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**TOWARD AN
INTERNATIONALLY COMPETITIVE
AND RESPONSIBLE
CANADIAN CHEMICAL SECTOR GROUPING**

**TO THE HONOURABLE MICHAEL WILSON, P.C., M.P.
MINISTER OF INDUSTRY, SCIENCE AND TECHNOLOGY AND
MINISTER FOR INTERNATIONAL TRADE**

**REPORT OF THE CHEMICAL SECTOR
GROUPING CONSULTATIVE COMMITTEE**

MAY 28, 1992



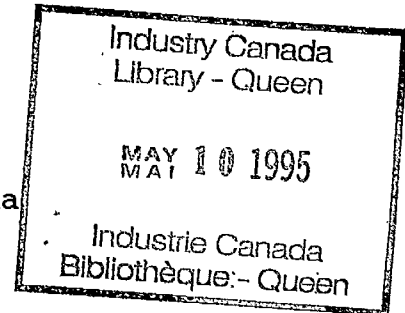
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P R O S P E R I T Y A G E N D A

C H E M I C A L S E C T O R G R O U P I N G C O N S U L T A T I V E C O M M I T T E E

May 28, 1992.

The Honourable Michael Wilson,
Minister Industry, Science & Technology Canada
235 Queen Street,
Ottawa, Canada
K1A 0H5.



Dear Minister:

I am pleased to submit to you today the Report of the Chemical Sector Grouping Consultative Committee. Attached you will find a list of those members of the Committee who have personally endorsed the Report. Because of time constraints, some of the members were not available in the last week to review the final Report and endorse it. I am confident that most, if not all, of these members will wish to add their endorsement in the coming days and we will advise you of their names in due course.

In addition to the personal endorsement of Committee members, we are also seeking the endorsement of the associations who are involved in the process. We will advise you of these as we receive them.

As you are well aware, Minister, the grouping brought together many segments of the chemical industry which have common interests and vision. The major thrusts outlined in the Report form a common thread of beliefs and focus. Their implementation will require commitment on the part of all stakeholders and the leadership of senior levels in government, industry, and academia. The challenge is indeed major, but the Committee believes that it is achievable over the long term and essential to the future of our industry and country.

While there are many similarities between the industries forming the group as defined in the Report, there are nevertheless questions of emphasis which will vary from industry to industry and association to association. You can therefore expect to receive more specific industry comments, either in the form of studies, action plans, or letters wishing to strengthen various points of view.


Hon. Michael Wilson

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On behalf of the members of the grouping, we look forward to hearing from you and the Steering Committee on the various concepts and approaches described in the Report. We believe these recommendations are worthy of your endorsement and the endorsement of the Prosperity Agenda Steering Committee.

The Chemical Sector Grouping is most concerned about implementation and how that will be accomplished. We are prepared to work with you and any other groups to further the process of implementation and your direction will be most welcomed as we go forward.

Respectfully,

A handwritten signature in dark ink, appearing to read "G. Firman Bentley". The signature is fluid and cursive, with a long horizontal stroke at the end.

G. Firman Bentley,
Chairman.

**Members of the Committee Have Endorsed
The Canadian Chemical Sector Grouping Report**

Firman Bentley	Committee Chairman Chairman & CEO	ADAMAC Management Group Inc.
Tony Amery	Director Corporate Planning & Chief Economist	Du Pont Canada Inc.
Jean Bélanger	President	The Canadian Chemical Producers' Association
John Blachford	President	H.L. Blachford Ltd./Ltée
Blair Bonnyman	Vice President Technical	Hoffman-La Roche Ltd.
Jim Brown	Managing Director	Canadian Fertilizer Institute
Derek Cornthwaite	President & CEO	Diversey Corporation
Michael Cloghesy	Executive Director	Canadian Manufacturers of Chemical Specialties Association
Graeme Crombie	President	Shell Canada Chemical Company
Ted Cross	Associate Director Technology Transfer & Licensing	University of Waterloo
Brenda Drinkwalter	Vice President Corporate Relations	Novapharm Ltd.
Gerald Elden	Chairman	The Canadian Chemical Producers' Association
Judy Erola	President	Pharmaceutical Manufacturers Association of Canada
Ron Evason	President	The Society of the Plastics Industry of Canada
John Feick	President & COO	Novacor Chemicals Ltd.
Brian Fischer	Senior Vice President	Imperial Oil, Chemicals Division

