



Engineering

April 2000

Vol.1

TIMES

Focus on Research

Milking Center Wastewater Treatment Alternatives

Wastewater that is generated from the cleaning activities associated with the milking process on Nova Scotia dairy farms poses a substantial environmental risk if not managed properly. The wastewater contains high concentrations of organic material and phosphorus which can degrade both surface and groundwater resources. Rob Jamieson, a graduate student in the Biological Engineering Dept. at DalTech in cooperation with Agr. Eng. Dept. at the NSAC and NSDAM Resource Stewardship Branch, is evaluating the use of both engineered and non-engineered soil infiltration systems for the treatment of milking centre wastewater.

A natural infiltration system would be described as a non-engineered area on the farm where milking

Treatment / 4

New Department Head Appointed



Kevin J. Sibley, M.Sc., P.Eng., P.Ag. (NSAC class of '80), has been appointed to the position of Department Head for a five year term ending in June 2004. Kevin has been with the department for just over ten years teaching and conducting research in the area of Agricultural Equipment and Mechanized Systems. He has now added the challenge of leading the department into the new millennium.

Globalization is creating more international opportunities for engineers and agricultural mechanization graduates. The world's economy is now intertwined to such a degree that professional interaction is seldom

possible on any other than an international level. The reality of advances in communication and transportation systems, the expansion of free trade among nations, and the changes in the international political order is a world of growing interdependence. This interdependence poses new challenges for graduates as they are confronted with problems whose analyses and solutions require an understanding of cultures and people beyond their native borders besides innovative engineering applications.

There are new and bigger challenges in managing the world's vital resources - water, soil, air, and energy. To assure a safe and abundant food supply. To insure sustainability of food production. To insure protection of the environment and bioresources. Meeting these challenges requires a shift in focus from traditional "Agricultural Engineering" subject areas to areas of "Biological and BioEnvironmental Engineering." As well, students must be

Challenges / 2

The Engineering Undergraduate Society

Brian White is the president of the NSAC Engineering Undergraduate Society. All first and second year Engineering students are eligible for membership in the EUS.

The EUS, as a group, tries to be active in the school and the community. We do so by organizing events and raising money for charities. For example, last semester we donated money to Christmas Daddies and are in the process of raising funds for the IWK telethon. As a group, we have participated in conferences with other Associate Universities



Brian White EUS President

and some fun activities like paintball and skiing.

The EUS members are presently painting a mural and

Students / 3

Staff Focus : Joseph Dale Cunningham



J.D. Cunningham, M.A.Sc. P.Eng, (NSAC class of '59), worked in Ontario for fourteen years (International Nickel, Advanced Farming System, Beaver Lumber Farm Buildings Division and FBDB) before coming 'back home' to the NSAC. Dale, as he chooses to be called, married Joyce in 1960. Joyce works for The Truro Daily News. They have two adult children, Allan an Electrical Engineer with Motorola in Halifax, and Julie, a Senior High Science Teacher, in Victoria, BC.

Dale joined the Engineering Department, NSAC in 1976 where he has been involved in the areas of farm buildings, materials handling and basic engineering topics including computer aided drafting & design. He stepped down last summer after a ten year term as Dept. Head and this winter he has enjoyed "just teaching", the one thing that has given him the most satisfaction at NSAC. Dale has had several trips to the Czech and Slovak Republics (and sur-

rounding countries) where he was involved in teaching CAD courses which were "unique experiences and classroom communication took on new meaning, but it became secondary to the eagerness and appreciation exhibited by students," says Dale.

Asked about his activities, he says that "Joyce & I enjoy sports activities together, having been involved in playing co-ed industrial league softball and coaching pee-pee girls softball over the years, but have now slowed down to curling, golfing, canoeing, camping, & even walking! We are active in church affairs and currently I am chairman of the Board of Deacons at first Baptist Church and a member of Church Council. We enjoy traveling whenever we can and have been on three of the Hawaiian Islands (from the tropical paradise settings to being the first humans to step on new volcanic rock which was still hot), numerous islands of the Caribbean (where golfing is great) and of course in many of the states - the French Quarter and the bayous of New Orleans being one of the most "different". The picturesque golf courses on Vancouver Island and Kananaskis Country of Alberta challenge those of PEI. We have been to all provinces of Canada and suggest that Nova Scotia and Vancouver Island are the two "best places to be" in Canada."

