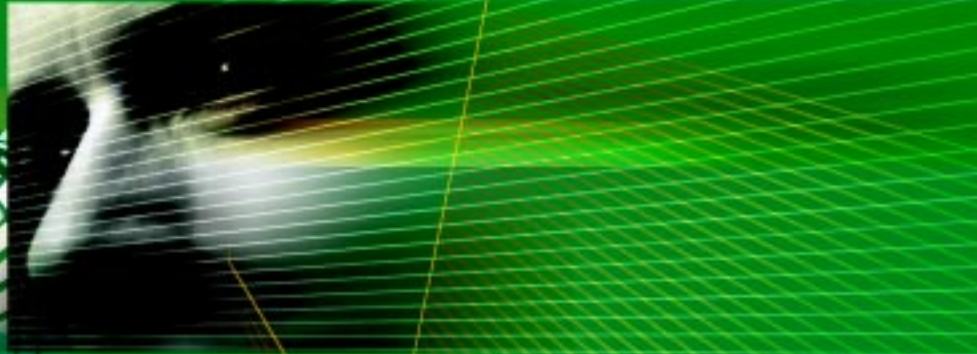


ANNUAL REPORT  
2001-2002



 Alberta  
INGENUITY  
Fund



## OUR PEOPLE

**Bill Bridger, Ph.D., F.R.C.S.,** President and Chief Executive Officer

**Anne Thomas,** Executive Administrator

**Wendy Lam, Ph.D.,** Director of Grants and Awards

**Nadine Cyr,** Program Coordinator

**Rhonda Lothammer,** Director of Communications

**Paulette Massie,** Administrative Assistant

**Connie Thompson,** Administrative Assistant

## We support people making discoveries



**Mr. Alvin Libin**  
Chairman, Board of Trustees



**Dr. William A. Bridger**  
President & Chief Executive Officer

From finding a way to capture new energy sources to developing crops that can withstand drought and disease, research drives innovation in our province. The application of this homegrown scientific endeavor continues to result in lasting economic benefits for Alberta and an enriched quality of life for Albertans and people beyond our borders.

Strengthened by Alberta Ingenuity support, researchers in academia and industry are producing first-class research that will lead to better management and conservation of our waterways, the sustainability of our valuable forests, and the development of stronger, hardier crops. Ingenuity-supported researchers are helping to establish Alberta as a recognized centre for energy and agricultural innovations, wireless communications, and nanotechnology. With Ingenuity assistance, our institutions are attracting brilliant young researchers to Alberta for advanced training in the fundamental sciences, engineering, and agriculture.

We are pleased to present this report on the second-year activities of the Alberta Ingenuity Fund. It has been an eventful year for us. Our first President, Bill Bridger, began his term mid-year and, together with our Board of Trustees, has worked to build programs and put staff in place. In this challenge, we are grateful for the outstanding abilities, valuable experience, and dedicated leadership of the Trustees.

Under the guidance of our Science and Engineering Advisory Council, new funding programs were implemented to bring bright research experts to Alberta and encourage those who are already here to continue to live and do their creative work in the province. Special thanks go to our dedicated and diligent peer reviewers who helped us to select those who received Ingenuity support. Our first awardees, in September 2001, included 20 top students. We are also pleased to note the implementation of our first programs to support promising researchers in academia and to help industry expand its science and engineering research capacity in the province.

One of our goals is to make Ingenuity another great reason for living and working in Alberta. Alberta Ingenuity embodies the optimism, vision, and pioneering spirit that built the province. We invite you to read in the pages ahead how the talented people we fund are leading science and engineering into new frontiers.

Yours sincerely,

**Mr. Alvin Libin**  
Chairman, Board of Trustees

**Dr. William A. Bridger**  
President & Chief Executive Officer

### HOW DOES OUR ENDOWMENT FUND WORK?

Our endowment fund operates like a trust fund that generates income from the principal. The investment is managed by Alberta Revenue. Annual budgets are designed to meet program needs while preserving the endowment for the future.

### WHAT DO WE SUPPORT?

Our funding includes basic and applied research in agriculture, the natural sciences, and engineering in fields as diverse as telecommunications, applied mathematics, ecology, and artificial intelligence.

We base our funding policies and grant programs on these two principles: fund only excellence and support the best people so they can pursue their discoveries. Our programs are developed in consultation with our international Science and Engineering Advisory Council and the Alberta research community.

They have stressed the need to help keep Alberta universities, public colleges and technical institutes, and industry competitive when recruiting bright new people and encouraging the leaders who are already here to stay in Alberta. Advisors have also stressed the importance of research training awards.

Alberta Ingenuity supports researchers working at the three research-intensive universities (University of Alberta, University of Calgary, and University of Lethbridge), as well as at public colleges and technical institutes. Our Industry Associateship program supports science and engineering research in the industrial sector.

### HOW DO WE DECIDE WHO AND WHAT TO SUPPORT?

Ingenuity funding is approved by our Board of Trustees, who rely on the advice of Alberta Ingenuity's President and staff, and a wide network of advisors, beginning with our international Science and Engineering Advisory Council. All applications are evaluated using a rigorous peer-review system. Each application is assessed for quality by external experts, and by review committees with representatives from Alberta and elsewhere. The review committees then forward their recommendations to our Trustees.

### HOW ARE WE ACCOUNTABLE?

We report to the people and the Government of Alberta through the Minister of Innovation and Science. Our annual report is submitted to the Legislature, and every three years, a more comprehensive Triennial Report is produced. In addition, an International Board of Review will assess our operations every six years.



