THE MATERIAL PROCESS IS IMPERATIVE FOR CANADA TO FURTHER ITS DEVELOPMENT. THERE MUST BE FURTHER ENTREPRENEURIAL SPIRIT AMONGST ENGINEERS IN CANADA IF WE ARE TO REALIZE OUR GOALS. THERE IS A DISTINCT, AND IN MANY CASES OVERLAPPING RESPONSIBILITY, FOR GOVERNMENT, INDUSTRY AND ACADEMIA TO PLAY.

THIS IS THE CENTENNIAL YEAR OF ENGINEERING. IT IS A YEAR OF DEEP SOUL SEARCHING, VISIONARIES AND COMMITTED, RATIONAL AND AUDACIOUS, RESPONSIBLE AND REALISTIC, ENGINEERS WILL REFLECT TOGETHER ON THE SOCIETY TO BUILD AND THE CHALLENGES TO MEET.

AND, IN A RETROACTIVE WAVE, THE GENERAL PUBLIC WILL JOIN IN ON THIS REFLECTION.

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PHIL A. LAPP - SPEECH - MARCH 4, 1987

CANADIAN ENGINEERING - THE NEXT ONE HUNDRED YEARS

LADIES AND GENTLEMEN, HONOURED GUESTS, FRIENDS AND COLLEAGUES: AS YOU KNOW, 1987 IS THE YEAR OF THE ENGINEERING CENTENNIAL IN CANADA.

ENGINEERS FROM ALL OVER THE COUNTRY ARE NOW CELEBRATING THE 100TH ANNIVERSARY OF ENGINEERING AS AN ORGANIZED PROFESSION IN CANADA.

FOR MANY MONTHS NOW, THE ENGINEERING CENTENNIAL BOARD, ITS MANY COMMITTEES, PROVINCIAL ENGINEERING ASSOCIATIONS AND SPECIALIZED TECHNICAL CORPORATIONS HAVE BEEN AT WORK ON PREPARATIONS FOR THIS GREAT EVENT, WITH THE CLOSE COOPERATION OF PRIVATE INDUSTRY AND VARIOUS PUBLIC BODIES.

UNDER THE THEME: "MIND, HEART AND VISION: CANADIAN ENGINEERING: THE NEXT 100 YEARS," A MYRIAD OF ACTIVITIES AT THE REGIONAL, NATIONAL AND EVEN INTERNATIONAL LEVELS HAS BEGUN TAKING PLACE ACROSS CANADA. THESE ACTIVITIES SHED LIGHT ON THE MAJOR ROLE OF ENGINEERING IN THE DAILY LIFE OF ALL CITIZENS, AS WELL AS TAKING A LOOK AT FUTURE PERSPECTIVES. THUS, WE ALL WILL HAVE A GLIMPSE OF THE CURRENT STATE OF AFFAIRS IN THE MANY VARIED DISCIPLINES OF ENGINEERING.

THE FILM WE ALL JUST VIEWED CALLED THE "INVISIBLE PROFESSION" HAS CERTAINLY OUTLINED THE FACT THAT ENGINEERING PERMIATES OUR DAILY LIVES. I WOULD LIKE TO TAKE THIS OPPORTUNITY TODAY TO ILLUSTRATE THIS EVEN FURTHER. BUT BEFORE DOING THAT I WOULD LIKE TO REVIEW FOR YOU THE BACKGROUND OF THE ENGINEERING CENTENNIAL YEAR.

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NEARLY ALL OF THE ACTIVITIES OF ENGINEERING PRACTICED IN CANADA HAVE THEIR ORIGINS IN CIVIL OR MILITARY ENGINEERING.

THUS, WHEN THE NAME OF THE SOCIETY WAS CHANGED TO THAT OF THE ENGINEERING INSTITUTE OF CANADA, IN 1918, THE PROFESSION WAS SPREADING OUT TO ENCOMPASS OTHER DISCIPLINES. THE NEW NAME ALSO MORE ADEQUATELY REFLECTED THE WORK ACCOMPLISHED BY SPECIALIZED ENGINEERS IN A COUNTRY IN FULL GROWTH. BEGINNING IN 1920, LAWS REGULATING ENGINEERING WERE ADOPTED IN SIX CANADIAN PROVINCES AND LATER IN THE REMAINING PROVINCES AND TERRITORIES.

