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***Keynote Address to the 2007
Science Policy Symposium/
Strengthening Science to Protect
Canadians***

Speaking Notes
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Thank you Madame Demers for your kind introduction. It is a privilege to be here this morning to reflect on public science in Canada and to speak to the Conference themes.

Specifically, I would like to give you the NRC's perspective on the state of Canadian science and to explore how, collectively, we can strengthen it to serve Canadians better in the context of the Government's new S&T Strategy.

En plus d'être à l'avant-plan de la recherche scientifique au Canada depuis près d'un siècle, le Conseil national de recherches du Canada est engagé dans un exercice de réflexion de ce genre depuis plusieurs années déjà.

You know many of the outcomes of that science. The heart pacemaker, the airline black box recorder, medical isotopes for cancer treatment, synthetic meningitis C vaccine, new wheat varieties, canola, environmentally-friendly plastics. I could go on.

The link between those outcomes and the unique role played by public science are less well-known and frankly, that's part of the problem that public science in Canada faces. It is one of the questions that symposium organizers have put to us: how to raise public awareness of the role of federal science and researchers. And how to instill in Canadians an awareness of the importance of science in policy decisions that affect their daily lives. I will be very interested to learn the results of your discussions.

To my way of thinking, awareness is more than listening to a 30-second sound bite—although that's a start. Awareness is an understanding on some level – if not in detail – of how science is conducted and an appreciation of what public science has accomplished in addressing issues critical to our daily lives and the quality of life in our country.

Furthermore, I think that this awareness should embrace a better understanding of the inter-connectivity of public science, university-based research and science in the private sector.

As I have said many times, public science, particularly as we seek to perform at NRC, not only produces significant scientific advancements, but goes further to support science in other organizations and all across our country. NRC science contributes to strong multi-sector partnerships, to projects that bring provincial, municipal and territorial governments together in common cause, to enhancing Canada's international presence, to providing opportunities for skilled people to move into industrial and scientific careers, and, of course, to supporting private sector innovation -- all of these activities are important elements of the Government's S&T Strategy.

So, if you ask someone who has a pacemaker whether he values that scientific development, they will quickly say yes. In fact, we don't need to ask; the answer is obvious. I would venture, however, that the majority of pacemaker wearers have no inkling that it was science in the public interest that has literally saved their lives, and they would have even less of an understanding of the great public-private sector partnership that saw the ideas translated from laboratory and hospital to commercial development.

En tant que président du CNRC, la feuille de route que cette organisation s'est bâtie au cours des 90 dernières années me remplit de fierté. L'une des nombreuses forces du CNRC est sa capacité de s'adapter à l'évolution constante des besoins des Canadiens. Le CNRC possède également le savoir-faire pour procéder de façon ponctuelle à l'examen général des tendances et des enjeux qui se dessinent sur la scène mondiale et faire l'inventaire des forces du Canada et des domaines devant être améliorés, afin d'établir les moyens et les méthodes par lesquels son action peut avoir la plus grande portée.

In May 2006, I was very pleased to launch *Science at Work for Canada*, NRC's new Strategy that will carry us to 2011 and beyond. The strategy commits us to work more closely with industry to help boost Canada's competitiveness; to support the private sector in creating market solutions to the challenges facing our nation; and to sustain the high quality of life that Canadians have come to enjoy and to expect.

Anyone who has studied these issues and what has worked and what has not in the past will know that these challenge demand innovative and multi-faceted partnerships.

They also know that you build partnerships around committed and talented people dedicated to confronting those challenges and pursuing the vision in the national interest.

To this end, the NRC Strategy commits NRC to a more focused approach – to marshal the intelligence and energy of its 4,200 staff and 1,500 guest workers, its 25 research institutes and centers, its 16 industrial partnership facilities, its national collaborative multi-disciplinary research programs, and its international outreach – to make significant contributions to Canada's priorities in health and wellness, sustainable energy and the environment.

These are areas critical to Canada's future. Not surprisingly, they are aligned with the thematic areas that symposium organizers have chosen for you to debate – food and drugs, water and the environment, and energy and natural resources.

Ces priorités sont très proches des défis mis en évidence par le gouvernement du Canada dans sa nouvelle stratégie en matière de science et de technologie,

intitulée *Réaliser le potentiel des sciences et de la technologie au profit du Canada*, qui a été rendue publique en mai dernier. La Stratégie reconnaît que les découvertes scientifiques et les nouvelles technologies apportent des solutions à plusieurs des problèmes qui importent le plus aux Canadiens.

