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National Research Council of Canada — a review of some of the year's activities

The National Research Council (NRC) is an independent national research agency established by Parliament to undertake, assist and promote scientific and engineering research in furthering Canada's development. Besides providing support to university researchers and to certain projects in industry, NRC operates ten laboratory divisions as well as the Canada Institute for Scientific and Technical Information.

The Report of the President 1976-1977 contains a review of the research in progress at the Council. Some of the highlights follow:

Magdalen Islands windmill

The windmills developed by NRC's Low Speed Aerodynamics Laboratory, with their looped blades mounted on a vertical axis, have attracted world-wide attention as a promising way of tapping the wind's energy. Their feasibility is now being tested in a large-scale experiment on the Magdalen Islands, where Hydro-Quebec's new vertical axis wind turbine will feed electricity into the local power grid. Rated at 200 kW, this prototype wind generator is the most powerful in existence. The NRC research team that helped in the design expect its annual energy output will save 40,000 gallons of diesel fuel, which up to now has been the only way of providing energy at this remote site.

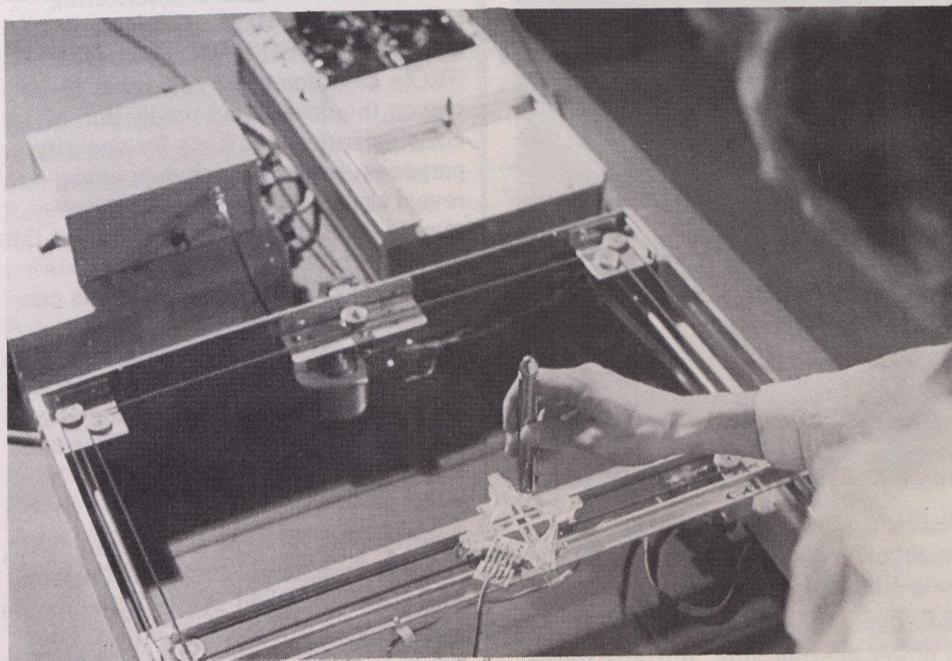
Wind displacement device

As part of a co-operative project with the University of Toronto and Environment Canada, a laser device developed by NRC has been installed in the CN Tower, Toronto, to monitor displacements of the tower by the wind. A laser beam projected up a shaft in the tower serves as a fixed reference for a sensing device that produces a signal proportional to displacement of the tower relative to the beam. This signal, together with wind data, is stored in a computer for subsequent analysis of the tower response.

Tunnelling technology

The Division of Building Research, in co-operation with Canadian consulting

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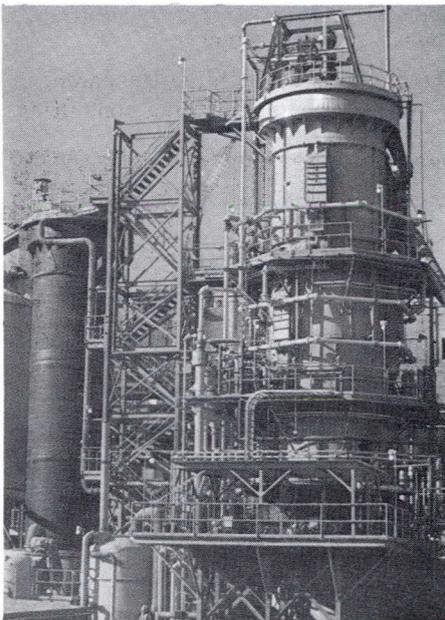
Wind displacement device now installed in Toronto's CN Tower.