THE YEAR 1925 SAW THE FOUNDING OF THE ASSOCIATION OF CONSULTING ENGINEERS OF CANADA. THIS ASSOCIATION TODAY HAS SOME 850 MEMBER FIRMS AND REPRESENTS MORE THAN 150 SPECIALTIES.

SEVERAL YEARS LATER, IN 1936, THE DOMINION COUNCIL OF PROFESSIONAL ENGINEERS WAS FOUNDED CHANGING ITS NAME TO CANADIAN COUNCIL OF PROFESSIONAL ENGINEERS IN 1957. I HAVE THE DISTINCT HONOUR AND PRIVILEGE TO SERVE AS THE PRESIDENT OF CCPE BEGINNING IN MAY. IT IS A FEDERATION OF THE 12 PROVINCIAL AND TERRITORIAL ASSOCIATIONS WHICH LICENSE ALL PROFESSIONAL ENGINEERS ACROSS CANADA.

BY CELEBRATING THE CENTENNIAL OF THE ENGINEERING INSTITUTE OF CANADA, WE ARE ALSO TURNING THE SPOTLIGHT ON 100 YEARS OF PROFESSIONL ENGINEERING IN CANADA. AND SO TO BETTER HIGHLIGHT THIS EVENT,

MEMBERS OF THE THREE MAJOR ASSOCIATIONS WHOSE ORIGINS I HAVE JUST DETAILED, CAME TOGETHER AND CREATED THE ENGINEERING CENTENNIAL BOARD INC.

TO SHOW THE TRUE COLORS OF THE CENTENNIAL, THE BOARD SELECTED THE THEME MIND, HEART AND VISION; CANADIAN ENGINEERING; THE NEXT 100 YEARS. THUS, WE SITUATED THE YEAR UNDER THE SIGN OF THF FUTURE; BUT THIS FUTURE MUST REFLECT THE HIGHEST QUALITIES OF THE MEN AND WOMEN WHO WILL BUILD IT, FOR THE GREATER GOOD OF SOCIETY.

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A COMMITTEE OF THE ENGINEERING CENTENNIAL BOARD, CHAIRED BY JURY PRESIDENT JAMES W. MACLAREN, P.ENG., A CONSULTING ENGINEER FROM TORONTO, SELECTED FROM MORE THAN 100 PROJECTS SUBMITTED BY CANADIAN ENGINEERS THE TOP TEN ENGINEERING ACHIEVEMENTS. THESE ENGINEERING ACHIEVEMENTS WERE SELECTED ON THE BASIS OF INNOVATIVE ENGINEERING WHICH HAD A GREAT IMPACT ON THE DEVELOPMENT OF OUR COUNTRY.

AS AN AEROSPACE ENGINEER I AM DISAPPOINTED THAT THE AVRO ARROW AND THE PRATT AND WHITNEY AIRCRAFT COMPANY PT-6 WERE NOT SELECTED. HOWEVER THAT'S AN AEROSPACE ENGINEER'S POINT OF VIEW AND WE ALL HAVE OUR FAVOURITES. I HAVE CHOSEN TO GROUP THEM UNDER THE THREE SECTORS OF TRANSPORTATION, ENERGY AND COMMUNICATIONS. I DRAW YOUR ATTENTION TO THE FACT THAT NOT ONLY DID THEY INDIVIDUALLY AND COLLECTIVELY RESULT IN THE DEVELOPMENT OF OUR COUNTRY, BUT ALSO THEY ULTIMATELY HAD A SPIN-OFF EFFECT INTO OTHER INITIATIVES AT HOME AND ABROAD.

