

Aquataalk

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Airing out an aquaculture hazard

Worker safety is key concern in radon study

BY JENNY TYE

Aquaculturists who work in poorly ventilated buildings may be exposed to a potentially dangerous, radioactive gas that lurks in some Ontario fish farming facilities, according to a joint study between the Ontario Ministry of Labour and the University of Guelph.

Radon is an invisible gas released during groundwater aeration. Arthur Scott and Susan Trankovits, the leaders of the study from the Ministry of Labour's Radiation Protection Service — in cooperation with Prof. Richard Moccia, Aquaculture Centre, University of Guelph — carried out a two-year, province-wide study and say radon could present a health risk to some Ontario

aquaculture workers.

"Radon is an unusual hazard faced by fish farmers," says Moccia. "That's partly why many of them are unaware of the potential for exposure. Fortunately, it's very rare, and the hazard is relatively easy and inexpensive to correct, once discovered."

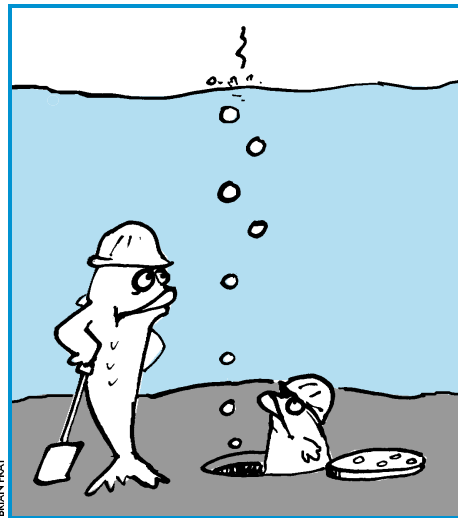
Radon is produced by the decay of the naturally radioactive element uranium. Often, groundwater from a pumped well, spring or artesian supply passes through soil or rock that may contain uranium. In some cases, dissolved radon from the decay of uranium is picked up by the water. If the water is agitated, or if air or other gasses

are bubbled through it, the dissolved radon gas is released.

Fish farms often use large amounts of groundwater that requires degassing and aeration before use in the facility. Depending on the water's radon concentration, significant amounts of the hazardous radon gas can be released into the atmosphere. Farmers with outdoor facilities are not at risk for radon exposure because the gas dissipates quickly. But if indoor facilities are poorly ventilated, high radon levels can accumulate inside buildings. Long-term exposure to radon can increase the chance of lung cancer, a serious and often fatal disease.

In the joint research study, 13 farms (voluntarily recruited at a radon workshop sponsored by the Aquaculture Centre and the Radiation Protection Service) were monitored for radon contamination. The researchers visited each

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farm to collect information on water source, water flow, building volume and layout. They then sampled the water to measure the dissolved radon concentration, and placed radon monitors in work areas to measure airborne levels. Three more sets of monitors were installed at three-month intervals to measure longer-term variations in air levels of radon inside farm buildings.

The information collected was used to calculate farm workers' exposure to the gas. In the end, the study indicated that three of the 13 farms tested had radon levels above safe limits in certain buildings.

Once the study was completed, the Radiation Protection Service met with the farmers to interpret study results and, in collaboration with the Aquaculture Centre, offered to help the affected farms examine and reduce radon problems. In most cases, simple and inexpensive building ventilation upgrades are all that may be necessary to correct the problem.

"The study was a productive collaboration between the University of Guelph and a provincial agency concerned with worker safety," says Moccia. "It was a well-rounded initiative because when the study was finished, we made sure that affected farms were not left alone to deal with a radon problem. We were able to offer solutions."

Producers who are concerned about the radon risk at their farm can contact the Aquaculture Centre for an initial consultation by calling 519-824-4120, Ext. 2689.



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Talking fish?

Researchers at the Universities of Guelph and Waterloo are working together to perfect the use of biotelemetry – the use of transmitter devices to collect biological information – to monitor physiological and behavioural changes of fish in response to different stressors. Battery-powered transmitters implanted into the body cavity of a fish can 'talk' to a computer to record heart rate, blood flow, muscle contractions and swimming behaviour. The data can be used to estimate energy expenditure and behavioural responses to various captive conditions and will ultimately help improve the health and welfare of farmed fish.

Alternative anaesthetics

Argon gas is being examined for its potential to anaesthetize fish. Argon gas is safe and easy to use, doesn't produce any chemical residues in fish flesh, and may offer an alternative to the use of carbon dioxide for fish euthanizing. Watch the next Aquatalk for the results of preliminary tests on rainbow trout.

