



UNITED UTILITIES, HEREFORD

MAIN CONTRACTOR:

ACWA Services Ltd

INDUSTRY:

Waste Management

**DATE OF CONTRACT
AWARD:**

2001

CONTRACT VALUE:

£700,000

ACWA CONTRACT NO:

EN 4066



INTRODUCTION:

ACWA Services Ltd successfully completed this turnkey contract to extend and upgrade an effluent treatment plant at United Utilities Industrial Wastes Management Centre in Hereford.

The ACWA treatment facility—which has incorporated an existing tank farm as part of the system design—provides a high degree of process flexibility and in addition to improving the performance of existing treatment systems, has considerably enhanced the Company's ability to handle "high strength organic sludges and liquid wastes". These include a variety of pharmaceutical wastes, high strength/low volume effluents from the food, drink and dairy industries and landfill leachate containing high levels of ammonia.

DESCRIPTION:

Whilst United Utilities had traditionally processed many of these high strength industrial wastes, the Company's treatment capacity was beginning to restrict any major increase on plant throughput. The new plant combines increased capacity with optimum and cost-effective performance and when fully loaded, is expected to treat additional liquid throughputs of around 50,000 m³/annum (up to 100,000 mg/l COD). Additional

throughputs of sludge (averaging 2% dry solids) are forecast to be in the region of 10,000m³/annum.

The total contract covered the design, procurement, installation, testing and commissioning of all mechanical, electrical and civil engineering work including the construction of a new site building to house the associated control systems and services.

THE PROCESS:

The ACWA treatment process comprises a waste collection reactor and transfer facility, waste storage prior to treatment, an oxygen injection activated sludge process, oxygen storage and vaporisation, effluent transfer equipment, centrate storage and sludge handling/dewatering with PLC control.

In addition to the use of an existing eight-vessel tank farm, the upgraded process was designed around four 120m³ glass-lined storage tanks, two of which are dedicated to the storage of high strength organic wastes. The third doubles-up as storage for either high strength organic wastes or centrate from sludge dewatering and the fourth tank provides storage for sludges.

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Each storage tank incorporates a side entry mixer unit, a level indicator/control and a trough deck type cover with passive carbon filter. Conical base sections facilitate effective drain-down, clean-out etc.

PROCESS FLEXIBILITY:

The ACWA system is designed to provide total flexibility in treating waste liquids with a variety of process requirements and to facilitate this, individual process cycles are selected, scheduled and effectively controlled by the operator from the human manual interface (HMI) of the PLC.

High strength organic wastes from the three new tanks can be discharged into the activated sludge process created in three existing tanks then to further storage in three more existing tanks for further mixing and blending. Sludges from another tank can be discharged either to a centrifuge for dewatering, or for storage or to the mixing and blending process.

SIMPLE PROCESS ARRANGEMENT DRAWING (Tanks numbered for reference):

High strength organic wastes and sludges delivered to the Hereford site by road tanker are discharged to the inlet sump through a perforated basket strainer and transferred to the storage tanks by a 60m³/hour macerator-type submersible pump. In selecting an appropriate tank for waste reception, the plant operator takes into consideration the type of waste to be stored, the tank contents and available storage levels. One tank is normally used for the storage of sludges produced by the process or imported in bulk quantities by road tanker.

The contents of the storage tanks can be discharged to a distribution manifold at a preset volume through operator controlled actuator valves. Generally the contents of tanks with the high strength organic waste and the tanks are discharged to the activated sludge plant and the contents of the tank

centrate, tanks are discharged to the activated sludge plant and the contents of tank rig pumped to a centrifuge for dewatering and subsequent discharge to a skip. Tank contents discharged to the reactor treatment process are pH corrected by a caustic dosing system.

ACTIVATED SLUDGE PROCESS:

The activated sludge process, which uses three tanks as batch type reactors, is provided with Air Products Oxy-Dep oxygen injection units which operate on demand for oxygen via dissolved oxygen meters. As part of the contract, ACWA supplied and installed an acoustically enclosed blower system, for removal of the CO² generated by the reactor process.

The three reactor tanks operate on a batch system in parallel, providing a typical process cycle of 18 hours aeration, four hours settlement, one hour decant and one hour fill. The system avoids any settlement problems and eliminates the need for sludge return equipment and a separate settlement process. Discharge from the batch reactor system is achieved by decanting arrangements which operate at a set flow-rate via the operator interface. Supernatant is discharged into an existing channel via automated belmouth weirs and is discharged via a self-priming centrifugal pump to the nearby Eign Sewage Treatment Works for further processing.

Surplus activated sludge which accumulates in the batch reactor system, is periodically discharged through valves into the collection channel, from which it is pumped to the sludge storage tank prior to centrifuge dewatering.