He adds, "a lot of our attention recently seems to be devoted to being part

of the early years of our grandson who we see as often as we can. Iain is nearly two years old now and is just finding out that he can say any new word he wants to mimic. He is an active, inquisitive little buddy, who will still patiently lie on the grass with grampy, listening attentively to the explanation of the engineering principles involved in why grasshoppers have those big, long back legs." Another generation of Engineers in the making I am sure.

Staff Activities

Terry Canning is on a one year leave in which he plans to pursue OH&S Consulting. He is scheduled to return by the end of August.

Nabil Rifai is on a one year sabbatical in The Slovak Republic. Nabil is scheduled to return by Jan 2001.

Staff Accomplishments

At the Atlantic Committee on Land and Engineering (ACLE) Symposium in Moncton, March 8-9, the department was well represented by staff and students alike. Dr. Rob Gordon chaired one of the sessions, three of our staff presented papers, eight graduate students made presentations and six under grads participated.

Challenges from page 1

provided enhanced opportunities to study and train for careers abroad and at "home."

In response to these needs, Kevin has recently lead a strategic review of the department's activities and programs which has resulted in a renewed vision and focus for the department. The core of that vision is the creation of an International Center for Biological Systems Design and Management. The focus of the department's programs and activities will be in two major areas: 1) BioEnvironmental Systems Design and Management and 2) Food and Fibre

Production Systems Design and Management. Within these areas, learning programs, research, and other services will be concentrated on topic areas such as: Mechanized Food and Fiber Production Systems; Water Systems and Quality and Quantity Management; Biomass Conversion and Waste Processing Systems; Environmental Quality Systems; Biological and Biophysical Systems; Renewable Energy Systems; Bioprocess and Biotechnology Systems; and Aquaculture and Seaculture Systems.

The department is now embarking on the journey to turn that vision into reality. Our mission is to provide our students with a technologically advanced

and relevant education in engineering principles and applications, and to conduct research and pre-commercialization activities that result in new engineered systems for the betterment of the food and fiber sector of the economy in Atlantic Canada and the world beyond.

We hope you agree that this is an exciting time to be embarking on our new mission. We invite you to partner with us, at any level, in turning this vision into reality. For more information or to discuss how you can become involved, please contact Kevin at (902) 893-6712 by phone or by email Kevin.Sibley@nsac.ns.ca

Student Focus : Justin Rogers

Justin hails from Brae, PEI, where he operates a portion of his 'family's' six generation farm originally settled in 1838. They grow grain and beef cattle. He is currently in his 3rd year of our four year B.Sc. program in Agricultural Mechanization.

The "Ag. Mech." Program, as it is affectionately called by our students is designed to provide students a sound technology systems management education in the agriculture, agri-food and environmental resources sectors. Students study a unique combination of technology systems and business management subjects in preparation for careers managing technology systems. Graduates of this program are in high demand, working for traditional food related companies like Cavendish Farms and Co-op Atlantic, and many are also working for banks and financial institutions. Justin likes the program for its "diversity of subjects covered and the good balance between theory and practical application that it offers". As well Justin says "I like the fact that I can tailor the program to suit my own particular interest with the choice of electives

available".

Justin is interested in promoting the benefits of agriculture and rural community life at every opportunity. He continually tries to get a positive message about agriculture to the general public. He participates in community events and festivals and is interested in developing Agri-food policy and sustainable agriculture. He uses class projects and presentations as opportunities to learn and discuss current issues facing the farming community. Last fall Justin traveled to Toronto to participate in the Royal Winter Fair where he was part of the team representing the PEI Potato Industry at their trade show booth.

Justin's current hobby is lovingly restoring his 1947 Farmall H tractor and cultivators. He is slowly but surely bringing it back to its former grandeur, and intends to put it to work on his farm.

Justin was the winner of the 1999/2000 Atlantic Farm Mechanization Show scholarship for his high academic



Justin and his 1947 Farmall H

standing, participation in student and extra-curricular activities, and his interest in agricultural machinery.

Around the department Justin is called by his handle "JR". JR says "I'm treated like a person and a friend around here, not just some number like at other bigger universities. I feel like I'm part of the interlocking personalities of students and staff that make up the department, and I like that. I like that very much!"

The department is pleased and proud to have Justin (and indeed all our other students) studying with us!

Graduation day Reception

Parents and Graduates are invited to a reception in the Engineering Building the morning of Graduation, May 5th. to meet staff and tour the department.

Students from page 1

finding some furniture for the students' lounge. Any donations to the cause are

welcomed.