Elle reconnaît également que nous devons canaliser nos énergies et ressources dans certains domaines tels que :

- Les sciences et technologies de l'environnement
- Les ressources naturelles et l'énergie
- Les sciences et technologies de la santé et sciences de la vie connexes
 - Les technologies de l'information et des communications

These are daunting issues, but we do not have to look far for inspiration as we take them on. They are standing among you today and among our ranks at NRC. One example that has been celebrated recently is Dr. Guylene Proulx's research on human factors during emergencies. Her post-disaster investigations – including the 1993 World Trade Center bombing – led the center to put in place an emergency way-finding system and an evacuation strategy that saved lives during 9/11.

Her findings on smoke alarms and photoluminescent materials are helping to protect Canadians and others in buildings around the world today. I was delighted to see such a major contribution acknowledged in June when she received the Public Service Award.

Now as we encourage the next generation of Guylene Proulx – there certainly appears to be a good deal of agreement on the grand issues *where* federal science should turn its attention.

But as we pursue issues such as health, the environment, and energy, we have an opportunity to elevate the competitiveness of our partners and clients in Canadian industry, specifically by magnifying the role public science plays in addressing the persistent productivity challenge.

In this regard, I believe that anyone who examines the evidence objectively would agree that Canada should consider new approaches. The status quo is not cutting it.

As a nation, our productivity, our competitiveness and our innovation – three things that depend on science and technology – continue to be matters of national concern.

As the Government's S&T Strategy noted, Canada's productivity gap with our largest trading partner – the United States – continues to increase.

Quand nous tenons compte du fait qu' :

- Au Canada, la R.-D. est entreprise à 54\$ par le milieu des affaires, ce qui représente un pourcentage bien en deçà de la moyenne des pays de l'OCDE, qui se situe à 68% ;
- Que Le Canada se classe au 14^e rang des pays de l'OCDE en ce qui concerne les dépenses d'affaires en R-D, en pourcentage du PIB ;
- Que Le Canada se classe au 16^e rang des pays de l'OCDE en ce qui concerne le nombre de brevets de haute gamme par million d'habitants ;
- Que Le Canada se classe au 19^e rang des pays de l'OCDE en ce qui concerne l'investissement dans le matériel et l'équipement, en pourcentage du PIB ;

Nous comprenons pourquoi il existe un vaste consensus parmi les économistes, les acteurs gouvernementaux, les groupes de réflexion et l'industrie voulant que le Canada puisse en faire davantage pour transformer les avancées en S et T en avantage concurrentiel.

Cet « écosystème de l'innovation », comme on en est venu à l'appeler couramment, englobe les administrations publiques, les collèges et les universités, ainsi que les organisations du secteur privé. Il comprend également un maillon qui a été systématiquement négligé, à savoir les organisations de rapprochement. Ce terme englobe les associations industrielles, les centres de formation, les réseaux et les programmes voués au développement et à l'innovation industrielle, comme le Programme d'aide à la recherche industrielle du CNRC.

But it is more than the mechanisms and more than the sum of the institutions, however. It includes highly-qualified people who are motivated by common cause to generate, and use, innovations. It is the national scientific and technical infrastructure that allows innovations to emerge. And it is investments from the financial sector that fund the development of innovations.

An acknowledged strength of our innovation system is a strong foundation in basic science. The evidence is clear in our high level of scientific publication and citation.

While NRC's mission is directed research for industrial and public benefit, we also recognize that we could not provide these services and fulfill this role without first class science as well.

At NRC alone, in 2005-2006, researchers published 1,430 articles in refereed journals including *Nature* and other of the most prestigious international publications – prepared 924 papers for peer-reviewed conferences and issued 1,515 technical reports for clients.

However, there is another important factor to consider. As the Government's S&T Strategy notes, business R&D investments have a direct and significant impact on the average income levels.

Au Canada, les entreprises effectuent 54 % du total de la recherche, ce qui est considérablement inférieur à la moyenne obtenue pour l'OCDE. L'apport des universités et des collèges canadiens à l'activité nationale de R-D atteint 30 %, ce qui équivaut au double de la moyenne. Par ailleurs, les dépenses publiques consacrées à la recherche et au développement représentent 16 % du total.

Among the several explanations for the relatively weak business commitment to R&D lies the fact that:

- Canada has research-intensive industries, but they account for a smaller share of Canada's economy than in the United States.
- Canada has a greater number of smaller firms relative to our competitors such as the United States. Smaller firms often have more difficulty financing and managing R&D and adopting new technology.
- Canada's competitive intensity and marketplace framework policies, such as business taxation, intellectual property, and regulatory regimes, could be more conducive to private-sector investment in R&D and commercialization;
- and,
- Canadian venture capital tends to be invested in a large number of smaller firms at early stages of development, rather than focused on building global leaders. Also, returns on venture capital investment in Canada have been relatively low, making it more difficult to attract the kind of long-term investment provided by pension funds and other institutional investors.