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COLONIAL TYPE ECONOMY IS GEARED TO SENDING AWAY RAW MATERIAL AND TO IMPORTING FINISHED PRODUCTS. IN SUCH AN ECONOMY YOU GROW INSTITUTIONS APPROPRIATE TO THE SITUATIONS; IT IS THEN VERY DIFFICULT TO CHANGE INTO EVEN AN INDUSTRIALIZED COUNTRY, LET ALONE A POST-INDUSTRIAL ECONOMY. IT IS AN EXTREMELY DIFFICULT JUMP TO MAKE!

THE INSTITUTIONS WE HAVE BUILT IN CANADA ARE VERY UNDERSTANDABLE. WE HAVE HAD LITTLE NEED FOR INDUSTRIAL RESEARCH SINCE THE BRANCH PLANT AND THE COMMONDITY PRODUCER NEEDS VERY LITTLE IN RELATION TO THE TONNAGES SHIPPED. THE GOVERNMENT HAS ENTERED THE VACUUM.

OUR COUNTRY HAS A VERY HIGH PERCENTAGE OF RESEARCH AND DEVELOPMENT DONE BY GOVERNMENT LABORATORIES. THE TROUBLE IS THAT GOVERNMENT LABORATORIES ARE THE LEAST SUITABLE INSTITUTIONS FROM WHICH TO LAUNCH AN INTERNATIONAL, MARKET ORIENTED, COMPETETIVE DRIVE. WE HAVE EXCELLENT GOVERNMENT LABORATORIES BUT THEY ARE OBVIOUSLY NOT, AND WERE NEVER INTENDED TO BE COMMERCIAL ENTERPRISES. THE BIG PROBLEM IN CANADA IS NOT A LACK OF RESEARCH BUT A LACK OF DEMAND FOR RESEARCH AND THE ABILITY TO APPLY THIS RESEARCH EFFECTIVELY. THE EXPERTISE OF THE ENGINEERS DOES HOWEVER REMAIN PARAMOUNT.

AS WE MOVE TOWARDS THE 21ST CENTURY THE RAISON D'ETRE FOR OUR COUNTRY IS DISAPPEARING. IT IS TECHNOLOGY WHICH WILL ULTIMATELY RESCUE US AND PREVENT CANADA FROM ASSUMING THE STATUS OF A DEVELOPING NATION. THE ONLY REALISTIC FUTURE FOR OUR COUNTRY IS TO PLACE OURSELVES STRATEGICALY AT THE INTERNATIONAL FOREFRONT OF TECHNOLOGY. IN ORDER TO MOVE AWAY FROM A RESOURCE ECONOMY TO THAT OF A MANUFACTURING ECONOMY, WE MUST FOCUS ON NEW ADVANCED MATERIALS. WHILE THE DEVELOPMENT AND EXPORT OF OUR ENGINEERING EXPERTISE WILL CONTINUE TO REMAIN VITAL, MARKETS ARE LIMITED FOR HYDRO ELECTRIC

PROJECTS AND NUCLEAR DEVELOPMENT. WE MUST FOCUS ON MATERIALS TECHNOLOGY - THE EXTENSION OF CURRENT TECHNOLOGIES WHICH WILL, IN THE END, RESULT IN HIGHER PERFORMANCE MATERIALS.

IN CERTAIN SECTORS, SUCH AS LEAD AND COPPER MINING, THE CHALLENGE IS TO COME UP WITH NEW USES FOR OLD MATERIALS THAT ARE LOSING THEIR MARKETS TO LIGHTWEIGHT COMPOSITES, PLASTICS, AND REFRACTORIES. WE HAVE SEEN HOW IRON HAS BEEN REPLACED BY ALUMINUM WHICH MAY QUITE CONCEIVABLY BE REPLACED BY PLASTICS. IN OTHER FIELDS SUCH AS TELECOMMUNICATIONS THERE IS A NECESSITY FOR EXPLORING NEW PROCESSES. WE MUST TAKE ADVANTAGE OF THE LATEST SCIENTIFIC KNOWLEDGE AND SET UP RESEARCH PROGRAMS ADAPTED TO NEW ENGINEERING PROCESSES.