As you can see it's not all work, we mix a little fun into it as well.

Things to look for in the next issue

- 1) Who will be the next executive?
- 2) Was the mural completed before the end of the semester?



The second year students are just loving Prof Madani's Fluids Quiz. Can anyone smell smoke?



Sylvia Macdonald and Andrew Sinclair testing their artistic abilities. Don't quit Engineering, guys!!!

Visiting Scientists from China



Gao Shufang and Dr. Cao Wenzhi

Gao Shufang of the Department of Land and Environmental Sciences, Fujian Agricultural College, and Dr. Cao Wenzhi, a post doctoral fellow, at the Environmental Science Research Centre, Xiamen University, China spent four months as visiting scientists at Nova Scotia Agricultural College, Department of Agricultural Engineering.

Their interests were in water quality management, GIS and GPS. They visited several water quality research sites in Nova Scotia and worked with Dr. Ali Madani, Dr. Rob Gordon both of the NSAC, and Mr. Gary Patterson of Agriculture and Agri-Food Canada. They also visited the Agriculture and Agri-Food Canada (AAFC) Research Station in Fredericton, and toured the water quality monitoring sites established by AAFC.

Treatment from page 1

center wastewater is discharged. During dry seasons the wastewater infiltrates into the soil, but during wet seasons these systems often fail to prevent surface flow discharges. An extensive environmental assessment was performed on two such systems which had been receiving effluents for several years. The long-term effectiveness of soil infiltration systems was assessed through detailed soil and groundwater sampling in conjunction with in-lab P-adsorption experiments. Samples of surface water runoff were also collected to characterize effluents leaving these natural systems during heavy rainfall events. Sampling results have shown that soil infiltration systems can perform as P sinks for decades but other mobile contaminants, such as nitrate-N, pose a risk to groundwater quality.

Vegetated Filter Strips (VFS) are engineered systems that rely on soil and vegetation for wastewater renovation, much like natural infiltration systems. The VFS, however, is designed to provide complete infiltration of the applied wastewater into the ground, even during wet or frozen conditions. A VFS system was designed and installed on an operational dairy farm in Nova Scotia. All

wastewater inputs to the system were quantified with a calibrated tipping bucket and regular effluent sampling. Shallow monitoring wells were installed to study changes in groundwater quality beneath the infiltration site. Surface water samples were collected at various lengths along the strip to evaluate the vegetation's effectiveness as a filter. Grass samples were collected to quantify nutrient uptake by vegetation. Results have shown the VFS system to be an effective and inexpensive treatment alternative. The system has prevented any surface discharge of the applied wastewater while groundwater quality has not been degraded. From analysis of the surface water samples that were collected it has been shown that the vegetation itself is a poor filter for soluble pollutants and reinforces the idea that a VFS treating milking center wastewater must be designed for complete infiltration of the applied wastewater.

ENGINEERING TIMES is produced by the NSAC Engineering staff, co-ordinated by Wayne Bhola, (NSAC class of '74) and is published three times a year.

New Faces

Dr. Nurul Akhand, Ph.D. (Irrigation Engineering, University of Arizona, USA), a postdoctoral research fellow, joined the Engineering Department on April 1, 2000. He is working with Ali Madani and Rob Gordon. Dr. Akhand is married and has a young son. We welcome them to our community.

Grant Langford, P.Eng. taught Engineering Economics in the winter semester. He previously held the position as Plant Manager, LaFarge Canada, in the Brookfield plant.

Congratulations

Tricia Coulter has been successful in receiving a 2000 NSERC scholarship (M.Sc.) for a two year period. She is working on: 'Bacteria in Agricultural Surface and Subsurface Drainage Water.'

Teresa Hauser successfully defended her M.Sc. thesis titled: 'An Evaluation of Subsurface Water Quality Under Carrot Production in Nova Scotia.'

Rob Gordon and Ali Madani have just received word that their Canadian Foundation for Innovation (CFI) research infrastructure grant application has been approved. This grant will be used mainly for automation instrumentation for their water quality monitoring sites, and other equipment and training in support of their Environmental Management Research Program.

Applications up

The Engineering Diploma Degree Applications are up substantially compared to this time last year.

Contact us

Nova Scotia Agricultural College, P O Box 550, Truro NS B2N 5E3. Visit us on the web www.nsac.ns.ca or phone: Kevin Sibley 902-893-6712, Brenda Ryan 902-893-6710.