## **OUR GRANT PROGRAMS**

We offer the following grant programs: Establishment Grants, Research and Industry Associateships, Studentships, and Ingenuity Research Centres. Competitions were held and award recipients announced for some of these programs in the 2001-2002 fiscal year, although in some cases, funds for completed competitions will be given out in the 2002-2003 fiscal year.

## **INGENUITY RESEARCH CENTRES**

Our flagship Ingenuity Research Centres program will focus funding on research where Alberta has established strengths and a critical mass of researchers in areas that could benefit Albertans. Early in the year, a call for letters of intent was sent out to eligible applicants. A number of these letters were selected to be developed into full proposals for consideration in the first competition, which closed in fiscal year 2001-2002. After thorough peer review, two new Centres awardees were announced in summer 2002.

## **ESTABLISHMENT GRANTS**

Ingenuity Establishment Grants support lab start-up costs for independent investigators who have been newly recruited to, or recruited back to, Alberta. These grants help researchers to purchase equipment and supplies, obtain technical support, and pay for research-related travel and lab renovations.

## **STUDENTSHIPS**

Full-time Alberta doctoral or master's students in a science, engineering, or agricultural field are eligible to apply for an Ingenuity Studentship Award. Students currently in their first year of graduate studies and new students coming into Alberta are both eligible for this award.

## Energy gold mine under the tundra

Hidden beneath the permanently frozen ground of Canada's most northerly region lies a potential energy gold mine. Icy chunks of compact natural gas hydrates in soil and rock formations sit below the Earth's surface waiting to be harvested. If scientists can find a way to tap this energy source it may hold great promise. "If we can recover methane from these hydrates, it's been calculated that this source of energy could provide energy to North America for the next 64,000 years," explains Dr. Jocelyn Grozic, a geotechnical engineer who looks at how natural gas hydrate deposits form in soil.

She's particularly interested in what happens to surrounding soil and rock formations when hydrate deposits melt and turn into gas. The results of her work could provide a better understanding of conditions that may pose problems in offshore drilling rigs. "Researchers in this area are working to develop technology that can capture this energy in a safe and affordable way, but it may take several years before we can do so," she says. "Before we do anything, we need to know that the gas won't escape and blow up the side of a well when we try to extract it." Hydrate ice can also block gas pipelines, posing another hazard to pipeline workers.

Extracting gas hydrates from soil is an area of research that is attracting great interest, particularly in countries such as Japan, which has no natural resources of its own but does have access to offshore energy supplies. Once natural gas is extracted from the earth it gets refined into fuels that burn in household furnaces and water heaters, and are utilized in industrial applications.

Dr. Grozic, who worked as an engineering consultant in industry for two years, left that life in Vancouver to return to academia and a career as a researcher at the University of Calgary. "I really fell in love with research," she says. "Unlike industry where you are constrained by a client's budget and needs, in research you can be creative and push everything right to the cutting edge." She accepted a position as Assistant Professor in the Department of Civil Engineering knowing that by holding an Ingenuity Establishment Grant, she could attract even more funding for her work.

Dr. Grozic returned to the Norwegian Geotechnical Institute in Oslo, Norway this past summer to work with equipment that, as a post-doctoral fellow, she built and used there. She's now back in Calgary, busily setting up a lab that will allow her to conduct her own studies of gas hydrates in soil.





## Creating stronger, hardier plants

Unlike animals, plants can't run away from things that may harm them. To survive, they must adapt to changing environmental conditions such as extremes in temperature or bacteria, viruses, or insects. Ingenuity Establishment Grant recipient Dr. Igor Kovalchuk's research looks at how plants alter their genetic makeup to better tolerate potential threats in nature.



The University of Lethbridge scientist began working in plant biology in his native Ukraine. His interest in the field was piqued when as a young medical student, he went on a study exchange to Switzerland and later completed his Ph.D. there. While in Switzerland he met leading plant virologist Dr. Barbara Hohn, who was studying how organisms had reacted to the 1986 nuclear disaster in Chernobyl. Along with his wife and colleague Olga, Igor began studying the impact of radiation on plant genomes and the wheat mutation rate after fallout from the reactor explosion contaminated regions of Ukraine.

While nuclear radiation may be the most extreme condition plants may ever face, other severe stresses, such as drought, high winds, and environmental damage, can also damage and weaken them. "Our goal is to prove how tobacco and canola plants in particular can alter their genetic makeup in order to survive," he explains. "By understanding how they do this, we can expose them to conditions that will force them to produce stronger offspring."

The challenge for Igor and other biologists is to promote plant growth and stronger crops while ensuring plant products remain safe for people to eat. A common public concern about food safety is how plants are altered and what the long-term effects of genetically modifying plants will be. If scientists can force plants to resist stress without genetic engineering, the use of transgenic plants may not be necessary.

## Essential research for essential oils

Over-the-counter herbal remedies promising relief from a wide variety of ailments, ranging from acne to arthritis, are a booming business in North America. Whether used for aromatherapy, cosmetics, or food supplements, there is an ever-increasing demand for "natural" products. But unlike prescription drugs, these natural alternatives are unregulated and do not undergo quality controls or safety tests before they are marketed.

