greater energy savings in other industries.

Circuit board makers normally rely on conventional chemical treatment to process wastes, but this is not effective for some materials used in the industry. Alternatives have been evaluated for treating complex metal bearing wastes. These include altering to the pH to displace the complex and pretreating the solution with reagents to break up the pollutant.

High costs for chemicals and the fact that the final sludge is classified as hazardous waste are major drawbacks to these alternatives.

No-sludge equipment consists of an ion-exchange column to remove copper from contaminated rinse waters. There is also an electrochemical reactor to recover copper from the concentrate of the ion exchange column and copper bearing bath dumps.

A selective chelating resin is employed in the ion exchange column. This resin can select one metal over other metal contaminants in a complexed metallic solution. The electrochemical reactor has been developed with a colorimetric analyser to automate the copper recovery process and optimise operations over a wide range of concentrations.

From: Environment Canada, Development & Demonstration of Resource & Energy Conservation Technology annual report

Potato waste plant saves energy

New wastwater treatment technology designed and developed by ADI International, New Brunswick, Canada, is helping a potato processor to meet pollution control standards and benefit from an energy byproduct.

The $5M ADI-BVF anaerobic digester treats wastewater from potato processing and ethanol plants. The key component is an 83Ml polyethylene lined earthen and concrete basin. The system, which operates in conjunction with existing treatment, will improve water conservation. It is also energy efficient in that it produces a biogas which will be recovered to supplement plant fuel needs.

From: WWI, December 1988.

Dairy two-step to protein recovery and cost cuts

Large quantities of valuable resources are lost through spills and equipment cleaning in the dairy industry. This results in the production of high strength wastewaters from dairy plants. The Canadian company Agrinove has developed a two step system that includes protein recovery and biological treatment.

Agrinove was discharging wastewaters with five-day biochemical demand (BOD_5) and suspended solids levels of 1200mg/l and 400mg/l respectively.

Protein recovery consists of flocculation/coagulation using sulphuric acid and calcium fluoride, followed by solid/liquid separation. The floc formed is not dense enough to settle, so it has to be removed by dissolved air flotation. Bench-scale studies indicated that the proposed resource recovery process reduced wastewater BOD_5 by 80%-85%. This indicated a reduction in the size of the biological treatment plant and the energy required.

Pilot plant studies showed that the recovered floc would consist of 60% protein, 23% fat, 5% lactose and 12% ash. Plans include mixing this recovered product with liquid whey and with dairy products recovered at source. The system is expected to be applicable in all 350 dairies operating in Canada.

The full scale protein facility went into operation in July 1987. Since then, average daily product recovery rate has been 180kg on a dry weight basis. Analysis of the recovered product revealed the following dry weight results: 51% protein; 31% fat; 11% ash; 7% lactose. Chemical oxygen demand reductions of 50%-75% were achieved on the dairy plant wastewater.

These reductions had a direct impact on operational costs associated with the downstream biological treatment system. It was calculated that the direct energy savings that resulted from this pretreatment step were equivalent of 1,000 barrels of oil per year.

From: Environment Canada, Development & Demonstration of Resource & Energy Conservation Technology annual report.

Hot sand captures still solvent waste

Environment Canada has sponsored a development that allows recovery of solvent and energy from still-bottom sludges produced from conventional distillation of solvent/paint mixtures. The process is technically and economically successful. It can separate solvent from feed material without turning the residue into a solid mass.

Recovery is carried out by bringing the sludge into contact with hot sand to drive off solvents as vapour. Sand, coated with the non-volatile portion of the sludge, is regenerated and reheated in a spouted bed reactor. Pyrolysis gas from the reactor is completely burned in an afterburner.

The resulting heat is used to generate process steam in a waste heat boiler. Particulate matter in the pyrolysis gas is derived from the mineral content of the sludge and it is partially removed before combustion in a set of cyclones. The balance is taken out of the flue gas from the waste heat boiler by a baghouse.

There is room for improvement in reliability and process capacity of the present unit. The next configuration, now under construction, will have a better layout, greater efficiency of the sand screws through a reduction in the change in elevation of the circulating sand, and improved facilities to move solvent, sand and process water. This process could also be developed to treat other slurries of combustible liquids and mineral solids, such as oil well drilling muds.

From: Environment Canada, Report EPS3/Cl/1.