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engineers, has sponsored and participated in the instrumentation of a unique tunnel which utilizes a "flexible" precast concrete tunnel lining. This is the first time the technique has been used in North America and represents a significant improvement in tunnelling technology. The tunnel-boring machine, designed and built in Canada and specially modified to handle the precast lining, becomes, underground, a protective shell within which the lining is erected and provides a safer environment for workers installing instrumentation.

New bleaching process

The bleaching tower of Eastex Corporation's Texas wood pulp plant in Selsbee, Texas, U.S.A. (*below*), is the first of its kind to employ a novel bleaching process developed by a University of Toronto scientist. His research is aimed at improving the production and bleaching of wood pulp for industry. Several important innovations have already arisen from the work which promises improved productivity and significant reduction in pollution. At Thunder Bay, Ontario, the world's first closed cycle kraft pulp mill is being constructed by the Great Lakes Pulp and Paper Company, based on these innovations.



Eastex's bleaching tower, Texas.

Long-life mini battery

The manufacture of a tiny battery used to power hearing aids, initially developed by the Defence Research Estab-

lishment in Ottawa, has been licensed by Canadian Patents and Development Limited to Unican Electrochemical Products Limited. It is expected that this long-life battery will be marketed at a low price. Unican, a subsidiary of Unican Security Systems Limited of Montreal, is raising capital to build a plant for the manufacture of the zinc-air battery which employs atmospheric oxygen as one of the components in the energy reaction. As a consequence, the battery can be produced in a reduced size.

Fuel injector transducer

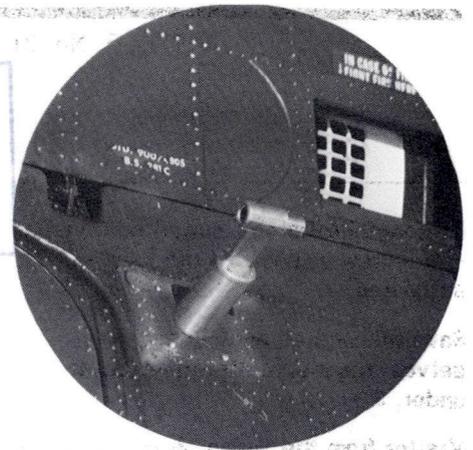
An NRC invention, licensed by Canadian Patents and Development Limited to Goodwood Data Systems Limited of Carleton Place, Ontario, will introduce savings in the maintenance of diesel engines. A transducer for measuring strain is clamped onto the fuel line which supplies each cylinder of the engine. Readings from the gauge can be used to determine the condition of the fuel injector valve, a crucial component of the diesel engine which is at present replaced periodically. Use of the transducer will cut down servicing times associated with large diesel engines in generating stations and ships. The company is at present supplying test batches of the transducer to several diesel manufacturers.

Anti-counterfeiting techniques

In its search for anti-counterfeiting techniques, the Bank of Canada is keenly interested in a development at NRC's Division of Physics that involves the design and production of complex iridescent films for security purposes. Such films change colour or reveal embedded patterns as they are viewed from different angles and in this they differ from dyes, inks or paints used in printing. This method has considerable advantages over existing devices in being much more difficult to counterfeit and in that its authenticity will be easily recognizable by the public.

Icing detector

A collaborative venture involving NRC, Leigh Instruments Limited of Carleton Place, Ontario, and Digital Electronics Laboratories Limited of Ottawa, has led to the development of an improved icing detector (*above*) for use in heli-



Icing detector

copters. The detector, which is being licensed by Canadian Patents and Development Limited, possesses notable advantages over conventional instruments. Helicopters, for example, are able to hover so that the air speed across their fuselage is almost zero while the rotors turn at high speed. Under such circumstances, a conventional detector may not give warning until the rotor blades are severely iced. The new system gives warnings under all conditions. Six of the instruments are being sold to the Royal Aircraft Establishment, England.