In Alberta, that may soon change. Olds College researcher Dr. Daise Lopes is constructing a database of the chemical composition of essential oils derived from aromatic and medicinal plants (such as peppermint and rose) grown in Alberta. Her findings will be used to develop quality control and certification standards for the province's herbal and medicinal plant industry, as well as enabling producers and processors to choose plant varieties that may give them a competitive edge. In a related project, she will investigate other common crops, such as barley, for nutritional substances.

Studying herbal remedies and medicinal plants is familiar territory for the native Brazilian, who grew up in a rural region where citrus juices and locally grown plants such as garlic and peppers were commonly used to treat medical ailments. Later, as a Pharmacy student Daise collaborated on an evaluation of the chemistry and pharmacology of these and other medicinal plants in the local tropical rain forest. She has just completed work as a natural-product chemist in Rio de Janeiro, where she specialized in the analysis and research of aromatic essential oils, antioxidants, and medicinal herbs in plants. As an Ingenuity Associate, she has transferred her skills to Olds College, where a new pilot plant is being built for use by small and medium companies who want to test their plant material before they take it to market.





## Sowing the seeds of research success in industry

When Andrew Liu completed his Ph.D. at the University of British Columbia, it didn't take long for the newly minted chemical engineer, a native of China, to figure out that one of the best places in Canada for people in his profession to work is Calgary, a major oil and gas centre in the province. So the enterprising young scientist set out to search the booming city for a company that could help him reach his career goals. Andrew soon discovered Virtual Materials Group Inc., a successful new company specializing in the design of chemical engineering software for the oil and gas industry.

He immediately liked what he heard about the company from Marco Satyro, VMG's Chief Technical Officer. "The people at VMG are very smart," Andrew says. "They've got lots of experience, great ideas, and the work they do is incredibly interesting and innovative." Andrew wasted no time in signing on with them as a consultant and software developer.

The specialized computer products he develops are used to calculate complex mathematical equations that enable companies to design and construct more efficient and productive equipment and machinery for gas plants and oil refineries. These software "engines" can provide an accurate picture of the amount and composition of the gases and liquids produced when a material is heated and separated into these forms.

### **AN OPPORTUNITY FOR FURTHER GROWTH**

It was Marco who first heard about the Ingenuity Industry Associateship program from a colleague. The program is designed to help Alberta companies of any size expand their science and engineering research capacity by recruiting new researchers to the province. VMG seized on the opportunity the program presented. "As a small but growing company we saw the Ingenuity program as an excellent way for us to pursue further research and to update the computer equipment that will be used in the research," Marco explains. "The program is really a win-win situation for Andrew, who is an up-and-coming researcher, our company—which is also growing—and for the Alberta science and engineering community as a whole."



## Painting a picture of our environment with water

The development of a more effective assessment process for Alberta environmentalists began with a single good question. After an intensive six-month brainstorming session, Ryan Smith, a master's student in the Department of Renewable Resources at the University of Alberta, came up with a question that may provide ecological answers: How can we relate land-use changes in the landscape to water-quality changes in rivers?

Ryan's research involves a comparative study of the Red Deer and Bow rivers from their glacial origins in Banff National Park to several points outside the park's boundaries. The absence or presence of particular invertebrates in the rivers is the "litmus test" that he uses to evaluate water quality. Aquatic insects such as caddis-flies are highly sensitive to deterioration in water quality and changes in their life cycle are an accurate reflection of the health of the river itself. Ryan's task is to determine to what degree the changes are attributable to natural variation and to what degree to activities in the landscape.

The cumulative assessment is the first study to take into consideration the effects which various land uses, such as agriculture, forestry, and oil and gas, have on water quality. It is the all-encompassing nature of the project that Ryan believes will be invaluable in creating a more effective environmental assessment process. "We can look at the pieces, but it's important to understand how the pieces fit together," he says.

The unspoiled quality of parts of Banff National Park is what makes Ryan's research possible, and he finds it fitting that his work may help maintain the park's ecological integrity.





## Detecting the diet of dinosaurs

Part of the heritage of Alberta is the fossil remains of the dinosaurs that dominated life in the region for 130 million years until their extinction 65 million years ago. Albertans are justifiably intrigued by these astounding beasts, and so are the thousands of enthusiasts who travel to our province to explore our museums and badlands. As custodians of one of the world's prime sites for dinosaur fossil discoveries, we must continue to learn as much as we can about the life of these creatures.

Eric Snively can trace his fascination with dinosaurs back to early childhood, when, as a four-year-old, he was shown the fossilized footprint of a duck-billed dinosaur. That early fascination is still present as he describes his research—the study of what tyrannosaurs ate.

"*Tyrannosaurus rex* was one of the largest meat-eating dinosaurs," he explains. "It was the most powerful and the most sophisticated and it had the strongest jaw muscles and bite force of any known species." By studying dinosaur remains, scientists can determine what these ancient creatures ate. Fossilized dung indicates that *T. rex*'s menu included plant-eating juvenile duckbilled or horned dinosaurs.

During a visit to Dinosaur Provincial Park, the California native fell in love with Alberta's badlands. The chance to work with Tony Russell (his supervisor), a world-renowned researcher on vertebrate animals and the Tyrrell Museum's Phil Currie, "the world's greatest dinosaurpaleontologist", along with Ingenuity support was enough to convince Eric to pursue his graduate studies at the University of Calgary.

Eric's research focuses on how tyrannosaurs fed and how they killed their prey by studying the jaw and neck muscles of its closest modern relatives: birds and crocodiles.

