pneumatic pumps, hydraulic pumps (eductors) and standard electric pumps. The case for and against each method is well documented and, as a broad generalisation, each has its correct point of application. In land-raise situations, it is also possible to use gravity to collect and move leachate, although such and option is less

commonly encountered. The prime function of all of these systems is to deliver leachate to the treatment/ discharge system reliably, as and when required.

One option that is often employed is to combine the extraction of leachate and landfill gas from the same boreholes. These may reach to the base of the site and be used to control both leachate and landfill gas extraction to the individually required levels.

Organics staff have wide experience of leachate extraction and are available to assist with implementation of this technology.

LEACHATE TREATMENT

Leachate treatment is an area of technological application in its own right. Whilst there are many similarities with municipal and industrial waste water treatment technologies, the experience gained in landfill leachate is such as to demonstrate the uniqueness of the tasks to be accomplished.

This is not necessarily surprising as leachate originates from a comprehensive mixture of nearly all of the materials employed in modern day society, randomly mixed together and leachate out by the action of rain, groundwater and biological activity.

Almost every landfill site has its own unique mix of chemical composition, flow rate and discharge requirements. The challenge is to determine which technology, or technologies, may be most economically employed to meet the requirements of the situation.

Organics has worked with many differing systems, in many differing circumstances and is well placed to assist in making the necessary technical and commercial decisions.

ORGANICS AND LEACHATE

The first corporate contact with leachate treatment came in 1989 when a pilot plant, high-rate, anaerobic system was built to treat leachate coming from a landfill site in South East England. This unit was rated at 12 cubic metres per day and was designed to reduce COD at a rate of 12 kg/cubic metre per day.

Subsequent leachate treatment technologies employed were directed primarily at aerated systems, where bacterial activity is generally more robust and reliable.

In the mid-1990s Organics supplied its first ammonia stripper, operating in the pH driven mode. During site trials it was found that as the temperature of the leachate rose the quantities of alkali required reduced. This discovery, and subsequent events, led to the development of the thermally driven ammonia stripping cycle.

Use of this latter technology has provided Organics with expertise in many related fields, such as economiser design and construction, heat-transfer system design and manufacture and complex process-system integration.

Preliminary, evaluative enquiries are welcomed.

KEY FEATURES

PROVEN EXPERIENCE IN LEACHATE COLLECTION AND LEACHATE TREATMENT OVER MORE THAN 14 YEARS

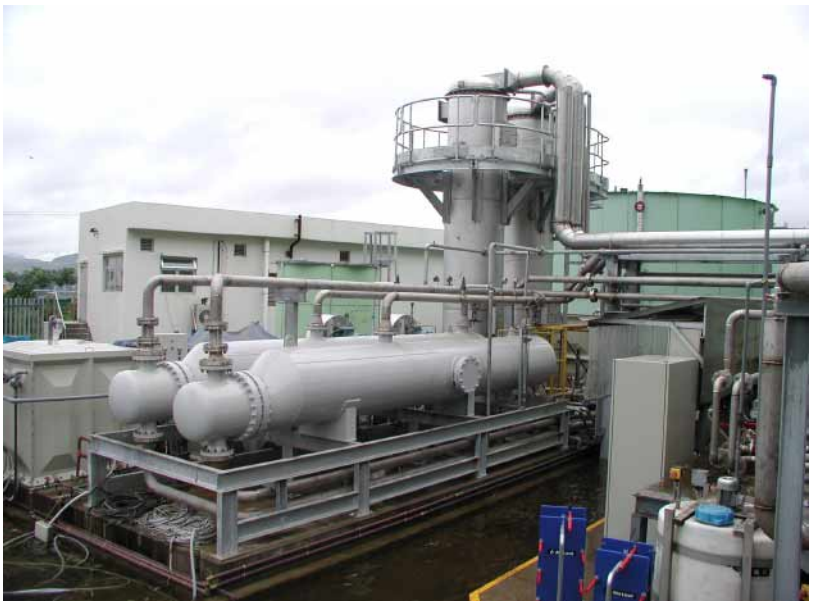
EQUIPMENT PROVIDING MORE THAN 95% AVAILABILITY FOR COMPLETE FACILITIES AND 99% FOR LEACHATE PUMPING

TURNKEY DESIGN, MANUFACTURE AND INSTALLATION SERVICES AVAILABLE OR COMPONENT SUPPLY ONLY

FINANCE AVAILABLE THROUGH AFFILIATED COMPANIES

OPERATION AND MAINTENANCE SERVICES PROVIDED

A ONE-STOP SOLUTION FOR A COMPLETE SERVICE RELATING TO THE TREATMENT AND DISCHARGE OF LEACHATE FROM LANDFILL SITES



DATASHEETS

Sequencing batch reactors
Sequencing Batch Reactors (SBRs) are the workhorse of the aerated leachate treatment approach. This system has optimised the use of aeration for leachate treatment and is, for example, the most widely employed technology in the United Kingdom.

Aeration systems
Where specific circumstances exist that make the conventional SBR approach inappropriate, aeration systems can be employed to achieve similar objectives. Generally costs may be lower for certain leachates, whilst treatment efficiency remains reliable and predictable.

Anaerobic systems
Anaerobic systems should be employed with caution. Anaerobic bacteria are, for example, poisoned by ammonia above a certain concentration. Landfill leachates are often high in ammonia.

Scrubbing columns/Stripping towers
Scrubbing and stripping technologies are commonly employed in process trains. Organics is able to design and deploy such systems as and when required.

Activated carbon filters
As with anaerobic systems, carbon filters have their role in leachate treatment but care should be exercised to ensure the circumstances their use are correct. This can often be a very high-cost solution with residual problems of disposal.

Leachate heaters
It is well known that most technologies improve in performance with an increase in temperature. Organics has built many different types of leachate heater and is well versed in the options that are realistically available.

Reverse osmosis
Whilst this technology has been extensively employed its application should be fully evaluated prior to deployment. It is expensive to build and to run and the concentrate it produces can often create new problems.

Methane stripping systems
Methane can be found in leachate in quantities above those recommended for discharge into sewers. Methane stripping removes such concerns. Being a physical process it is predictable and reliable.

Ammonia stripping systems
Ammonia is a key pollutant in leachate. Aerobic and anoxic systems (the latter for nitrate removal) can remove it effectively where it is in low concentrations. Ammonia stripping may be viable where concentrations are high.

Treatability units
Where possible, it is desirable to carry out treatability trials on leachate prior to installation of a full-scale system. This will enable the preferred solution to be tested prior to the commitment of significant sums of money.

Reed beds/Engineered wetlands
Reed beds offer a relatively low cost and low maintenance system for leachate polishing. This technology has potential for wide application in cleaning polluted wastewater. Engineered wetlands are aimed at providing a natural solution to the complete treatment requirement.

Evaporators
Where there are significant quantities of waste heat available, either in the form of landfill gas or the waste heat from an engine, it is possible to evaporate leachate and produce a residual solid for disposal.

Organics Limited

The Barclay Centre
University of Warwick Science Park
Coventry CV4 7EZ,
United Kingdom
T: +44 (0)2476 692141
F: +44 (0)2476 692238
E: comms@organics.com
W: www.organics.com