HOW CAN WE BEST APPLY THIS NEW MATERIAL TECHNOLOGY?

THE GREATEST NUMBER OF NEW ENGINEERING PROJECTS, AND JOBS FOR THAT MATTER, WILL ARISE FROM THE SMALL AND OFTEN NEW ENTERPRISES, WHICH RESPOND TO THE DEMANDS OF THE FUTURE. THE GREATEST REWARDS WILL GO TO THOSE WHO HAVE EXHIBITED AN ENTREPRENEURIAL SPIRIT AND HAVE STARTED THEIR OWN BUSINESSES. IN CANADA WE CANNOT DEPEND UPON THE GOVERNMENT FOR THE DEVELOPMENT OF INNITIATIVES. THIS IS NOT TO SAY THAT THE GOVERNMENT HAS A MAJOR ROLE TO PLAY.

IN CANADA RESEARCH HAS FREQUENTLY BEEN UNDERTAKEN FOR THE SAKE OF RESEARCH AND NOT TO MEET THE REQUIREMENTS OF INDUSTRY. UNIVERSITY AND GOVERNMENT RESEARCH IS HOWEVER BECOMING MORE MARKET DRIVEN IN ORDER TO BE MORE EFFECTIVE TO INDUSTRY. THE INTERACTION BETWEEN GOVERNMENT, BUSINESS AND INDUSTRY IS BEING ENHANCED.

PERHAPS THE TIME HAS COME TO IMPLEMENT THE PRIVATE LABORATORY SYSTEM UNIQUE TO THE UNITED STATES. AS MANY OF YOU KNOW, SOME GOVERNMENT CONTRACTS IN THE UNITED STATES ARE GIVEN TO PRIVATE LABORATORIES WHICH CAN THEN MARKET THEIR CAPABILITY AMONG OTHER POTENTIAL USERS OF THOSE TALENTS. THIS SYSTEM CREATES CAPABILITY AND ENSURES, VIA PROFIT, THAT THE PEOPLE WITH THE CAPABILITY WILL GO OUT AND SELL IT. THE TIME HAS COME TO SERIOUSLY CONSIDER THIS FOR CANADA.

IT IS GENERALLY ACCEPTED THAT TAX INCENTIVES ARE THE MOST EFFECTIVE MEANS TO SUPPORT COMPANIES WHICH INVEST IN TECHNOLOGY. A RECENT SURVEY CONCLUDED THAT 86% OF COMPANIES RESEARCH AND DEVELOPMENT PROGRAMS WOULD HAVE BEEN ADVERSELY AFFECTED HAD IT NOT BEEN FOR FEDERAL TAX INCENTIVES. TAX INCENTIVES MUST BE IMPROVED BY THE FEDERAL GOVERNMENT.

THE SRTC WAS MISUSED BUT DID HOWEVER CREATE SIGNIFICANT INDUSTRIAL TECHNOLOGY. IT WAS RESPONSIBLE FOR THE SURVIVAL OF MANY SMALL COMPANIES. TODAY A REPLACEMENT SYSTEM IS NECESSARY.

I THINK YOU WOULD ALL AGREE THAT WE ARE LIVING IN AN INFORMATION SOCIETY. HOWEVER IN CANADA WE LACK AN APPROPRIATE AND EFFECTIVE SYSTEM FOR THE DIFFUSION OF TECHNOLOGY. UNFORTUNATELY WE HAVE A TENDENCY TO OVER PROTECT INFORMATION. CERTAINLY I CAN APPRECIATE

THAT THERE IS AN ELEMENT OF PROFIT INVOLVED. HOWEVER, THERE IS AN IMMEDIATE REQUIREMENT FOR A NEW SYSTEM FOR THE EQUITABLE DIFFUSION OF TECHNOLOGY. MY PREOCCUPATION WITH NEW MATERIAL PROCESSES WILL GO NOWHERE WITHOUT SUCH TECHNOLOGY DIFFUSION.