He will also be studying muscle function in eagles, hawks, and falcons. "By putting electrodes on the necks of birds in wildlife reserves, we can analyze their neck and jaw function when they feed," he says. "We can see how they pull back and up on their food and better understand the strength of the muscle pull on different parts of their neck."

One might think that all of this talk about the jaws of huge predatory dinosaurs would leave Eric glad to be studying them in extinction, but he says he would jump at the chance to see them alive. "I would probably go out there unprepared, just to see them interact with other animals in their ecosystems."



### OUR BOARD OF TRUSTEES

We are governed by a Board of Trustees. Six Trustees are nominated by various educational institutions and professional organizations to represent them and six more are appointed by the Government of Alberta.



**Back row (L to R):**

Eric Newell, Scobey Hartley, John Moldon, Janice Rennie, Elizabeth Cannon, Ted Newall, Darrel Danyluk

**Front row (L to R):**

James Horsman, Bernie Kotelko, Alvin Libin, Ron Triffo, Marvin Moore

### SCIENCE AND ENGINEERING ADVISORY COUNCIL (SEAC)

Our Science and Engineering Advisory Council advises us on major policies and programs. Members are international experts in their respective research fields, and leaders in broader areas such as technology commercialization, science and technology policy, and championing women in science and engineering.



**Back row (L to R):**

Dr. Alan Astbury, Dr. Chris Somerville,  
Dr. Maria Klawe, Dr. John Schaefer,  
Dr. David Gubbins, Dr. Richard de Neufville

**Front row (L to R):**

Dr. Larry Milligan, Dr. Khalid Aziz,  
Dr. Dennis Teeguarden, Dr. Michael Gray  
Missing from photo: Dr. Adel Sedra,  
Dr. Arthur Dempster



## INDUSTRY

In addition to our program support for industry research, we partner with Alberta industry on several initiatives:

Alberta Ingenuity is a patron organization of the ASTech Foundation (Alberta Science and Technology Leadership Awards Foundation). ASTech comprises key industry leaders and stakeholders committed to the development of science and technology. Through the contributions of Alberta Ingenuity and other patron organizations, the Foundation carries out its mission and celebrates the accomplishments of Alberta's science and technology community.

In partnership with the Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA), we also sponsor the Alberta Ingenuity Fund Research Excellence Award, given to professionals in academia or industry who have conducted innovative research in engineering, geology, or geophysics. Additionally, Alberta Ingenuity sponsors the Science and Technology category of the Edmonton YWCA's annual "Tribute to Women of Distinction" Awards. The award recognizes significant contribution or outstanding achievement in the advancement of science or technology, through research or application, in the Edmonton area.

## YOUTH EDUCATION

One of Alberta Ingenuity's main objectives is to encourage young Albertans to consider careers in science and engineering research. We partner with community and academic organizations to achieve this goal.

## DISCOVER-E



Each summer, kids aged 9 to 15 have the chance to discover the excitement of science and engineering through Discover-E (for Excitement) summer science camps run by University of Alberta students. Activities at the most recent Grande Prairie

camp (funded by Alberta Ingenuity) included building gravity cars, dissecting squid, constructing pinball machines, and making electric toothbrushes. The creative learning activities introduce campers to aspects of civil and mechanical engineering, chemistry, biology, and physics.

Discover-E also holds week-long day camps at the University of Alberta throughout the summer. Alberta Ingenuity has also sponsored Discover-E workshops for Grande Prairie schools.

## MINDS-IN-MOTION

Anthony Chen is only in grade school, but he has studied science and engineering at the University of Calgary—the fun way, at a week-long summer camp. Anthony is an enthusiastic Minds-in-Motion "graduate". Minds-in-Motion is the science and engineering camp program run by University of Calgary students on campus.

Anthony was one of many 2001 Calgary campers funded by an Alberta Ingenuity Fund bursary for children who otherwise would not be able to attend.

Alberta Ingenuity Fund also sponsored the first Grandparent-Grandchild Saturday Minds-in-Motion workshop. It proved to be the most popular event ever hosted by the Minds-in-Motion program.

**OUR RESEARCHERS:****OCTOBER 2001 ESTABLISHMENT GRANT RECIPIENTS  
UNIVERSITY OF ALBERTA**

**Norman Beaulieu** Department of Electrical and Computer Engineering, Faculty of Engineering *Innovations in theory and technology for wireless communications.*

**Subir Bhattacharjee** Department of Mechanical Engineering, Faculty of Engineering *Development of a laboratory for colloidal phenomena and complex fluids.*

**Daniel Kwok** Department of Mechanical Engineering, Faculty of Engineering *Adsorption-mediated self-propelled drop movement on self-assembled monolayers.*

**Martin Unsworth** Department of Physics, Faculty of Science *Electromagnetic studies of tectonic processes.*

**Anthony Yeung**  
Department of Chemical and Materials Engineering, Faculty of Engineering *Micro-interfacial phenomena.*

**UNIVERSITY OF CALGARY**

**Jocelyn Grozic** Department of Civil Engineering, Faculty of Engineering *A laboratory study on the geomechanics of gas hydrate formation/dissociation in porous media.*

**David Schriemer** Department of Biochemistry and Molecular Biology, Faculty of Medicine *The development of advanced biomolecular interaction analysis tools for the post-genomic era.*

**Caterina Valeo** Department of Geomatics Engineering, Faculty of Engineering *Emulating fire related disturbance in forested watersheds.*