John Hagerman	Vice President & General Manager	Canada Cup Inc.
Warren Hall	President	CYRO Canada Inc.
Bryan Henry	Chair, Chemistry & Biochemistry	University of Guelph
Jack King	President	Crop Protection Institute of Canada
Andre Lapalme	Vice Chairman	Pétromont Inc.
Jean-Guy Legault	President	Delmar Chemicals Inc.
Ian Lennox	President & CEO	Monsanto Canada Inc.
Dick Murry	President	Canadian Paint and Coatings Association
Herb Montgomery	Executive Director	Canadian Association of Chemical Distributors
Ted Rhodes	Dean of Engineering	University of Calgary
Wayne Schnarr	Research Director	Canadian Drug Manufacturers' Association
Joe Sobie	President	Benjamin Moore Co. Ltd.
Marc Turcotte	President & CEO	Tioxide Canada Inc.
John Van Brunt	Senior Vice President & Chief Operating Officer	Cominco Fertilizers
Bernard West	President	Rhône-Poulenc Canada Inc.
Denis Wilcock	President & CEO	Dow Chemical Canada Inc.
Keith Willard	President	ICI Canada Inc.

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EXECUTIVE SUMMARY

The chemical sector grouping brings together the chemical, chemical processing and plastics processing industries as well as the distribution industry associated with them. The chemical industry refers to the petrochemical, inorganic, specialty chemicals, fertilizer and fine chemicals industries; the chemical processing industries are formulating industries, including the pharmaceutical, paints and coatings, pesticides and chemical specialties industries; and the plastics processing industry refers to processors that use synthetic resins as raw materials.

Providing materials for virtually all sectors of economic activity in Canada and for the general public, the grouping is crucial to Canada's economic future. It ranks fifth within manufacturing, having annual sales of \$37 billion, and provides over 200,000 jobs.

The companies forming the chemical sector grouping share a vision of an internationally competitive and responsible Canadian chemical sector grouping.

They see themselves not only as innovation-driven engines of economic growth, but as corporate citizens accepting responsibility for making a solid contribution to the overall goals of Canadian society.

In order to achieve that vision, the Consultative Committee reached a number of key conclusions which then served as a basis for defining an action plan to be further developed over the coming months.

1. The chemical sector grouping must foster within its companies a spirit of responsible corporate citizenship in Canada and support individual members to achieve this end.
2. Canadian governments must cooperate with each other in formulating coherent policies that avoid duplication and must commit themselves to a policy framework which is internationally competitive over the long term.
3. All company personnel must commit themselves to continuous quality improvement.

4. The chemical sector grouping must ally itself with academia to develop a highly focused, market-driven approach, eliminating fragmentation of effort and striking a careful balance between basic and applied research and development.
5. Industry and academia, supported by government, must establish closer linkages. Industry must integrate learning into its culture in support of its broader goals.
6. Visionary companies with a global outlook must foster cooperative strategic alliances.
7. Companies must be the principal agents of change in this transition period, enhanced where feasible by creative partnerships. Governments should focus on non-financial, transitional assistance.

INTRODUCTION

THE CHEMICAL SECTOR GROUPING CONSULTATIVE COMMITTEE

The chemical sector grouping, assembled for the purposes of this study, brings together the chemical, chemical processing and plastics processing industries as well as distribution industries associated with them. The chemical industry refers to the petrochemical, inorganic, specialty chemicals, fertilizer and fine chemicals industries. The chemical processing industries refer to the variety of formulating industries including the pharmaceutical, paints and coatings, pesticides and chemical specialties industries. The plastics processing industry refers to the variety of processors that use synthetic resins as their raw materials. Further information about the raw materials, processes and products of these segments of the grouping is provided in Appendix 1.