THERE IS AN IMPORTANT ROLE TO PLAY FOR UNIVERSITY RESEARCH.

THERE IS AN IMMEDIATE REQUIREMENT FOR INCREASED GOVERNMENT FUNDING TO UPGRADE UNIVERSITY RESEARCH AND TO PROVIDE ADEQUATE FACILITIES TO TRAIN THE RESEARCHERS WHO WILL BE REQUIRED TO IMPLEMENT FUTURE STRATEGIES. I WAS FORTUNATE ENOUGH TO HAVE DEVELOPED A CERTAIN EXPERTISE IN THE AEROSPACE ENGINEERING FIELD, IN LARGE PART BECAUSE OF MY ACADEMIC EXPERIENCES. RESEARCH AND STUDY UNDER SUCH EMINENT INDIVIDUALS AS GEORGE RUSSELL HARRISON, GORDON BROWN AND C. STARK DRAPER CERTAINLY LAID THE GROUNDWORK FOR MY CAREER.

CANADA IS FAR FROM RECEIVING MAXIMUM BENEFITS FROM MONEY SPENT ON GOVERNMENT LABORATORIES.

THEY CONTINUE TO REMAIN RESEARCH ORIENTED. RESEARCH MUST BE LINKED WITH DEVELOPMENT IN ORDER THAT RESULTS CAN BE DIRECTED AT MARKETS THEREBY YIELDING A SENSIBLE RETURN ON INVESTMENT.

THE FEDERAL GOVERNMENT SHOULD ESTABLISH ONE MINISTRY OF INDUSTRY AND SCIENCE RATHER THAN TWO SELF CONTAINED DEPARTMENTS. UNTIL THIS REORGANIZATION IS IMPLEMENTED THERE CAN BE NO DEFINITIVE PLAN OF ACTION FOR FUTURE INITIATIVE.

I DO NOT WISH TO LEAVE YOU WITH THE IMPRESSION THAT THE FEDERAL GOVERNMENT HAS ABROGATED ITS RESPONSIBILITY IN SCIENCE AND TECHNO-

LOGY. IN FACT I CAN STATE THAT RECENT INITIATIVES BY THE GOVERNMENT UNDERLINE ITS AWARENESS OF ENGINEERING AND THE REQUIREMENT FOR RESEARCH AND DEVELOPMENT AND SCIENCE AND TECHNOLOGY. ON FEBRUARY 16 OF THIS YEAR THE NATIONAL ADVISORY BOARD ON SCIENCE AND TECHNOLOGY HELD ITS FIRST MEETING IN OTTAWA. THE BOARD HAS A MANDATE TO ADVISE THE PRIME MINISTER ON CURRENT AND ANTICIPATED DOMESTIC AND INTERNATIONAL DEVELOPMENTS AND TRENDS IN SCIENCE AND TECHNOLOGY.

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- ✓ - THE ALOUETTE SATELITE
- ✓ - THE CREATION OF THE TRANS CANADA TELEPHONE SYSTEM.

THE PRIME MINISTER TOLD THE INVITED GUESTS AT THE INAUGURATION CEREMONIES IN OTTAWA THAT "IT WOULD BE IMPOSSIBLE TO IMAGINE THIS COUNTRY WITHOUT THE DARING AND COURAGE OF THE MANY ENGINEERS WHO

BUILT IT. THE WORD 'EXCELLENCE' IS ALWAYS ASSOCIATED WITH CANADA'S ENGINEERS." MR. MULRONEY THEN WENT ON TO SAY THAT "ENGINEERS ARE ALWAYS ON THE CUTTING EDGE OF NEW TECHNOLOGY AND HAVE THE REPUTATION OF BEING INNOVATIVE AND HIGHLY SKILLED PROFESSIONALS."

TO MOST OF US, THESE ENGINEERING ACHIEVEMENTS ARE ALREADY RECOGNIZED AS BEING MAJOR ACCOMPLISHMENTS. WHAT I DRAW YOUR ATTENTION TO IS THE FACT THAT THEY HAVE SPAWNED NEW INDUSTRY.

