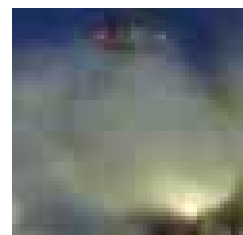


*Integrated
odour
services*



Capability statement

Entec

Entec is one of the UK's largest environmental and engineering consultancies. Our technical and business skills are dedicated to delivering strategic, technical and engineering solutions which bring commercial benefit to customers at home and overseas. This know-how is based on over 60 years' consulting experience in the public and private sectors.



Certificate No. EMS 69090

Certificate No. FS13881

Entec operates a Quality Management System in accordance with the latest requirements of the international standard BS EN ISO 9001 and an Environmental Management System compliant with BS EN ISO 14001. Both are audited by BSI Management Systems.



Integrated odour services

Current perspective

Regulatory attention is increasingly being brought to bear upon the management and control of odours emitted from industrial processes and utilities. At the same time, public concern over loss of amenity arising from odour nuisance has intensified, both in relation to existing “problem” installations and planning proposals for potentially odorous developments.

From a technical standpoint, generation and release of odour can also be indicative of poor process control, which has implications for adjacent and downstream product treatment and production, in addition to external environmental effects.

Such issues can become business-critical, can tie up considerable resources and have adverse effects upon business development programmes. In addition, adverse public opinion and shareholder perception can damage the reputation of a company.



In October 2002, the Environment Agency published a consultation draft of its horizontal IPPC Guidance on odour. For the first time, this document puts forward recommendations for numerical odour performance criteria across the range of UK industry and includes comprehensive guidance for meeting Best Available Techniques (BAT) criteria.

In December 2002, DEFRA published for consultation proposals to amend the existing laws on statutory nuisance so that wastewater treatment works odour could be regulated. This followed several high court judgements in the last 2 years that exempted wastewater treatment works from regulation under the Environmental Protection Act 1990.

Accordingly, odour issues are firmly on the public's and the regulators' agenda and are set to remain there

Forces for change



Integrated odour services



Entec's approach

Entec's odour assessment, control and management expertise and experience is grounded upon our involvement over many years in consultancy work for private industry, policy and regulatory impact assessment work for government departments such as DEFRA and the Environment Agency and advisory work for local government.

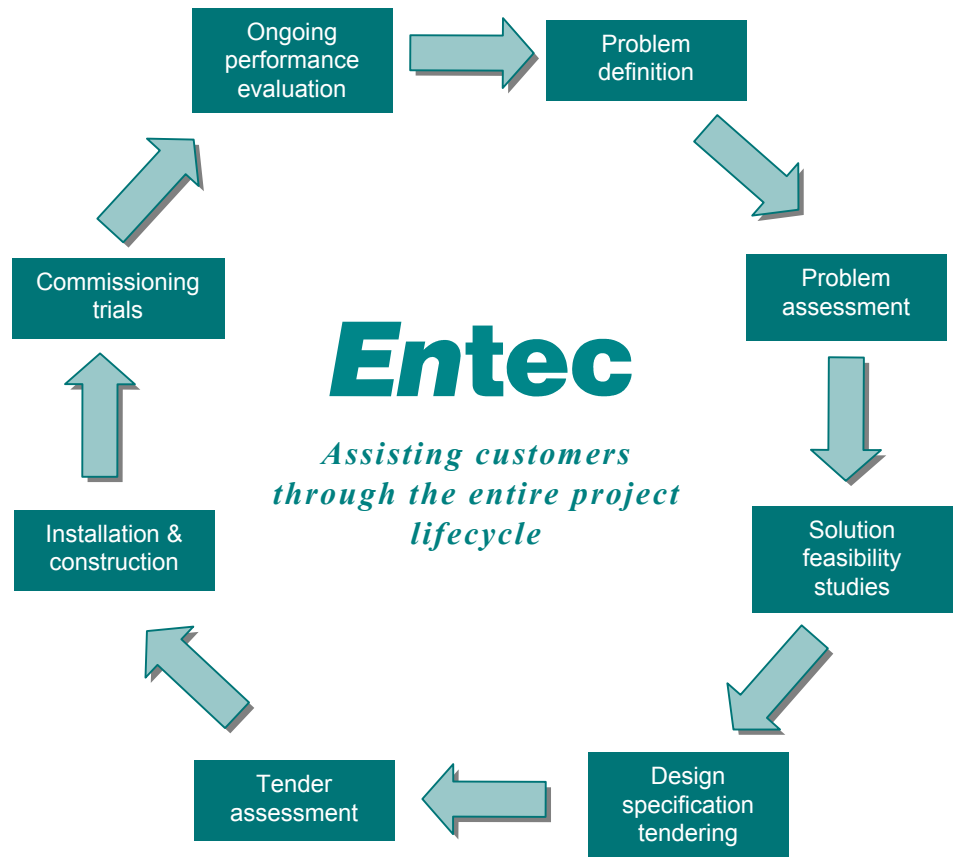
Our approach to each commission is to analyse the specific business needs of the client organisation and, in partnership, to develop solutions that are appropriate, cost-effective and sustainable.