Icebreaker air-cushion vehicles

Following the discovery by Transport Canada and Canadian Coast Guard engineers that air-cushion vehicles are very effective in breaking thick ice on lakes and rivers, scientists from the Engine Laboratory of NRC's Division of Mechanical Engineering have cooperated with other government departments in this exciting new field and started tests to help clarify the yet unclear mechanism by which air-cushion vehicles break ice faster and with far less expenditures of fuel than conventional icebreakers. The research program in 1977 includes icebreaking tests on a pond at Ottawa's Uplands Airport air-cushion-vehicle test site, and drag tests on snow covered surfaces at Rockcliffe Airport, Ottawa. This development promises to be of great practical importance in helping many Canadian cities cope with spring floodings due to ice accumulation on rivers. The NRC Associate Committee on Air-Cushion Technology is considering an extended research project to define the requirements of air-cushion vehicles designed for urban flood prevention.

Save the whales and we save ourselves, says scientist-diver down under

"Go slow and give the environment a chance.... If the nations don't agree on the law of the sea there will be the biggest land-grab in history — under water. As for whales, I agree with the slogan that if we can save them, maybe we can save ourselves." This was the message that was given by renowned Canadian marine scientist Joseph B. MacInnis, keynote speaker at Oceans '77, the World Underwater Congress in Melbourne, Australia, on June 11 and at the Annual Congress of the Ocean Society of New Zealand, in Auckland on June 19.

In his addresses to both meetings, Dr. MacInnis described from his own experience the beauty and wonders of the ocean and argued eloquently for the protection of the marine environment. He also delivered lectures in Australia on the medical and operational aspects of diving in the Canadian Arctic and introduced his latest film, *The Narwhals Came*. (The narwhal is a species of whale found in the Arctic seas, which has a horn like the mythical unicorn.)

Message reached many

On his trip "down under", sponsored partly by the Department of External Affairs, from June 10 to 20, Dr. MacInnis spoke publicly, in addition to his congress presentations, and held discussions with government officials, marine and environmental scientists, divers and businessmen in Melbourne, Canberra, Sydney and Auckland. Praising the staff of the Canadian high commissions and consulates who helped to arrange his program, he estimates that he spoke personally to over 100 people and lectured to live audiences of over 4,000, as well as appearing in over a dozen television and radio programs and press conferences.

One of the highlights of his tour was a 20-minute dive in Sydney with the New South Wales Minister of Environment and Planning, Paul Landa.

MacInnis the man

Dr. MacInnis, an international authority on underwater medical research and environmental marine research, is eminently qualified to plead the environmentalist cause. He is president of Undersea Research Ltd., of Toronto



Canadian marine scientist Dr. Joseph MacInnis (left) and Australia's New South Wales Minister for Planning and Environment Paul Landa (right), with instructor, Lieutenant Bruce Thompson, prepare to dive at the Clearance Diving School at HMAS Penguin, Sydney on June 16. Dr. MacInnis visited the School of Underwater Medicine and Australian Navy underwater facilities.

and is certified by the United States Navy as a "man-in-the-sea aquanaut" for the Sealab III program. In 1969, he designed and constructed *Sublimos*, Canada's first underwater habitat.

"Firsts" under ice

The 40-year-old doctor, a native of Barrie, Ontario, has carried out diving research throughout the world and led four scientific diving expeditions to Resolute Bay, 600 miles north of the Arctic Circle from 1970 to 1974. He led the first dive under the ice at the North Pole and established the first Polar dive station under ice. He also made the first telephone call, via satellite from the floor of the Arctic Ocean to Prime Minister Pierre Trudeau at his home in Ottawa. In 1975, Dr. MacInnis accompanied Prince Charles on a dive beneath Polar ice, when the prince carried 50 pounds of weights. "I told him," said MacInnis, "the first 25 were to overcome the problems of the suit, and the second 25 to overcome reluctance."