The Chemical Sector Grouping Consultative Committee, hereafter called "the Committee", brings together all of the above industries within Canadian manufacturing that are interrelated through supplier/customer, company, technology relationships, and through a common knowledge basis. Because education generally and research and development in particular are so important to this sector, representatives of academia were also involved in the discussions throughout the process. The Committee also benefited from discussions with federal and provincial government officials who participated in the process as observers. The Committee recognized that employer-employee relationships will be crucial to achieving the objectives contained in this report. Organized labour has not been a party to the consultative process to date, but the door remains open for future meetings.

IMPORTANCE OF THE GROUPING

The chemical sector grouping is one of the five largest industry groupings in Canada. In terms of factory shipments, based on latest available 1989 data, the chemical sector grouping, with sales of approximately \$37 billion, ranked behind the forestry grouping, at about \$60 billion, the transportation equipment grouping at \$54 billion, the food and beverages grouping at \$44 billion and the metals and metal products grouping at \$42 billion. The chemical sector grouping, at the same time, created jobs for about 200,000 employees, placing it again in the 5th rank. These numbers represent approximately 12% of total manufacturing shipments and 10% of total manufacturing employment.

Over the period 1982 to 1989, shipments grew by nearly 9% per year. The subsequent recession caused a substantial drop, bringing the growth rate for the decade 1982-1991 down to 5.5% per year, which still exceeds the rate for total manufacturing in Canada. During that same period, investment increased by approximately \$7 billion to reach a total of over \$30 billion, which is about 13% of total investment in manufacturing.

Productivity (shipments per employee) for the chemical sector grouping ranks second only to petroleum refining. Over the two decades 1970-1990, it had the highest productivity growth, above 3% annually, more than doubling the performance of any other manufacturing sector.

Exports approximately doubled to about \$8 billion between 1982 and 1988 and have been relatively stable since. Imports, however, have climbed at a higher rate so that the trade balance is now slightly in deficit. Within the grouping, the fertilizer, petrochemical and inorganic sectors have been the major exporters, comprising about three quarters of the total exports of the grouping. The chemical processing and plastics processing sectors have a trade deficit due to the multiplicity of small volume imports which could not, up to now, be economically produced in Canada because of the small size of the domestic market.

Within the chemical sector grouping, but outside the manufacturing data above, the distribution sector had sales in the order of \$2 billion and employs 2,500 people.

CHARACTERISTICS OF THE INDUSTRIES IN THE GROUPING

Appendix 1 provides an expanded overview of some of the main industries which comprise this grouping. The key statistics for 1989, where available, are as follows:

Industry	Establishment	Shipments \$millions	Employment	Exports \$millions	Imports \$millions	Accumulated Investments \$millions
Petrochemicals	161	8,000	16,500	3,100	2,300	8,400
Inorganics	137	2,700	9,500	700	600	3,300
Specialty & Fine Chemicals	88	1,200	4,700	200	2,000	800
Fertilizers	24	1,929	5,700	1,626	244	4,727
Paints & Coatings	150	1,692	8,400	21	218	37
Pesticides	12	400	3,500	20	400	N/A
Chemical Specialties	310	3,850	22,250	N/A	N/A	N/A
Pharmaceutical	145	3,257	19,398	181	781	1,702
Plastics Processing	2,800	17,200	120,000	3,300	4,500	2,000
Distributors	32	2,000	2,500	N/A	N/A	N/A

NOTE: Totals may not agree with text because of overlapping industry data

THE CURRENT STATE OF THE CHEMICAL SECTOR GROUPING

RECENT CHANGES

Over the last decade, and particularly the last three to five years, the chemical sector grouping has been subjected to accelerating change brought about primarily by the globalization of the chemical industry and, in North America, the more liberalized trading environment. This has been intensified by accompanying major changes in industrial and consumer demand. Adaptation has been particularly difficult for many companies in the chemical and plastics processing sectors.