We use the latest, cutting-edge technical tools to help us in delivering the optimum solutions and, where these don't exist, undertake research to develop the best procedures to service the need.

Entec's range of services has been formulated to match the needs of industry, utilities and institutions in the 21st century. These services are under continuing review and development in response to rapidly-changing circumstances and market requirements.



Integrated odour services



Project lifecycle

Effective management and control of odours owes as much to careful process plant design and operation as to the correct selection and operation of odour control techniques. The Entec approach to this field integrates expert technical knowledge and skills with practical process and design experience to achieve cost-effective solutions throughout the project lifecycle.

We have the resources and project management capability to manage the entire project cycle on behalf of client organisations. Alternatively, we can contribute focused technical and engineering expertise at any specific point in the process or for specific phases.





Problem definition & assessment

Analysis of specific problems can be conducted by a variety of approaches, including:

- odour complaint evaluation in relation to meteorological conditions;
- measurement and monitoring of odour emissions and ambient levels;
- analysis of air exchange rates and ventilation patterns;
- efficiency testing of abatement plant.

Feasibility studies

Dispersion modelling of odours can be conducted, against annoyance criteria, in order to assess the optimum solution to the emission problem.



Design, specification & tendering

Utilising our extensive knowledge base, matching process to required duty and performance specification, an appropriate solution to the problem can be designed. Cost-effectiveness is assured in terms of capital and operating, by producing common-basis NPV (Net Present Value) comparisons.

Installation/construction

Entec has the relevant civil, electrical, mechanical and process engineering skills to manage the entire process. This, combined with our quality assured project and cost management expertise, adds significant value to the procurement process.



Commissioning

With in-house personnel experienced in the technical operation and optimisation of odour abatement plant, Entec can provide a cost-effective and comprehensive commissioning service, incorporating M&E, ICA and chemical engineering process knowledge into an integrated package. Our services also include performance testing, involving estimates of material usage, abatement efficiencies and air change rate assessment.

Case studies

The following pages demonstrate Entec's capabilities

Integrated odour services, using case study examples. ►



Cramlington STW – Odour Study Northumbrian Water

Cramlington Sewage Treatment Works (STW) in Northumberland provides full treatment to a population of 25,000 plus significant industrial flows and tankered effluents, and also provides a manned area administration centre for Northumbrian Water Limited (NWL). It has a history of public odour complaints, notably from the adjacent East Hartford village, of concern to both NWL and the local Blyth Valley District Council (BVDC). NWL appointed Entec in January 2000 to assess the relevant issues and recommend consequent actions to both NWL and BVDC by September 2000.

Entec collected historic odour complaint data from NWL and BVDC, and arranged simultaneous summer odour surveys using BVDC staff in the village, a hydrogen sulphide monitor in NWL offices and mapping techniques across the STW itself. Environmental staff used this data to build and verify an odour dispersion model, while engineering staff collected operational STW data including trade effluent, hydraulic flows/loads, discharge consent measurements and operational surveys / questionnaires during the odour survey. The latter was used to assess the efficiency of the various processes alongside their odour emission potential.

Combining these disciplines enabled Entec to produce a prioritised analysis of the need to improve each process, optimise the relevant practices and reduce consequent odour emissions. Measures to minimise, ventilate and/or abate odours were costed alongside treatment refurbishment costs and prioritised into three categories for preliminary, primary, secondary and sludge treatment. The consequent report was presented to NWL and then BVDC in September 2000 to enable a long-term programme to be agreed to simultaneously improve treatment and reduce odours cost efficiently.

Entec's unique blend of environmental and engineering skills were ideally suited to this study, which required detailed understanding of both the odour emissions / dispersion and the sewage treatment processes / risks to compliance.