**Hugh Williams** Department of Mathematics and Statistics, Faculty of Science *Development and testing of number theoretic cryptosystems.*

**UNIVERSITY OF LETHBRIDGE**

**Igor Kovalchuk** Department of Biological Studies, Faculty of Art and Science *Pathogen-induced plant genome instability: a contribution to the evolution of resistance genes in plants.*

**2002 ASSOCIATESHIP RECIPIENTS:  
UNIVERSITY OF ALBERTA**

**Andrei Brantov** Department of Physics, Faculty of Science *Plasma transport and kinetic theory.*

**Rui Chen** Department of Chemistry, Faculty of Science *Development of two-dimensional liquid chromatography/mass spectrometry for proteome analysis.*

**Dalton Harvie** Department of Chemical and Materials Engineering, Faculty of Engineering *A multi-fluid description of solid liquid suspension flows.*

**Murray Humphries** Department of Biological Sciences, Faculty of Science *Threshold responses of wildlife to natural and anthropogenic impacts: linking patterns to process via bioenergetics.*

**Bao Liu** Department of Mechanical Engineering, Faculty of Engineering *Devising adaptive wavelet transforms for condition monitoring and fault diagnosis of rotating equipment.*

**Omid Madani** Department of Computing Science, Faculty of Science *Machine learning for control policies in image interpretation.*

**Lucero Mariani** Department of Renewable Resources, Faculty of Agriculture, Forestry, and Home Economics *Effects of soil fauna on organic matter mineralization in boreal forest soils.*

**David Selby** Department of Earth and Atmospheric Sciences, Faculty of Science *A new tool for geological age determination of hydrocarbons: development of the rhenium-osmium radioisotope system.*

**Hartmut Wege** Department of Mechanical Engineering, Faculty of Engineering *Self-propelled drop movement by formation of nanostructures.*

**Yan Xin** Department of Electrical and Computer Engineering, Faculty of Engineering *Peak-to-average power ratio reduction for multicarrier modulation using guided scrambling coding.*



#### UNIVERSITY OF CALGARY

**Jo-Anne Brown** Department of Physics and Astronomy, Faculty of Science *Exploring the magnetic field in the disk of the galaxy.*

**David Corr** Faculty of Kinesiology *Molecular motors and mechanisms of contraction.*

**David Emslie** Department of Chemistry, Faculty of Science *2,2'-diboratebiphenyl; a unique chelating Lewis acid with potential as a ligand, cocatalyst and organic synthon.*

**Peter Hoyer** Department of Computer Science, Faculty of Science *Quantum algorithms and complexity theory.*

**Sang-Un Park** Department of Biological Sciences, Faculty of Science *Genetic engineering of opium poppy to improve growth and alkaloid yield.*

**Mikko Syrjäsuo** Department of Physics and Astronomy, Faculty of Science *Automated image analysis in auroral research.*

**Yingjun Zhao** Department of Electrical and Computer Engineering, Faculty of Engineering *Self-assembly of porous coordination solids for heavy metal sorption.*

#### UNIVERSITY OF LETHBRIDGE

**Susan Lingle** Department of Psychology and Neuroscience, Faculty of Arts and Science *Evolution of cooperation in deer.*

#### OLDS COLLEGE

**Daise Lopes** Centre for Innovation *Value-added natural products from Alberta's crops: identification and quantification of bioactive component.*

#### INDUSTRY

**Andrew Liu**  
Virtual Materials Group Inc. *Calculation of physical properties with uncertainty integrated with process simulation.*

#### OCTOBER 2001 STUDENTSHIP RECIPIENTS

##### UNIVERSITY OF ALBERTA

**Zhen Deng** Department of Computing Science, Faculty of Science *Investigation of vision-based control for human-assistive robotics.*

**Kirk Feindel** Department of Chemistry, Faculty of Science *Solid-state NMR investigation of spin-lattice relaxation of heavy nuclei and indirect characterization of EFG.*

**Michelle Forgeron** Department of Chemistry, Faculty of Science *New directions and applications of solid-state NMR.*

**Bo Hu** Department of Electrical and Computer Engineering, Faculty of Engineering *Phasor Nakagami-m fading model.*

**Kristopher Ooms** Department of Chemistry, Faculty of Science *Cross-polarization from optically polarized  $^{129}\text{Xe}$  to  $^{29}\text{Si}$  in inorganic channels and cavities.*

**Hans Osthoff** Department of Chemistry, Faculty of Science *A laser-based gas sensor for environmental monitoring.*

**Shawn Parries** Department of Biological Sciences, Faculty of Science *The developmental roles of nitric oxide in the pond snail *Helisoma trivolvis*.*

**Mohammad Shadnam** Department of Mechanical Engineering, Faculty of Engineering *Micro-patterning, self-assembled monolayer surface properties using a laser beam.*

**Rumana Sharmin** Department of Chemical and Materials Engineering, Faculty of Engineering *Data-based fault detection and isolation systems for the process industry.*

**Ryan Smith** Department of Renewable Resources, Faculty of Agriculture, Forestry and Home Economics *A cumulative effects assessment of water quality in the Bow River system in Banff National Park.*

**Heidi Swanson** Department of Biological Sciences, Faculty of Science *Invasion time and lake productivity as determinants of the ecological effects of rainbow smelt.*

**Wendy Topic** Department of Chemistry, Faculty of Science *High resolution study of helium atom containing Van Der Waals complexes.*