A \$60-million "rainbow"

Did you know that Ontario produced nearly four million kilograms of farm-grown rainbow trout in 1998, with a contribution of about \$60 million to the provincial economy? Farmers also raised tilapia, Arctic charr, perch and speckled trout for human consumption, as well as a few other species for sports-fishing. Details of fish production in Ontario can be found in the Aquaculture Centre's publication, called *Aquastats 1998*. The 1999 production survey will be completed this summer.



Avoiding aquaculture accidents

Workshop promotes producer safety

BY ROWENA LINEHEN

Fish farming is an exciting and rewarding profession...but like any agricultural trade, it has its hazards. However, dangerous situations can be avoided with the proper knowledge, experience and equipment.

That's why the Aquaculture Centre, University of Guelph, along with Ontario's Farm Safety Association, hosted a one-day workshop to join government, research and private aquaculturists with industrial safety consultants. Workshops such as this one, called Health and Safety in Aquaculture, are important resource tools for anyone involved with fish farming.

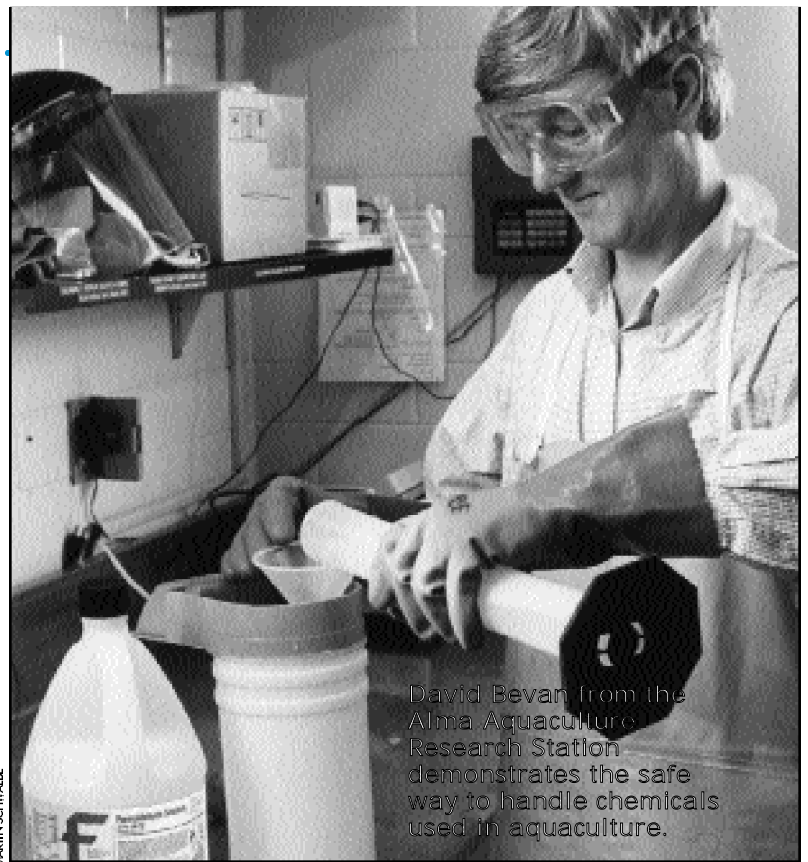
While acknowledging the obvious safety considerations associated with boating and offshore work common with cage-aquaculture farms, the focus of the workshop centred on the more common — yet equally dangerous — sources of workplace hazards. Presentations included the handling and maintenance of on-site electrical systems and generators, high-pressure gas cylinders, and the safe use of aquaculture chemicals and pesticides.

"The goal of the workshop was to educate aquaculturists about farming hazards and to reduce the potential for tragedy," says conference organizer Prof. Richard Moccia.

The workshop also dealt in detail with the important role of the Workplace Hazardous Materials Information System (WHMIS), stressing the value of conducting farm safety inspections, and touching on important legislative issues facing employers and employees.

WHMIS is at the core of Canada's nationwide system — implemented under federal and provincial legislation — to protect the health and safety of workers in contact with hazardous materials. The system pinpoints three basic workplace safety practices:

- **Training.** Educate employees about the hazards and safe use of workplace materials.
- **Labelling.** Read, use, and understand the cautionary labeling system on containers of hazardous material.
- **Material Safety Data Sheets.** Ensure the data for on-site chemicals is accessible for safe use and hazard information.



David Bevan from the Alma Aquaculture Research Station demonstrates the safe way to handle chemicals used in aquaculture.