Knowing these things to be true, NRC's Strategy aims to Canada's S&T Strategy and strengthen Canada's innovation system. It is doing this by anticipating and performing R&D in areas that will improve the competitiveness of Canadian industry. It is providing integrated industrial support. It is investing in our unique strengths, and building a sustainable and agile national research organization. Notre stratégie est fondée sur la convergence de technologies habilitantes comme la biotechnologie, la technologie de l'information et la nanotechnologie, avec des disciplines comme la fabrication, le transport, la construction et la conception de matériaux de pointe.

Le CNRC continue de consacrer des ressources importantes pour soutenir l'industrie dans des secteurs clés comme l'aérospatiale, la construction, les technologies de l'information et des communications, les sciences de la vie et la fabrication.

Evidence that it is working lies in the fact that more than 40% of NRC revenues are generated by R&D collaborations, fee-for service activities and other interactions with business.

When GE Aviation, for example, needed to complete icing certification tests on its new 75,000 lb. thrust jet aircraft engine, it approached NRC Aerospace. Within five months, a new facility for icing certification tests was in place at Mirabel Airport.

We have licensed and will continue to license our innovations to business. In the field of radiation therapy, for example, where precision is absolutely vital, our Institute for National Measurements Standards, created the code of measurement for doses of radiation. We licensed it to MDS Nordion for commercial use and will continue to receive revenue from it at least until 2012.

Often the reach of our spin-offs is international. Several years ago we licensed an innovation in medical imaging technology to Novadaq Technologies Inc. The company advanced it in the market. Now the SPY system that allows surgeons to view, record, replay and print high-quality real-time images of coronary arteries and bypass grafts is used in cardiovascular surgery in Japan's hospitals.

La recherche effectuée par les universités constitue, à notre sens, un élément important du système d'innovation. Quelque 450 membres de notre personnel remplissent ainsi des mandats de professeur auxiliaire dans des campus partout au Canada. Le CNRC a également noué des partenariats avec des universités et établi des installations sur plusieurs campus. L'Institut national de nanotechnologie, par exemple, est le fruit d'un partenariat avec l'Université de l'Alberta et le gouvernement de cette province.

Nous offrons aux ministères fédéraux des services payants et menons des travaux conjoints avec eux; en 2005-2006, ces prestations se sont chiffrées à 58,8 millions de dollars. L'an dernier, par exemple, nous avons aidé le ministère de la Défense nationale à concevoir les plans de réfection de ses navires de classe Halifax, afin d'améliorer la vitesse de marche avant, de réduire les vibrations et le bruit, et d'économiser des millions de dollars en carburant tout en réduisant les émissions polluantes des moteurs.

And we have 95 formal research collaboration agreements with international partners worth \$32.7 million. In June, we renewed a memorandum of understanding with the Helmholtz Association of German Research Centers – an agreement that brings together some of the world's best researchers in alternative energy, bio-fuels and environmentally-friendly energy use.

Some have described NRC as an innovation system inside one organization. To its beefy science arm and its experienced technology development arm, add its funding arm, its knowledge arm, its linkage arm and its commercialization arm

and we have a national institution that can operate with speed, responsiveness, flexibility, maturity, scope and reach.

However, in today's world, no one organization – public or private, national, regional or local – has the capacity to “go it alone.” Increasingly complex issues, the convergence of S&T and integrated solutions and the emergence of global supply chains all point for the need for partnerships.

Le CNRC s'est engagé à augmenter le nombre de ses partenariats et collaborations avec les ministères et agences fédérales, les universités, les collèges et le secteur privé.

De plus, le CNRC est bien placé pour mettre son leadership en R-D, ses excellentes installations et son aide industrielle au service de la Stratégie de sciences et technologie fédérale et de ses objectifs grâce à ses nombreux liens avec l'industrie, le milieu universitaire et plusieurs organismes de recherche publics et privés.

The work we are undertaking in implementing NRC's *Science at work for Canada* strategy and supporting Canada's S&T Strategy has and will continue to have a real impact on the lives of Canadians and indeed, people around the world.

The question still remains though: how do we communicate this impact?

La question reste encore la même: comment faire pour communiquer cet impact?

It is an issue that does not lend itself well to sound-bites. Nor should it be. No doubt you will wrestle with it over the next few days. I wish you a productive launch to the dialogue that begins with this symposium.

Public science – however little understood by the public, however seldom mentioned in the mass media – has literally changed the lives of Canadians and will continue to change them long into the future. Just ask the fellow with the pacemaker.

Thank you. Merci.