## UNIVERSITY OF CALGARY

**Patrick Brunelle** Department of Chemistry, Faculty of Science  
*Damage to neuron cell membranes by glyxyl radicals.*

**Chantall Fedorchuk** Department of Chemistry, Faculty of Science  
*Investigations of novel ligand systems.*

**Sean Hum** Department of Electrical and Computer Engineering,  
Faculty of Engineering *Adaptive antennas for radio-on-fiber systems.*

**Peter Keech** Department of Chemistry, Faculty of Science  
*Electrochemistry of solid oxide fuel cell anodes.*

**Cori Lausen** Department of Biological Sciences, Faculty of Science  
*Population structures of western small-footed bat and big brown bats  
in southern Alberta.*

**Jennifer Reid** Department of Chemistry, Faculty of Science *Design  
and construction of highly porous sulfonate-based frameworks.*

**Eric Snively**  
Department of Biological Sciences, Faculty of Science *Comparative  
feeding mechanics of carnivorous theropod dinosaurs.*

**Danuta Sztukowski**  
Department of Chemical and Petroleum Engineering, Faculty of Engineering  
*Water-in-oil emulsions stabilized by asphaltenes and solids.*

## MAY 2001 STUDENTSHIP RECIPIENTS

## UNIVERSITY OF ALBERTA

**Lindsey Carmichael** Department of Biological Sciences,  
Faculty of Science *Population genetics, migration patterns, and  
subspecies classification of Arctic canids.*

**Cheryl Chetkiewicz** Department of Biological Sciences,  
Faculty of Science *Integrating habitat management and corridor  
design for carnivore conservation in the Rocky Mountains.*

**Andrei Gaponenko** Department of Physics, Faculty of Science  
*TRIUMF weak interaction symmetry test: precision study of muon decay.*

**Ruby Grewal** Department of Biological Sciences, Faculty of  
Science *The control of active cell death in the face of oxidative stress.*

**Anne Hearn** Department of Chemical and Materials Engineering,  
Faculty of Engineering *Catalytic performance of supported polyaryloxy  
ligands in gas-phase ethylene polymerization.*

**Suzanne Hoppins** Department of Biological Sciences, Faculty of  
Science *Investigation of Tim8 structure and function in Neurospora crassa.*

**Ernest Jankowski** Department of Physics, Faculty of Science  
*Software for optimal jet finding and particle mass determination.*

**Hans Jensen** Department of Electrical and Computer Engineering,  
Faculty of Engineering *Chiral optical devices for optical computing  
applications.*

**Jun Lu** Department of Biological Sciences, Faculty of Science  
*Characterization of TraM functions in F conjugation system.*

**Ross Stirling** Department of Mechanical Engineering, Faculty of  
Engineering *Inertially based proprioceptive sensor development.*

**Yuaning Wang** Department of Electrical and Computer  
Engineering, Faculty of Engineering *Modeling of electricity markets.*

**Jun Yang** Department of Mechanical Engineering, Faculty of Engineering  
*Time-dependent electrophoretic flow and streaming potential in intersection  
microchannels and micropumps.*

## UNIVERSITY OF CALGARY

**Cheryl Bodnar** Department of Chemical and Petroleum Engineering,  
Faculty of Engineering *Expansion of hepatic oval stem cells in bioreactors.*

**Jason Cooper** Department of Physics and Astronomy, Faculty of  
Science *Application of semi-classical dynamics and quantum statistics  
to the prediction of vibrational-rotational spectra.*

**Casey Hubert** Department of Biological Sciences, Faculty of Science  
*Nitrate mediated microbial control of souring in oil reservoirs.*

**Julia Linke** Department of Geography, Faculty of Social Sciences  
*Detection of seismic lines with Landsat TM and IRS images: effects on  
landscape structure and locations of bears.*

**Gen Ong** Department of Electrical and Computer Engineering,  
Faculty of Engineering *Tunable optical filter.*

**Simon Strasser** Department of Physics and Astronomy, Faculty of  
Science *Temperature and density structure of galactic neutral hydrogen.*

**Frédéric Walter** Department of Geography, Faculty of Social  
Sciences *Climate change and glacier dynamics on Bylot Island.*

**Eva Zurek** Department of Chemistry, Faculty of Science *Modeling  
methylaluminoxane-activated olefin polymerization/implementation of  
solvation in QM/MM.*



# Auditor's Report

## **TO THE BOARD OF TRUSTEES OF THE ALBERTA HERITAGE FOUNDATION FOR SCIENCE AND ENGINEERING RESEARCH**

I have audited the statement of financial position of the Alberta Heritage Foundation for Science and Engineering Research as at March 31, 2002 and the statements of operations, changes in net assets, and cash flows for the year then ended. These financial statements are the responsibility of the Foundation's management. My responsibility is to express an opinion on these financial statements based on my audit.

I conducted my audit in accordance with Canadian generally accepted auditing standards. Those standards require that I plan and perform an audit to obtain reasonable assurance whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation.

In my opinion, these financial statements present fairly, in all material respects, the financial position of the Foundation as at March 31, 2002 and the results of its operations and cash flows for the year then ended in accordance with Canadian generally accepted accounting principles.

I also report that Section 8(2) of the *Alberta Heritage Foundation for Science and Engineering Research Act* states that "The Provincial Treasurer shall not pay money out of the Endowment Fund if in the opinion of the trustees of the Foundation, on consultation with the Provincial Treasurer, the payment would impair the real value of the Endowment Fund over the long term." As the terms "real value" and "over the long term" are not defined in the legislation, I am unable to assess whether transfers from the Endowment Fund were made in compliance with this section of the Act.