Facts and Figures

Project

Cramlington STW – Odour Study

Client

Northumbrian Water

Location

East Hartford, Northumberland, UK

Potential Capital Value

£2m+

Entec Services

- Feasibility using civil, mechanical and process engineering
- Operational user liaison
- Odour dispersion modelling / liaison

*Comprehensive odour
and process study for
key sewage works*



Odour Assessment at Dunfermline WWTW Scottish Water



Tackling wastewater odour concerns

Dunfermline wastewater treatment works at Inverkeithing, Scotland has been upgrading its existing primary treatment works to provide secondary treatment of the wastewater and a sludge treatment centre. The capital project, worth over £9 million, has been necessary to improve the quality of wastewater discharged from the WWTW plant.

The concern of the client has been to assess the impact of odour emissions from the upgraded works. A long-term odour monitoring programme was devised and undertaken by Entec before, during and after the construction, which also included the commissioning phase. The odour monitoring is to be carried out for a further 12 months after hand-over of the works.

The programme involved an initial detailed site odour monitoring survey. This was followed by the installation, commissioning and then routine maintenance and data management of three Single Point Monitors (SPM's) located strategically around the site. In addition to the SPM's which measure ambient hydrogen sulphide concentrations down to 1 part per billion, Entec has installed a weather station on the site to determine the wind direction, wind speed and other meteorological parameters. The technology of data transmission using a telemetric link has enabled data download and analysis to be undertaken at any time from Entec offices providing instant data to the client. Quarterly site surveys are also being undertaken to evaluate the relationship between total odour and hydrogen sulphide concentrations around the site and validation of the monitors.

The advantages of the system have included a quick response and investigation when noticeable odour has been detected at or near the site. Analysing data from the three hydrogen sulphide monitors and the weather station has assisted in determining if specific site operations have resulted in a higher impact of odour. In particular, the location of the monitors, one to the west of the site, another to the south east and another in a town close by to the north west has ensured that incidents of odour have been assessed for their source. Furthermore data has been assessed periodically and any significant odour events reported immediately to the client. The programme has provided the benefits of cost savings by significantly reducing on-site time for the investigation of odour while providing instant on-line access to monitoring data from around the site.



UK Landfill Site Odour Assessment **Confidential Client**

This confidential client appointed Entec to carry out a detailed odour impact assessment of landfill operations to support the planning application process. A series of on-site odour emission measurements were taken at the existing landfill site, covering all aspects of waste operations, and this information provided the input data for an odour dispersion model. The modelled dispersion of odour from the current operations was compared with odour complaint records over the previous three years. The model predictions correlated well with reality. In addition to the modelling approach, a series of odour patrol surveys, conducted by independent assessors, was carried out around the site and environs.

The odour model, thus validated, was then used to examine the dispersion of odours from the future proposed operations at the site, incorporating a range of alternative mitigation measures. This included limiting the extent of working face areas, rapid covering of waste following deposition and use of a range of cover materials (soil, plastic sheeting and combinations thereof). The investigations demonstrated convincingly that the management of potential odours could be improved and would reduce the historical odour impact.

*Detailed
technical assessment
demonstrates
effectiveness of
practical mitigation
measures*



Coastal STW Covers / Odour Control Northumbrian Water

Northumbrian Water Limited (NWL) had to provide primary and secondary treatment for eight coastal sewage treatment works (STWs) to enable compliance with the EU Urban Wastewater Directive by Dec 2000. To maximise standardisation savings across the sites, they created various projects to develop standard designs and procurement across the sites, including appointments for odour control and covers.

Entec was appointed in 1998 for development contracts for both the odour control and covers. Considerable initial operational liaison was used to identify

designs that were both user friendly (i.e. combined adequate odour containment and extraction with mechanical plant accessibility) and public friendly, requiring odour dispersion models to be developed and calibrated for all sites. This optimised cover designs, ventilation quantities and abatement plant / exhaust stack locations for all sites.

Reviews of NWL trials identified "Odorgard" catalytic scrubbers as the favoured abatement technology, and GRP as the optimum cover material. Entec developed contract documentation with various tenderers, eventually awarding

multi-site contracts with significant savings to both abatement and cover specialist contractors. The flexibility of these contracts was fully demonstrated when the fundamental STW process was subsequently changed on three of the sites.

Entec's role continued with contract administration and extensive site liaison, to ensure consistency of approach and transfer of lessons learnt between each site and its consultants and contractors.

Entec's depth of resources was crucial in providing a consistent simultaneous service across eight sites and all relevant civil, process and MEICA disciplines throughout the design and construction period. The client was impressed enough to award odour control and cover provision on a ninth subsequent STW in 2000 on the same basis.