MARTIN SCHWALBE

Aquaculture chemicals — including anaesthetics, antibiotics, disinfectants, fungicides, and pesticides — are just some of the chemicals on a fish farm that have the potential to cause personal harm. It's important to avoid inhaling or touching many of these chemicals, so farmers should use properly fitted respirators and protective gloves. As explained in the workshop sessions, basic equipment goes a long way toward preventing exposure sensitivity, allergy, respiratory damage and other long-term toxic effects.

On-site compressed gas cylinders present a significant physical hazard if not treated with respect, and the workshop offered some words of wisdom to prevent the accidental release of compressed gas.

Cylinders should be well secured to a fixed location to avoid being knocked over. The valve protection cap should be in place

when the cylinder is not in use, or is being transported. The use of an anchoring rack in a vehicle is a wise safety measure during cylinder transport.

Because of the proximity of water and electrical equipment at aquaculture sites, there are precautions that can be taken to avoid electrical shock and fire. Water is a good conductor of stray electrical current from faulty or improperly grounded circuits, so site workers face unique shock hazards. Damp conditions also hasten the corrosion of electrical instrumentation, which can cause increased circuit resistance and heat, leading to fire.

"Injury and death caused by lack of knowledge is unnecessary and unacceptable in today's farming environment," says Moccia.

For help conducting a farm safety audit, contact the nearest office of the Farm Safety Association or call the Aquaculture Centre.



Hooked on tech transfer

The aquaculture industry has a unique relationship with the Alma station

BY JENNY TYE

Through collaborative efforts with aquaculture's key industrial players, the Alma Aquaculture Research Station is helping bring the most current information and technologies to Ontario fish producers.

The Alma facility, one of the University of Guelph's 18 research stations, provides an excellent opportunity for industry and other interested parties to undertake unbiased scientific study.

Companies can conduct research in a partly-, fully- or non-proprietary fashion.

"For many companies, work that is not fully proprietary is quite acceptable," says station director Prof. Richard Moccia. This provision allows the university to publicly present, publish and disseminate the acquired aquaculture information, he says. "But for companies that wish to keep research results for their private use, arrangements can also be made. It's a winning formula all around with industry partnerships — for industry, the university and most importantly, fish producers."

One of the Alma station's mandates is to help develop near-commercial products and technologies and engage in aquaculture problem solving and trouble shooting. Working closely with industry, the station serves an important role in getting new products and services to producers.

Several feed and pharmaceutical companies, such as Shur-Gain, Martin Mills Inc. and Elanco Animal Health, have taken advantage of Alma's top-notch research facilities and expertise.

"We believe it's important to develop close linkages and collaborative relationships with the private sector, especially those that supply goods and services to aquaculture," says Moccia. "The research capabilities at Alma can help address the needs of those companies that routinely impact the aquaculture industry."

He says the Alma station is ideal for aquaculture studies. It has highly trained staff and the facilities necessary to

perform numerous replicates, which are essential for statistically valid studies.

Paul Dick, Manager of Regulatory Affairs and Research Affairs at Elanco Animal Health (an animal pharmaceutical branch of Eli Lilly) looks for professional and knowledgeable scientists, a skilled technical support group and up-to-date infrastructure in a research station.

"Quality assurance as well as valid data is very important to our company," says Dick. "That's why skilled researchers and high-quality research facilities, like those at Alma, are so important."

Others agree.

"The Alma Aquaculture Research Station is a state-of-the-art facility," says Dr. Adel El-Mowafi, aquaculture research coordinator, for animal feed company Shur-Gain. "It's the best I've seen in Canada."

Last year, Shur-Gain conducted tests at Alma to evaluate different sources and levels of blood meal in trout rations, as well as different fish pigment sources. This year, the company researched

the use of less expensive and more readily available fat sources, without compromising fillet quality.

"Alma is great because market-size fish can be grown," says El-Mowafi. "It's important to understand how nutrition effects these bigger animals compared to smaller fish. Aquaculturists should be proud of the research facilities that we have here in Ontario."

Martin Mills Inc., a company that also specializes in fish feed manufacturing and works with alternative fish food additives, continues to carry out studies at Alma.

"There's a world-class facility in our back yard," says Mark Wagner, feed manager at Martin Mills Inc. "The infrastructure at Alma is great and the scientists always know what's going on."

Organizations wishing to inquire about using Alma resources can contact Richard Moccia at 824-4120, Ext. 6216.



Dr. Adel El-Mowafi (left), aquaculture research coordinator, Shur-Gain and Prof. Richard Moccia, University of Guelph Aquaculture Centre discuss the finer points of fish nutrition research at the Alma Aquaculture Research Station.