CA  
Auditor General

Edmonton, Alberta  
June 14, 2002

**STATEMENT OF FINANCIAL POSITION**  
**MARCH 31, 2002**

	2002	2001
<b>Assets</b>		
Current		
Cash (Note 3)	\$ 64,615	\$ 35,397
Accounts receivable	3,372	1,875
Prepaid expenses	4,092	2,741
	<b>72,079</b>	40,013
Long Term		
Property, plant and equipment (Note 5)	<b>171,098</b>	32,747
Total Assets	<b>\$ 243,177</b>	\$ 72,760
<b>Liabilities and Net Assets</b>		
Current		
Accounts payable and accrued liabilities	\$ 103,909	\$ 48,072
Long Term		
Deferred lease inducement	<b>48,951</b>	-
Total Liabilities	<b>152,860</b>	48,072
Net assets (Note 6)	<b>90,317</b>	24,688
	<b>\$ 243,177</b>	\$ 72,760

**STATEMENT OF OPERATIONS  
FOR THE YEAR ENDED MARCH 31, 2002**

	2002	2001
<b>Revenue</b>		
Transfer from Endowment Fund (Note 4)	\$ 1,550,000	\$ 575,000
Interest	4,423	3,886
	<b>1,554,423</b>	<b>578,886</b>
<b>Expense</b>		
Grant and awards		
Training	275,531	-
	<b>\$ 275,531</b>	<b>-</b>
<b>Operations</b>		
Peer review	220,588	79,533
Human resources	491,621	177,614
Communication and education	118,577	4,572
	<b>\$ 830,786</b>	<b>\$ 261,719</b>
<b>Administration</b>		
Office services	198,171	57,576
Information services	8,093	15,581
Governance and planning	154,604	216,479
Amortization of property, plant and equipment	21,609	2,843
	<b>382,477</b>	<b>292,479</b>
	<b>1,488,794</b>	<b>554,198</b>
<b>Excess of revenue over expense</b>	<b>\$ 65,629</b>	<b>\$ 24,688</b>

**STATEMENT OF CHANGES IN NET ASSETS  
FOR THE YEAR ENDED MARCH 31, 2002**

	2002			2001
	Invested in Property, Plant and Equipment	Unrestricted	Total	Total
Balance at beginning of year	\$ 32,747	\$ (8,059)	\$ 24,688	\$ -
Excess of revenue over expenses	-	65,629	65,629	24,688
Purchase of property, plant and equipment	161,436	(161,436)	-	-
Proceeds from disposal of property, plant and equipment	(1,476)	1,476	-	-
Amortization of property, plant and equipment	(21,609)	21,609	-	-
Balance at end of year	\$ 171,098	\$ 80,781	\$ 90,317	\$ 24,688

**STATEMENT OF CASH FLOW  
FOR THE YEAR ENDED MARCH 31, 2002**

	2002	2001
<b>Operating activities</b>		
Cash from operations	\$ 1,554,423	\$ 578,886
Cash for grants and awards	(275,531)	-
Cash for operations	(794,877)	(255,863)
Cash for administration	(294,837)	(252,036)
<b>Net cash provided from operating activities</b>	<b>\$ 189,178</b>	<b>\$ 70,987</b>
<b>Investing activities</b>		
Cash paid for purchase of property, plant and equipment	(161,436)	-
Proceeds on disposal of property, plant and equipment	1,476	(35,590)
<b>Net cash used for investing activities</b>	<b>(159,960)</b>	<b>(35,590)</b>
<b>Net increase in cash for the year</b>	<b>29,218</b>	<b>35,397</b>
<b>Cash at beginning of year</b>	<b>35,397</b>	<b>-</b>
<b>Cash at end of year</b>	<b>\$ 64,615</b>	<b>\$ 35,397</b>

**NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED MARCH 31, 2002****Note 1 Authority and Purpose**

The Alberta Heritage Foundation for Science and Engineering Research (the Foundation) operates under the authority of the Alberta Heritage Foundation for Science and Engineering Research Act, Chapter A-21, Revised Statutes of Alberta 2000, as amended. The Foundation commenced operations on April 1, 2000 and is exempt from Income Tax under section 149 (1)(d.1) of the Income Tax Act.

The Foundation supports and promotes a balanced long term program of science and engineering research based in Alberta directed to the discovery of new knowledge and application of that knowledge to improve the quality of Alberta's economy, communities and environment.

**Note 2 Significant Accounting Policies and Reporting Practices**

These financial statements have been prepared by management in accordance with Canadian generally accepted accounting principles.

**(a) Property, Plant and Equipment and Amortization**

Property, plant and equipment are recorded at cost less accumulated amortization. Property, plant and equipment are amortized on a straight-line basis over their estimated useful lives at the following annual rates:

Furniture	10%
Office equipment	20%
Computer equipment	33%

Leasehold improvements are amortized on a straight-line basis over the term of the lease.



## **NOTES TO THE FINANCIAL STATEMENTS FOR THE YEAR ENDED MARCH 31, 2002**

### **Note 2 Significant Accounting Policies and Reporting Practices (continued)**

(b) Fair Value of Financial Instruments

Short-term instruments are valued at their carrying amounts which are reasonable estimates of fair value due to the relatively short period to maturity of the instruments. This approach applies to cash, accounts receivable, accounts payable and accrued liabilities.