MAJOR CHARACTERISTICS

At this stage of its development, the Canadian chemical sector grouping is characterized by a number of dominant features:

1. RAW MATERIALS

For the commodity chemicals sector, Canada's abundant resources continue to provide a strong raw material position. International energy resources have been subjected to a number of volatile supply situations over the last two decades. Domestic availability of these resources has therefore provided a competitive advantage for petrochemicals and ammonia through security of supply, making Canada less vulnerable to supply vagaries than other major competing countries such as Europe and Japan. The energy resources are located in Western Canada, giving that region worldwide competitive strength for ethane and other derivatives based on natural gas liquids (NGL). Tempering this regional advantage, however, is the existence of a good, albeit incomplete, pipeline network for transporting energy raw materials from west to east and the greater proximity of Eastern Canadian petrochemical producers to their markets.

For commodity petrochemicals, there is major interweaving in that many of them are raw materials for others in the petrochemical chain. While most major commodity petrochemicals are made in Canada, the level of supply flexibility available in Western Europe, and the U.S. Gulf Coast, through pipelines and otherwise, is not available here.

For specialty and fine chemicals, however, the strong raw material position does not normally exist, which puts producers at a disadvantage because they must rely on imported raw materials.

The chemical processing industry often requires commodity chemicals as key raw materials and, for these, the domestic supply is generally available at competitive prices. But formulations typically require many specialized components which are often not available in Canada and which create competitive supply problems because of distance, low volume and lack of service.

Finally the plastics processing sector has domestic and competitive access to most of the commodity synthetic resins that are its main raw materials although there are gaps in the more specialized synthetic resins, in additives, and in compounding materials, which create competitive problems.

2. HUMAN RESOURCES

Management structures, stable over much of the past two decades have in the past three to five years undergone an accelerating rate of change as companies have rationalized nationally and internationally, merged, spun off divisions and integrated functions on a global basis. This has led to a higher turnover of management personnel, often with more limited exposure to the Canadian scene. In addition, there remains a major proportion of management which has traditionally focused almost entirely on manufacturing and domestic marketing. These managers have not had opportunities to develop knowledge of innovation and world markets and to integrate into Canadian operations. To make matters worse, as the industry has recently globalized, a number of key technical, marketing and management positions have disappeared from Canadian operations.

Another concern is that the supply of skilled immigrant entrepreneurs is drying up. These people have traditionally played key roles in some segments of the chemical grouping, notably the plastics processing and related industry sectors.

The industry is recognized as a high-technology industry characterized by an above-average percentage of university and technical graduates. These employees have enjoyed higher average compensation than those in most other sectors. Short-term demand for such people has significantly declined in much of the industry, reflecting a major effort to reduce costs in this severe economic downturn. The current situation is highly uneven, with many graduates not finding jobs in their preferred areas of interest.

For the future, however, there is serious concern about the availability of science and technology graduates, from both quality and quantity aspects. Some of this can be traced to the perceived lack of satisfying career opportunities in the industry. Another factor is the low degree of interrelationship that currently exists between the chemical sector grouping and the educational framework. As a result, there is concern that students in elementary and secondary school levels, are not encouraged to consider careers in science and technology, thus raising concern about the future supply of science and technical graduates. In a similar manner, the isolation of teachers generally from the industry framework is resulting in students being unprepared for the work environment in which they will have to progress. These trends are exacerbated for certain parts of the chemical sector grouping where a poor public image related to environmental performance has made careers in the industry appear less attractive.

Relations between management and employees have generally been good compared with other industries in Canada. However, the push towards productivity has met with some difficulties as employees have been reluctant to buy-in to the adaptation required for necessary technological evolution. While compensation strategies in management ranks have recognized performance or productivity improvement, this has not been the case typically with non-management workers. A number of companies have made notable advances with highly positive results, but generally the management-employee relationship has been of the traditional style where managers have not worked closely enough with employees in the pursuit of company goals.

Finally, there is little ongoing learning culture because the industry's efforts are mainly directed at meeting short-term needs rather than demonstrating long-term commitment to the need to upgrade employees. Job training initiatives by government have often not been sufficiently focused on the skill demands of the marketplace, and have therefore not provided an adequate return for the efforts and costs involved.