*UK Water Industry's
largest multi-site
odour control
procurement?*

Facts and Figures

Project
Coastal STW Covers / Odour Control
Client
Northumbrian Water
Location
Nine coastal STWs, NE England, UK
Capital Project Value
£3.9m

Entec Services

- Feasibility and conceptual design
- Operational user liaison
- Odour dispersion modelling / liaison
- Detailed civil design
- Project management and programming
- CDM planning supervision
- Construction liaison / administration



Emission Monitoring Audit at Food Processing Plant Confidential Client

A food processing plant required a comprehensive air emission monitoring survey of all release points to atmosphere from their site. A number of pollutants were required to be measured and included volatile organic compounds (both as total and speciated), metals, halides, particulate matter and combustion gases. Entec's track record of managing emission monitoring projects using a sister company, AES, to undertake site sampling and analytical work ensured that the capability and experience was available to undertake a project of this scale.

The monitoring methodology was conducted in accordance with relevant British Standards and United States Environmental Protection Agency (USEPA) approved methods, while laboratory analysis was performed by AES accredited laboratories under the United Kingdom Accreditation Scheme (UKAS).

Using state-of-the art analytical instruments, very low analytical detection limits have been achieved for the pollutants measured. With regard to the site emission survey, a team leader who is

accredited to the necessary sampling training scheme for isokinetic monitoring has led each sampling team.

As a result of the emission monitoring survey, the mass emission rates of all the pollutants for each of the release points has been assessed. The air emissions monitoring data can now, if required, be used to compile the Environment Agency's 'inventory of sources and releases'.



Analytical monitoring of air quality emissions



Bletchley Landfill **Shanks Waste Services**



*Entec design
solution to
Shanks' odour
problem*

Entec was called in by Shanks Waste Services to assist with a solution to a landfill gas odour problem at their Bletchley Landfill. Historic waste inputs of a calcium sulphate had resulted in the generation of hydrogen sulphide, a particularly malodorous gas. Following a series of complaints from local residents the Environment Agency had taken enforcement action under the Waste Management Licence for part of the Bletchley site until the odour issue was resolved.

Shanks employed Entec because of their previous extensive experience of similar malodorous gas issues at several other UK landfill sites. Part of the site had previously been capped with clay which though effective at keeping out infiltration it did not prevent the egress of H₂S gas. The design solution was to construct a geomembrane capping layer with protector geotextiles. Gas collection pipework was incorporated into the layer beneath the cap and linked into the site's landfill gas collection system.

Entec produced the contract documents and supervised the construction of the remedial works through the implementation of a comprehensive CQA Plan. Following the successful completion of the capping works the odour problem was solved and the Environment Agency allowed Shanks Waste Services to resume waste disposal activities in that part of the site.

Facts and Figures

Project

Bletchley Landfill

Client

Shanks Waste Services

Location

Bletchley, Milton Keynes, Bedfordshire

Entec Services

- Detailed design
- Contract documents
- Construction supervision
- Construction quality assurance



Integrated odour services

Sample client list

<i>Service</i>	<i>Sector</i>			
	Water Companies	Waste Management	Industry	Public Sector
Odour Measurement & Dispersion Modelling	Wessex Water Northumbrian Water Southern Water Scottish Water Essex & Suffolk McAdam Design MBRTech	Thames Waste Management Cumbria Waste Management Caird Hall Aggregates Onyx RMC	Cadbury Alba Proteins Synpac Chemicals Contract Chemicals Slaney Meats AMEC British Gypsum Scottish Power Technip Geoprod Total Fina Elf	Vale Royal BC Suffolk Coastal DC Crewe & Nantwich BC Poole BC Environment Agency Mendip DC
Expert Witness	Southern Water	Thames Waste Management	Alba Proteins	Poole BC Environment Agency Mendip DC
Odour Abatement Studies	Southern Water Wessex Water	Shanks SITA Caird Bardon	Leo Sawrij Ltd Muraspec Sun Valley Ltd	Suffolk Coastal DC
Engineering Design	Northumbrian Water Southern Water United Utilities Yorkshire Water	Shanks RMC Viridor SITA	Roche Vitamins Texaco	Environment Agency
Performance Testing	Northumbrian Water Southern Water Wessex Water	Thames Waste Management	Cadbury Forrest & Sons	Environment Agency



Integrated odour services

Entec

*For further details on
Entec's full range of environmental and engineering services:*

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