WE ALL KNOW THAT THE DEVELOPMENT OF THE RAILWAY SYSTEMS ACROSS CANADA OPENED UP THE WEST AND RESULTED IN CANADA BEING TRULY "A MARIE USQUE AD MARIE". HOWEVER THE RAILWAY LAID THE FOUNDATION FOR THE DEVELOPMENT OF THE TELEGRAPH SYSTEM, ~~WHICH~~ ULTIMATELY ~~LED~~ TO A TELEPHONE SYSTEM. WE NOW HAVE A NATION WIDE TRANS-CANADA MICROWAVE TELEPONE NETWORK. AS A RESULT OF THESE ACHIEVEMENTS CANADIAN ENGINEERS BECAME LEADERS IN RELATED TECHNOLOGY TO THE POINT THAT TODAY WE ARE CALLED UPON AROUND THE WORLD TO DEVELOP TELECOMMUNICATIONS SYSTEMS. THIS EXPERTISE CONTRIBUTED TO CANADIAN ENGINEERS BECOMING WORLD RENOWN IN SATELLITE COMMUNICATIONS.

WHILE THE BEAVER AIRCRAFT ~~AND ITS FOLLOW-UP SISTER SHIP~~ CONTRIBUTED TO THE OPENING UP OF THE NORTH, THEY ALSO RESULTED IN THE CREATION OF NEW BUSINESSES AND INDUSTRY. MAX WARD STARTED OUT WITH ~~A GYPSY~~ MOTH AND TODAY RUNS A MAJOR INTERNATIONAL AIRLINE.

CANADIAN HYDRO ELECTRIC PROJECTS ARE SIGNIFICANT IN THEIR OWN RIGHT. WHAT BECOMES EVEN MORE IMPRESSIVE IS THE FACT THAT CANADIAN EXPERTISE IS NOW BEING UTILIZED IN THE SOVIET UNION AND CHINA. THE

ECONOMY IS GEARED TO SENDING AWAY RAW MATERIAL AND TO IMPORTING FINISHED PRODUCTS. IN SUCH AN ECONOMY YOU GROW INSTITUTIONS APPROPRIATE TO THE SITUATIONS; IT IS THEN VERY DIFFICULT TO CHANGE INTO EVEN AN INDUSTRIALIZED COUNTRY, LET ALONE A POST-INDUSTRIAL ECONOMY. IT IS AN EXTREMELY DIFFICULT JUMP TO MAKE!

THE INSTITUTIONS WE HAVE BUILT IN CANADA ARE VERY UNDERSTANDABLE. WE HAVE HAD LITTLE NEED FOR INDUSTRIAL RESEARCH SINCE THE BRANCH PLANT AND THE COMMONDITY PRODUCER NEEDS VERY LITTLE IN RELATION TO THE TONNAGES SHIPPED. THEREFORE, GOVERNMENT HAS ENTERED THE VACUUM.

OUR COUNTRY HAS A VERY HIGH PERCENTAGE OF RESEARCH AND DEVELOPMENT DONE BY GOVERNMENT LABORATORIES. THE TROUBLE IS THAT GOVERNMENT LABORATORIES ARE NOT NECESSARILY THE BEST INSTITUTIONS FROM WHICH TO LAUNCH AN INTERNATIONAL, MARKET ORIENTED, COMPETETIVE DRIVE. WE HAVE EXCELLENT GOVERNMENT LABORATORIES BUT THEY ARE OBVIOUSLY NOT, AND WERE NEVER INTENDED TO, COMMERCIAL ENTERPRISES. THE BIG PROBLEM IN CANADA IS NOT A LACK OF RESEARCH BUT A LACK OF DEMAND FOR RESEARCH AND THE ABILITY TO APPLY THIS RESEARCH EFFECTIVELY. THE EXPERTISE OF THE ENGINEERS DOES HOWEVER REMAIN PARAMOUNT.