3. INNOVATION

The innovation performance of the Canadian chemical sector grouping is best characterized as less-than-world-class, due to isolation of the principal participants from industry, universities and governments. The results have been:

- o insufficient focus of university and government R&D efforts on business-driven technology needs;
- o insufficient recognition by business of the need for R&D as a route to prosperity;
- o over-fragmentation of R&D efforts by all participants;
- o insufficient mutual understanding between practitioners and users of R&D;
- o insufficient "value-added" R&D for the chemical and plastics processing industries;
- o few centres or networks of excellence in industry and/or universities;
- o limited technology transfer due to lack of knowledge of available technology and lack of capacity to receive and implement it in many companies;
- o insufficient process and machinery technology development in Canada;
- o failure of industry to make the best use of available human and technological resources in universities and government.

Industry R&D efforts have been almost exclusively oriented towards development rather than basic research. There has also been a bias towards purchasing existing technology rather than carrying out the work in Canada; even here, there has often been a lack of knowledge about the technology available from international sources. And finally, environmental and health considerations have been driving a large proportion of current R&D projects.

While the overall sector within Canada ranks third in total dollars spent on R&D yearly and second in terms of spending as a percentage of shipments, it trails significantly, at 1.6% of sales, the levels of R&D expenditures by equivalent industries in the U.S., Western Europe and Japan which range between 4.2 and 5.9% of sales. As a result, few strong centres of R&D excellence exist in the Canadian industry which could be used as stepping stones to justify additional efforts in Canada.

There are a few notable exceptions to this scenario:

- o the pharmaceutical industry is currently demonstrating major growth trends in its R&D activity, underpinned by close working relationships between universities, government and the industry. R&D spending is now at a level of approximately 9% of sales;
- o the plastics processing industry has developed a close R&D relationship with the National Research Council which has been helpful in elaborating appropriate product standards;
- o the chemicals industry has put in place a joint university-industry-government approach to pre-competitive R&D with the establishment of the Institute for Chemical Science and Technology. While results are beginning to be demonstrated, very few companies have joined the effort despite the fact that this is in the desired direction.

4. CONSUMER DEMAND

Within the grouping itself, the chemical industry supplies much of the raw materials for the other members of the grouping. The grouping, in turn, has customers in almost all other sections, from traditional resource industries, such as mining, pulp and paper and agriculture, to construction and other manufacturing sectors, such as automotive and advanced electronics.

A large proportion of the output of the chemical and plastics processing industries is also sold as finished products to the general public through a variety of organizations such as wholesalers, retailers and health-care facilities.

The demands on the chemical industry vary widely because of its many different customers. A large proportion of downstream customers, industries or the general public, have not set exacting standards for the products they purchase. The resource industries for example, had benefited for a long time from dominant world-market positions which did not necessitate rigid product standards and innovation and, in turn, did not put pressure on the chemical industry grouping to improve the quality of its products.

In addition, other downstream customer industries and a number of companies in the chemical and plastics processing sector had been quite successful selling in Canada behind significant tariff barriers, again not being driven by intense international competition toward innovation and quality.

Finally, interprovincial trade barriers, particularly in terms of government procurement, have also reduced competition and lessened the innovative drive within the chemical processing industries.

During the last four to five years, a number of events have significantly altered demand conditions.

First is the Canada-U.S. Free Trade Agreement (FTA). Where the realistic market had been 25 million people, with customers spread over 3000 miles, free trade is bringing access to 200 million people within 1000 miles of Toronto/Montreal and 30 million people within 1000 miles of Western Canada. In addition, current North American Free Trade Agreement (NAFTA) negotiations, as well as the current General Agreement on Tariffs and Trade (GATT) round, are leading to a highly liberalized world market.

Second is the globalization trend both in the chemical sector grouping overall and in many of its downstream customer industries. Accentuated by a North-Americanization trend brought about by the FTA, a number of subsidiary companies in the chemicals and chemical processing sectors that had been established in Canada to simply access the Canadian market behind tariff barriers are finding it difficult to exist on the basis of past practices. The result is a major rationalization trend with many companies centralizing an increasing number of functions and operations in the U.S.