(c) Revenue Recognition

Unrestricted contributions are recognized as revenue in the current period if the amount to be received can be reasonably estimated and collection is reasonably assured. Unrestricted investment income is recognized as revenue when earned.

(d) Grants and Awards Expense

Grants and awards approved by the Trustees of the Foundation are recorded as expenses when the awardee has been notified of the amount of the award and all terms and conditions of eligibility for payment of the award have been met.

(e) Lease Inducement

The lease inducement, a cash payment received by the Foundation on the lease for office premises, has been deferred and is accounted for as a reduction of office rental expense on a straight-line basis over the term of the lease.

### **Note 3 Cash**

Cash consists of a deposit in the Consolidated Cash Investment Trust Fund which is managed by Alberta Finance to provide competitive interest income while maintaining maximum security and liquidity of depositors' capital. The portfolio is comprised of high quality short-term and mid-term income securities with a maximum term to maturity of five years. Interest is earned on the daily cash balance at the average rate of earnings of the Fund, which varies depending on prevailing market interest rates.

## NOTES TO THE FINANCIAL STATEMENTS FOR THE YEAR ENDED MARCH 31, 2002

### Note 4 Alberta Heritage Foundation for Science and Engineering Research Endowment Fund

The Endowment Fund operates pursuant to the *Alberta Heritage Foundation for Science and Engineering Research Act* and consists of an initial endowment of \$500 million from the General Revenue Fund of the Province of Alberta together with cumulative earnings thereon, less cumulative transfers to the Foundation.

Transfers to the Foundation are available at the request of the Trustees of the Foundation provided that such transfers do not impair the real value of the Endowment Fund, over the long term.

At March 31, 2002, the net assets of the Endowment Fund valued at cost was approximately \$513 million (2001 \$524 million) and the market value of the investments was \$475 million (2001 \$467 million).

### Note 5 Property, Plant and Equipment

	2002			2001
	Cost	Accumulated Amortization	Value Book Value	Net Book Value
Furniture and equipment	\$ 83,841	\$ 4,879	\$ 78,962	\$ 7,568
Computer hardware and software	48,977	14,483	34,494	25,179
Leasehold improvements	62,587	4,945	57,642	-
	\$ 195,405	\$ 24,307	\$ 171,098	\$ 32,747

### Note 6 Net Assets

Expenses include the science and engineering programs of the Foundation which are funded from the transfers from the Endowment Fund and available cash balances. The Foundation's policy is to retain funds in the Endowment Fund and transfers are made only on an as needed basis.

**NOTES TO THE FINANCIAL STATEMENTS  
FOR THE YEAR ENDED MARCH 31, 2002**

**Note 7 Salaries and Benefits – Trustees and Officers**

	2002			2001
	Salaries <sup>(a)</sup>	Benefits <sup>(b)</sup>	Total <sup>(c)</sup>	Total <sup>(c)</sup>
Chairman	\$ 10,750	\$ –	\$ 10,750	\$ 11,850
Board of Trustees	89,000	2,604	91,604	91,056
President	122,500	7,023	129,523	–
	<b>\$ 222,250</b>	<b>\$ 9,627</b>	<b>\$ 231,877</b>	<b>\$ 102,906</b>

(a) Salaries include retainers, honoraria, and any other direct cash remuneration.

(b) Benefits include the Foundation's share of all employee benefits and contributions or payments made on behalf of employees including Employment Insurance, Canada Pension Plan, vacation payouts, pension, health care, dental coverage, medical benefits, out-of-country medical benefits, group life insurance, accidental disability and dismemberment insurance, long and short term disability plans and professional memberships.

(c) Salaries and benefits are distributed to various expense categories including committee meetings and fees, salaries and benefits, and government and planning.

**Note 8 Commitments**

(a) The Foundation has entered into a 60 month lease for office premises. This lease expires October 31, 2006.

(b) Total commitments pertain to the following fiscal years:

	Grants and Awards	Office Premises	Total
2002-2003	\$ 327,633	\$ 39,160	\$ 366,793
2003-2004	11,877	39,160	51,037
2004-2005	–	39,160	39,160
2005-2006	–	39,160	39,160
2006-2007	–	22,843	22,843
	<b>\$ 339,510</b>	<b>\$ 179,483</b>	<b>\$ 518,993</b>

## NOTES TO THE FINANCIAL STATEMENTS FOR THE YEAR ENDED MARCH 31, 2002

### Note 9 Budget

The budget process involves the determination of the cost for the estimated number of investigators sponsored for the Foundations awards and meeting standards of excellence which the Foundation could support within the spending guidelines and program objectives laid out by the Board of Trustees of the Foundation.

The 2001-2002 budget was approved by the Board of Trustees in November, 2001. Following is the Alberta Ingenuity Fund Research budget:

	<b>Actual</b>	<b>Budget</b>
Revenue	\$ 1,554,423	\$ 1,800,000
Grants and Awards	275,531	492,033
Program Operation	830,786	854,902
Administration	382,477	437,460
Excess (deficiency) of revenue over expense	\$ 65,629	\$ 15,605

Funds are budgeted and transferred from the Endowment Fund on an as needed basis.

### Note 10 Comparative Figures

Certain 2001 figures have been reclassified to conform to the 2002 presentation.

### Note 11 Approval of Financial Statements

These financial statements were approved by the Board of Trustees.



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