AS WE MOVE TOWARDS THE 21ST CENTURY THE RAISON D'ETRE FOR OUR COUNTRY IS DISAPPEARING. IT IS ~~SCIENCE AND~~ TECHNOLOGY WHICH WILL ULTIMATELY RESCUE US AND PREVENT CANADA FROM ASSUMING THE STATUS OF A DEVELOPING NATION. THE ONLY REALISTIC FUTURE FOR OUR COUNTRY IS TO STRATEGICALY PLACE OURSELVES AT THE INTERNATIONAL FOREFRONT OF ~~SCIENCE AND~~ TECHNOLOGY.

IN ORDER TO MOVE AWAY FROM A RESOURCE ECONOMY TO MORE OF A MANUFACTURING ~~AND INFORMATION~~ ECONOMY, WE MUST FOCUS ON ~~THE~~ MATERIALS ~~PROCESS~~. WHILE THE DEVELOPMENT AND EXPORT OF OUR ENGINEERING EXPERTISE WILL CONTINUE TO REMAIN VITAL, MARKETS ARE LIMITED FOR HYDRO ELECTRIC PROJECTS AND NUCLEAR DEVELOPMENT. WE MUST FOCUS ON ~~THE~~ MATERIALS ~~PROCESS~~ - THE EXTENSION OF OLD TECHNOLOGY WHICH WILL IN THE END RESULT IN HIGHER PERFORMANCE MATERIALS.

IN CERTAIN SECTORS, SUCH AS LEAD AND COPPER MINING, THE CHALLENGE IS TO COME UP WITH NEW USES FOR OLD MATERIALS THAT ARE LOSING THEIR MARKETS TO LIGHTWEIGHT COMPOSITES, ~~AND~~ PLASTICS, WE HAVE SEEN HOW IRON HAS BEEN REPLACED BY ALUMINUM WHICH MAY QUITE CONCEIVABLY BE REPLACED BY PLASTICS. IN OTHER FIELDS SUCH AS TELECOMMUNICATIONS THERE IS A NECESSITY OF EXPLORING NEW PROCESSES. WE MUST TAKE ADVANTAGE OF THE LATEST SCIENTIFIC KNOWLEDGE AND SET UP RESEARCH PROGRAMS ADAPTED TO NEW ENGINEERING PROCESSES.

HOW CAN WE BEST APPLY THIS NEW MATERIALS ~~PROCESS~~?

THE GREATEST NUMBER OF NEW ENGINEERING PROJECTS, AND JOBS FOR THAT MATTER, WILL ARISE FROM THE SMALL AND OFTEN NEW ENTERPRISES, WHICH RESPOND TO THE DEMANDS OF THE FUTURE. THE GREATEST REWARDS WILL GO TO THOSE WHO HAVE EXHIBITED AN ENTREPRENEURIAL SPIRIT AND HAVE STARTED THEIR OWN BUSINESSES. IN CANADA WE CANNOT DEPEND UPON THE GOVERNMENT FOR THE DEVELOPMENT OF INNITIATIVES. THIS IS NOT TO SAY THAT THE GOVERNMENT HAS A MAJOR ROLE TO PLAY.

IN CANADA RESEARCH HAS FREQUENTLY BEEN UNDERTAKEN FOR THE SAKE OF

RESEARCH AND NOT TO MEET THE REQUIREMENTS OF INDUSTRY. UNIVERSITY AND GOVERNMENT RESEARCH SHOULD BECOME MARKET DRIVEN IN ORDER TO FACILITATE EFFECTIVE INDUSTRIAL RESEARCH AND DEVELOPMENT. THE INTERACTION BETWEEN GOVERNMENT, BUSINESS AND INDUSTRY MUST BE ENHANCED.