Dr. MacInnis is also a professional

undersea filmmaker and author. His film *Deep Androsia* was awarded a gold medal of excellence at the International Film Festival in Santa Monica, U.S.A., in 1965 and his underwater photographs have appeared in such publications as *National Geographic* and *Sports Illustrated*. Since January this year, he has lectured in nine countries, including Britain, France, Germany, Israel, Sweden and Norway.

Media coverage

The Australian media gave Dr. MacInnis extensive coverage. Most major dailies reported his visit. A full-page article on his accomplishments appeared in *The Bulletin*, Australia's equivalent of *Time* magazine. He appeared for 20 minutes as feature guest on the popular *Don Lane Show* and was interviewed on several radio programs and three of the four Australian networks. The press was specially receptive to his plea for the protection of the marine environment. Sample newspaper headlines were: "Diving for a better sea future" (*The Australian*); "Deep down low-down on environment" (*The Sydney Morning Herald*); and "Diver warns of 'underwater land-grab'" (*The Bulletin*).

"From my point of view," says Dr. MacInnis, "the trip was a great success. "Going to Australia and New Zealand was an opportunity to discuss and show Canada's ocean facilities and to learn how other nations manage their own continental shelves."

Before he left Australia, Dr. MacInnis was invited to return next year, on a speaking tour of all State capitals. He expressed a strong interest in doing so.

Visitor from the Sudan

Foreign Minister Dr. Mansour Khalid of the Sudan, is in Canada from July 25 to August 7 at the joint invitation of Secretary of State for External Affairs Don Jamieson and Industry, Trade and Commerce, Minister Jean Chrétien. This is the first such visit to Canada by a high-ranking member of the Government of the Sudan.

Dr. Khalid and his delegation, which includes officials from five government ministries, are discussing a wide variety of bilateral economic interests, including trade and technical co-operation, as well as political subjects,

including prospects for peace in the Middle East, and the strengthening of general bilateral relations.

After a three-day stay in the capital, Dr. Khalid and his delegation were scheduled to visit several provinces to meet representatives from the provincial governments and industry. They were to discuss commercial and investment opportunities the Sudan – a large food-producer – may offer to interested Canadian firms.

Delegation from China

Saskatchewan fish proved no match for Peking anglers, when a 12-man delegation from the Chinese People's Institute of Foreign Affairs went fishing to relax during a two-week tour of Canada recently.

The visit, in return for one to China by members of the Canadian Institute of International Affairs in 1973, was sponsored by the Department of External Affairs in collaboration with the Canadian Institute of International Affairs.

Institute president Hao Teh-ching headed the delegation, which visited Ottawa, Quebec City, Regina, Lac La Ronge, Saskatoon, Toronto, Hamilton, Oakville, Niagara Falls and Gravenhurst, before going on to the United States for a three-week stay.

In Ottawa, briefings dealing with Canada's federal system and trade were held at the Department of External Affairs. Assistant Under-Secretary of State for External Affairs K. Goldschlag briefed the group on Canadian foreign policy, and Assistant Under-Secretary of State for External Affairs André Bissonnette was host at a reception

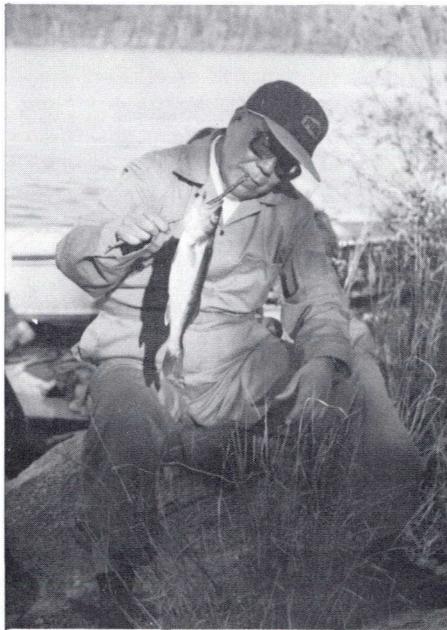
honouring the guests on their arrival.

Meetings were also held with Assistant Deputy Minister of Indian and Northern Affairs E.M.R. Cotterill, to discuss northern development.

Before leaving for Quebec City, the group dined in the Parliamentary Restaurant with members of the External Affairs and Defence Committee and committee chairman Marcel Prudhomme, Member of Parliament. While there, they met briefly with Secretary of State for External Affairs Don Jamieson.

