

# InFact

## Ammonia Reduction Using an Electro-chemical Reactor – Project Update

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### Centre Ideal for Ammonia Removal Research

#### “This is what every high-tech venture is looking for”

At Edmonton’s Wastewater Research & Training Centre, research is under way on an innovative electrochemical treatment that converts ammonia directly to harmless nitrogen gas.

ENPAR Technologies Inc. of Guelph developed the process, called AmmEL, and installed a pilot unit at the Centre last November. Over the next few months, a University of Alberta graduate student will test the technology and base a Master’s thesis on the findings. The technology may help wastewater managers address the challenge faced by high concentrations of ammonia. Water decanted off biosolids lagoons can have ammonia concentrations in excess of 1000 parts per million. When sent to treatment plants, this water can place unacceptable nutrient loads on bioreactors during cold winter months when growth of nitrifying bacteria slows.



*Innovative ENPAR technology.*

“This technology definitely has applications around the world,” says Dr. Gene Shelp, president and CEO, ENPAR Technologies Inc.

Adequate ammonia removal in wastewater treatment is critical to ensuring a healthy environment. Ammonia, a byproduct of animal and vegetable waste, can rob sensitive plants and fish of oxygen if it is released in high concentrations into lakes, rivers and streams.

#### Rare R&D opportunity

Although ENPAR has tested similar technology in Ontario, the Edmonton pilot is unique because it employs a stripping tower and scrubber. The unit removes ammonia from waste streams by passing it through an air stripping tower. The ammonia-laden air stream then passes

through a scrubbing tower, where the ammonia is captured in a stream of sodium chloride solution. This liquid stream is treated in an electrochemical reactor, and the ammonia is converted to nitrogen gas and released to the atmosphere. Since the atmosphere is about 80 per cent nitrogen, the nitrogen gas is not an environmental concern.



*Dr. Ian Buchanan*

“Part of the project will be to determine the cost associated with the treatment,” explains Dr. Ian Buchanan, associate professor, Environmental Engineering Group, Department of Civil and Environmental Engineering, University of Alberta.

The Wastewater Research and Training Centre is ideally suited to such research, says Dr. Buchanan:



*Dr. Gene Shelp*

“It provides a wonderful facility for pilot testing, one in short supply.”

“This is what every high-tech venture is looking for – someone who

believes in the technology enough to invest in large-scale testing,” concurs Dr. Shelp of ENPAR. Successful testing is expected to lead the way to a commercial installation.



### Edmonton Waste Management Centre of Excellence

The Edmonton Waste Management Centre of Excellence is a not-for-profit joint venture between public, private and academic partners. The Centre promotes research, development and training to enhance scientific and applied knowledge in all areas of waste management and facilitates transfer of knowledge to contribute to the protection of public health, the sustainable use of environmental resources and the quality of life locally and globally.

The Centre’s founding partners are: the City of Edmonton, the University of Alberta, the Alberta Research Council, AMEC Earth and Environmental Ltd., Northern Alberta Institute of Technology and Olds College.

## A Closer Look

### Scope

The project is testing the effectiveness of an innovative electrochemical treatment called AmmEL that converts ammonia in high concentration streams directly to nitrogen gas. The technology may help wastewater managers address the challenge caused by high concentrations of ammonia, particularly during cold winter conditions.



Technicians install ENPAR pilot project.

### Partners

- University of Alberta
- ENPAR Technologies Inc.
- City of Edmonton
- Alberta Environment
- Edmonton Waste Management Centre of Excellence

### Goals

The goal is to assess the applicability of the technology to biological nutrient removal plants in northern climates. The technology appears to be robust and cost-effective, but needs to be proven.

### Time Frame

- Pilot unit installed November 2004.
- Study to be completed in 2005.

### Potential Benefits and Applications

- Enhanced protection of the aquatic ecosystem
- Reliable water supply quality
- Further progress toward the goal of zero discharge of contaminants
- Direct applicability in light of planned expansion of Edmonton's Gold Bar Wastewater Treatment Plant and

stricter environmental regulations

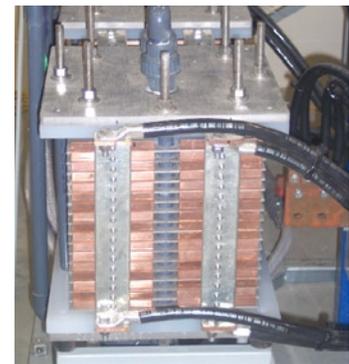
- Wide potential application at wastewater treatment plants around the world.

### Status

- A University of Alberta graduate student is testing the technology and will base a Master's thesis on the findings.
- If the pilot proves that the technology is effective and economical, the next step will likely be a demonstration-scale system.



U of A graduate student Sam Su (l) and ENPAR Technologies technician Daren Yetman (r) installed the new technology in late 2004. Su will base a Master's thesis on the study's findings.

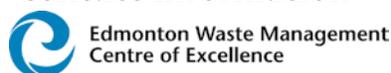


Electrochemical reactor converts ammonia to harmless nitrogen gas.

### Equipment Specifications

- Stripping tower throughput: 4 L/min
- Stripping tower pH: 10 - 11
- Media: Jaeger Tri-Pack 1" tower packing
- Electrochemical reactor: 6 Volts DC, 1000 Amps
- Feed source: Biosolids centrate from Edmonton Co-composter
- Design inlet ammonia concentration: 1000 ppm
- Design discharge ammonia concentration: 100 ppm

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