PERHAPS THE TIME HAS COME TO IMPLEMENT THE PRIVATE LABORATORY SYSTEM UNIQUE TO THE UNITED STATES. AS MANY OF YOU KNOW, SOME GOVERNMENT CONTRACTS IN THE UNITED STATES ARE GIVEN TO PRIVATE LABORATORIES WHICH CAN THEN MARKET THEIR CAPABILITY AMONG OTHER POTENTIAL USERS OF THOSE TALENTS. THIS SYSTEM CREATES CAPABILITY AND ENSURES, VIA PROFIT, THAT THE PEOPLE WITH THE CAPABILITY WILL GO OUT AND SELL IT. THE TIME HAS COME TO SERIOUSLY CONSIDER THIS FOR CANADA.

IT IS GENERALLY ACCEPTED THAT TAX INCENTIVES ARE THE MOST EFFECTIVE MEANS TO SUPPORT COMPANIES WHICH INVEST IN TECHNOLOGY. A RECENT SURVEY CONCLUDED THAT 86% OF COMPANIES RESEARCH AND DEVELOPMENT PROGRAMS WOULD HAVE BEEN ADVERSELY AFFECTED HAD IT NOT BEEN FOR FEDERAL TAX INCENTIVES. TAX INCENTIVES MUST BE IMPROVED BY THE FEDERAL GOVERNMENT.

I THINK YOU WOULD ALL AGREE THAT WE ARE LIVING IN AN INFORMATION SOCIETY. HOWEVER IN CANADA WE LACK AN APPROPRIATE AND EFFECTIVE SYSTEM FOR THE DIFFUSION OF TECHNOLOGY. UNFORTUNATELY WE HAVE A TENDENCY TO OVER PROTECT INFORMATION. CERTAINLY I CAN APPRECIATE THAT THERE IS AN ELEMENT OF PROFIT INVOLVED. HOWEVER THERE IS A REQUIREMENT IMMEDIATELY FOR A NEW SYSTEM FOR THE EQUITABLE DIFFUSION OF TECHNOLOGY. MY PREOCCUPATION WITH NEW MATERIAL PROCESSES WILL GO

NOWHERE WITHOUT SUCH TECHNOLOGY DIFFUSION.

THERE IS AN IMPORTANT ROLE TO PLAY FOR UNIVERSITY RESEARCH.

THERE IS AN IMMEDIATE REQUIREMENT FOR INCREASED GOVERNMENT FUNDING TO UPGRADE UNIVERSITY RESEARCH AND TO PROVIDE ADEQUATE FACILITIES TO TRAIN THE RESEARCHERS WHO WILL BE REQUIRED TO IMPLEMENT FUTURE STRATEGIES. I WAS FORTUNATE ENOUGH TO HAVE DEVELOPED A CERTAIN EXPERTISE IN THE AEROSPACE ENGINEERING FIELD, IN LARGE PART BECAUSE OF MY ACADEMIC EXPERIENCES. RESEARCH AND STUDY UNDER SUCH EMINENT INDIVIDUALS AS GEORGE RUSSELL HARRISON, GORDON BROWN AND C. STARK DRAPER CERTAINLY LAID THE GROUNDWORK FOR MY CAREER.

CANADA IS FAR FROM RECEIVING MAXIMUM BENEFITS FROM MONEY SPENT ON GOVERNMENT LABORATORIES.

THEY CONTINUE TO REMAIN RESEARCH ORIENTED. RESEARCH MUST BE LINKED WITH DEVELOPMENT IN ORDER THAT RESULTS CAN BE DIRECTED AT MARKETS THEREBY YIELDING A SENSIBLE RETURN ON INVESTMENT.

THE FEDERAL GOVERNMENT SHOULD ESTABLISH ONE MINISTRY OF INDUSTRY AND SCIENCE RATHER THAN TWO SELF CONTAINED DEPARTMENTS. UNTIL THIS REORGANIZATION IS IMPLEMENTED THERE CAN BE NO DEFINITIVE PLAN OF ACTION FOR FUTURE INITIATIVE

I DO NOT WISH TO LEAVE YOU WITH THE IMPRESSION THAT THE FEDERAL GOVERNMENT HAS ABROGATED ITS RESPONSIBILITY IN SCIENCE AND TECHNOLOGY. IN FACT I CAN STATE THAT RECENT INITIATIVES BY THE GOVERNMENT