In Quebec City, the visitors met members of the provincial government, officials of the Intergovernmental Affairs department and academics from Laval University, before touring the walled city.

The Regina visit began with an offi-



Chinese guests relax for a day's fishing at Lac La Ronge.



Chinese delegation visits a farm in Regina, Saskatchewan.

cial reception and dinner, given by Saskatchewan Premier Allan Blakeney to honour the delegation. Later, the guests stopped at a cattle ranch, a farm where they lunched with a family, a potash mine, and then they spent a Sunday at Lac La Ronge, fishing and relaxing at a private lodge, before travelling to Saskatoon to tour the city and visit the University of Saskatchewan.

In Toronto, they held discussions with Metro Toronto chairman Paul Godfrey and with members of the Ontario government. They also visited the University of Toronto, the Ontario Science Centre and the CN Tower.

Trips to Niagara Falls and to Niagara on the Lake were preceded by tours of the Ford Motor plant in Oakville and the Steel Company of Canada plant in Hamilton.

Before returning to Ottawa, the group stopped at Gravenhurst to see the birthplace of Dr. Norman Bethune, a Canadian doctor revered in China for his work with the Chinese army during their battles with Japanese forces in the Second World War (see *Canada Weekly*, Volume 4, No. 37, dated September 15, 1976).

Additional gift to the International Year of the Child

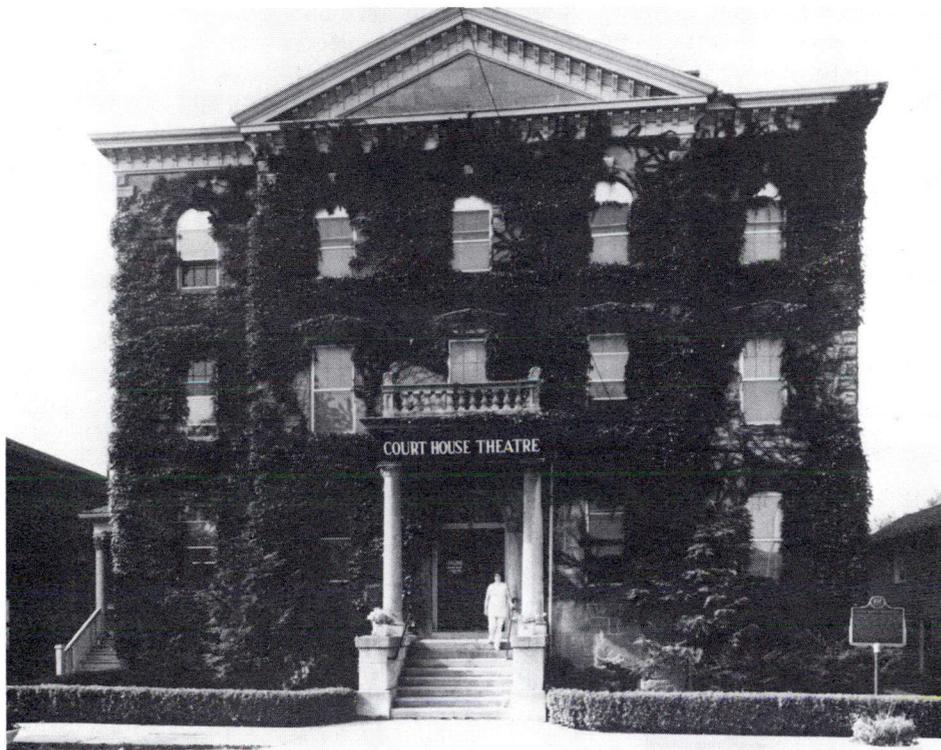
A Canadian contribution of \$100,000 towards the operating expenses of the International Year of the Child was announced at the Executive Board of UNICEF, held recently in Manila in the Philippines.

The voluntary contribution is in addition to the regular voluntary Canadian contributions to UNICEF. The annual Canadian Government contribution to UNICEF of \$6.5 million makes Canada the fourth largest contributor. The Canadian Government also contributes towards special UNICEF projects and the Canadian public make voluntary contributions in the order of \$10 million.

The International Year of the Child was proclaimed by last year's General Assembly for 1979, the twentieth anniversary of the Declaration of the Rights of the Child.

The International Year of the Child will focus on programs that will generate far-reaching and sustained activities on behalf of children.

News of the arts



Fifteen years ago, ten actors – unpaid – performed the scene “Don Juan in Hell” from George Bernard Shaw’s *Man and Superman* before some 200 people in the little Court House Theatre at Niagara-on-the-Lake, Ontario. On July 17, the Shaw company staged the North American première of the entire play *Man and Superman*, at the Shaw Festival Theatre. The cast includes Tony Van Bridge, who also directed the play, Ian Richardson and Carole Shelley. Shaw’s *Great Catherine* and *Widowers’ Houses* are being presented at the Court House Theatre this summer.

Victory for underground art

The Toronto Transit Commission’s program to incorporate arts works into the design of its new Spadina subway stations is going ahead after a year-long public controversy. Eight of the nine works of art originally proposed for the stations have already been approved for commission.

The Subway Art Program was suspended about a year ago in response to public concern over the large sum of money to be spent on the art at a time of severe cutbacks in Metro Toronto’s budget and sharp increases in TTC fares. Shortly afterwards, the TTC rescued the program with a new financing scheme. Instead of drawing the nearly \$600,000 needed to pay for the art from public funds, the TTC launched a fund-raising campaign to secure the money from private sources. The campaign was backed by the Ontario Heritage Foundation, and Wintario promised to match any money

raised up to a total of \$175,000.

To date, the campaign has raised about \$150,000 which, with the matching Wintario grant, gives a total of close to \$300,000. This is enough for four of the nine commissions, and commitments have already been made on these.



Outside view of Joy, a multicoloured skylight at Glencairn station.

Exhibition of Chinese costumes prove popular

Toronto’s Royal Ontario Museum is holding over by popular demand its exhibition of Chinese costumes, *IN THE PRESENCE OF THE DRAGON THRONE*, until August 14. Since the exhibition’s opening on April 19, more than 80,000 visitors have clicked through the turnstiles to see this dazzling collection of 250 ceremonial robes of the Ch’ing period (1644-1911).

The exhibition, the culmination of five years’ research and two years’ intensive restoration work, shows how the affluent dressed in China over a period of several centuries.

IN THE PRESENCE OF THE DRAGON THRONE has created a focus for many complementary activities involving the Chinese community of Toronto. The art of Tai Chi, a form of body movement considered to be both exercise and healing art, is being demonstrated by members of the Toronto Tai Chi Association on July 24 and on August 7. The Cantonese Music Club, which performs both classical and contemporary Chinese music, performed at the museum on July 10. Calligraphy, the Chinese art of beautiful written communication, was demonstrated by E. Yian Lee on July 19 and again on August 2.

Station skylight

The only one which has received approval is Rita Letendre’s *Joy*, a multi-coloured plexiglass skylight at the Glencairn station. The TTC has also approved four other works of art based on the assumption that money will continue to flow into the campaign’s coffers over the next several months. The commission has budgeted for the extra \$90,000 that will cover these last four pieces.

The only piece which has been dropped, at least for the time being, is a \$99,000 neon light sculpture by Michael Hayden titled *Arc en Ciel*, originally proposed for the Yorkdale station. It is composed of 180 feet of neon tubing which is hooked into a computer to activate different colours and designs whenever a train passes through the station. The Commission will be able to install this sculpture at a later date, if the funds become available.

Canada's role in international hockey

Iona Campagnolo, Minister of State, Fitness and Amateur Sport, recently announced the formation of an *ad hoc* committee headed by Senator Sidney Buckwold, to evaluate Canadian participation in international hockey competition.

"When, as a nation, we commit ourselves to international hockey, we must accept a number of responsibilities," Mrs. Campagnolo said. "These responsibilities are not just limited to members of Team Canada, but also extend to those nations that we compete against and, indeed, to the millions of people who follow hockey."

"I believe it is time that we clearly identify these responsibilities as well as the issues that Canadians feel are at stake when we compete at the international level," the Minister added.

The committee will begin work immediately and will present a report in late autumn. Major sports associations, all levels of government, business and the public-at-large will be invited to express their views to the committee. Moreover, members of the committee will hold public hearings in a number of communities across Canada. They will also study the results of a questionnaire to be sent to representative sectors of the Canadian population.

Prairie wheat-growing methods abroad

Canadian wheat-farming practices may be copied in Tanzania under a \$3.4-million Canadian International Development Agency grant to the East African country.

In announcing the grant, Don Jamieson, Secretary of State for External Affairs, said the assistance

would help Tanzania achieve its long-range goal of self-sufficiency in food and help to finance technical aid and the provision of Canadian farm equipment.

Canadian agricultural assistance has been aimed at wheat production in Tanzania since 1970. Earlier assistance covered research and development, but Canada is now becoming increasingly involved in practical methods to boost production.

Methods employed so successfully

by Canadian prairie farmers will probably be used in wheat farming in Tanzania, including large farms, emphasis on moisture conservation, weed control, and soil conservation.

To help Tanzania train workers in mechanized wheat production, a team of farmers and farm machinery mechanics from Saskatchewan, as well as farm equipment, is being supplied to two state-run farms of 10,000 acres each, where land is already under wheat production.

News briefs

- Some farmers may be missing out on a federal tax rebate on gasoline which was introduced in June 1975. All salesmen, businessmen and farmers who use gasoline in earning a living are eligible to claim a 10-cent-per-gallon rebate on all gasoline used for business purposes. "By and large, farmers are familiar with this rebate," says D.P. Atkinson, chief of Revenue Canada's gasoline tax division. "However, some producers have not made any claim to date." It's not too late though. Farmers may apply for the 10-cent rebate up to four years from the time the gasoline was purchased.

- The Federal Government, in co-operation with Indian, Métis and non-status Indian, and Inuit representatives, will develop a personnel management policy to increase their participation in the federal Public Service, announced Treasury Board President Robert Andras recently. There are about 300,000 status Indians, 18,000 Inuit and 750,000 Métis and non-status Indians in Canada, accounting for four per cent of the total population.

- Former Prime Minister John Diefenbaker was reported to be in "stable condition" in hospital, July 24, after being admitted the previous day suffering from internal stomach bleeding.

- Three Quebec firms headed the list of 62 Defence Construction (1951) Limited contracts worth a total of \$8,621,938 awarded recently, Defence Minister Barney Danson has announced. Contracts of \$1,297,324 to Plomberie Bellerose Inc., Montreal; \$1,272,277 to Cassidy Ltée., Montreal and \$888,806 to Lee Construction Inc., St. Hubert, were awarded for plumbing and heating, kitchen equipment and electrical work

respectively at the new training centre at Canadian Forces Base St. Jean, Quebec. Quebec firms received 18 contracts for a total of \$4,982,037; Alberta 14 for \$1,383,521; Ontario ten for \$897,078; New Brunswick eight for \$430,564; British Columbia five for \$284,447; Manitoba three for \$306,168; Nova Scotia three for \$105,023 and Saskatchewan one for \$233,100.

- Energy Minister Alastair Gillespie has sacked John Foster as president of Atomic Energy of Canada Ltd. after learning that the Government company lost \$180 million in the past year. The firing came on the recommendation of the Crown corporation's board of directors.

- Telephone subscribers in ten major cities will be able to dial directly to 16 countries in the next two years, Teleglobe Canada says.

- Defence Minister Danson announced on July 15 that the armed forces would be increased by 4,700 persons in the next few years. It will be the first major increase since the Second World War and will bring the army, navy and air force up to 83,000.

- The Toronto Transit Commission will shortly be telling its riders through advertisements that they should say 'meep' to people who stand in front of doors or block aisles. A folder distributed to TTC employees notes: "Saying 'meep' is a lot easier and probably a lot more polite than saying 'Move your hulk, turkey' or whatever." Ross Kelly, manager of TTC marketing, said the 'meep' was the idea of "one of the creative people" at an agency. Asked if he had given the word a test yet himself on the system, Mr. Kelly said: "No, I think I'd be afraid to...at least until people get more accustomed to it."

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