This trend toward the U.S. is similarly affecting many downstream customer industries which, if they are not closing Canadian operations, are at least centralizing their purchasing departments in the U.S., making it more difficult for Canadian suppliers from the chemical sector grouping to build relationships.

Third is the growing public awareness of the need for industry to be more sensitive to environmental considerations in its purchasing practices. Our customers' industries, as well as the chemical sector grouping itself, are having to place considerably more emphasis on how their products are made, marketed and disposed of, from an environmental perspective. As a result, there is a crucial need for innovation in the industry itself and its major downstream customer industries.

A fourth factor may emerge from the Prosperity Initiative itself if various industries, in partnership with governments, decide to position themselves appropriately for world markets. In such circumstances, the downstream customers of the chemical and plastics processing industries can be expected

to become even more demanding in their supply requirements, and their continuing viability will be an important factor in the ongoing prosperity of the entire chemical sector grouping.

All these factors are affecting the market at the same time as short-term recessionary factors continue to dominate, resulting in flat, if not declining, demand.

5. RELATED AND SUPPORTING INDUSTRIES

Surrounding any industry, and improving or impeding its competitiveness, is an array of other industries that provide equipment and services. Canada, historically based on the large-scale development of its resources such as minerals, energy, forestry and agriculture, has evolved a supporting structure highly sensitive to the needs of those industrial sectors. The Canadian chemical sector grouping, though it developed well over a century ago, really came into its own only in the second half of the twentieth century. As a result, it has suffered broadly from a supportive structure that was built for other sectors rather than for the chemical industry's needs.

The machinery and equipment industry's support for this sector grouping is a good example of the difficulties. The chemical sector grouping has had to rely mainly on foreign machinery and equipment to meet its needs, often at a competitive disadvantage and without ready access to the opportunity to form a closer relationship with suppliers. A notable exception has been the plastics processing industry where some specialized machinery developed in Canada has supported and advanced innovation.

The financial sector has also been more comfortable dealing with resource-based commodity producers. In particular, there has been a lack of venture capital to assist new and innovative companies in pursuing operations and growth. In addition, the financial sector has generally had less understanding of the chemical sector grouping than its counterparts do in other major countries, and so it is less supportive. A recent factor which is beginning to affect financial institutions is the degree to which they may be liable for environmental concerns incurred by their customers, particularly those in chemically-related operations. This could have the potential, if government policies are not carefully crafted, of reducing the availability of funds, and increasing the costs of capital. It is also quite difficult for smaller companies to obtain insurance coverage because of similar concerns.

Some segments of the chemical sector grouping are among the most capital-intensive and face construction costs which are higher in Canada than in other competing countries. When construction costs for large-scale chemical plants in Canada are compared with those for the same plants on the U.S. Gulf Coast, Alberta costs are about 15% higher on average, and those in other chemical-producing provinces are about 20% higher.

Lower labour costs on the U.S. Gulf Coast are due to greater access to open or merit-shop contracting and to a greater labour productivity. Climate is also a contributing factor which can only be partially offset by resorting to innovative engineering solutions. Higher costs for inputs such as construction materials and equipment rentals also add to the differential. This construction cost differential is a very serious barrier to the construction of new capital-intensive chemical plants in Canada. The same differential, for similar reasons, applies to maintenance operations.

Construction costs, however, are less significant for the chemical and plastics processing industries which are more labour-intensive.

Finally, because of its geography, Canada has developed a strong transportation infrastructure, particularly in the rail mode, to move its resources to various parts of Canada and to export markets. The commodity portion of the chemical sector grouping has benefited from this extensive rail infrastructure. Transportation deregulation was an important initiative by government which has improved the competitiveness of our transportation system, particularly opposite the U.S. At this time the road transport industry is still adjusting to the new conditions brought about by the FTA and transportation deregulation, and therefore is also not as competitive at this time as that available to U.S. competitors. The net result of the commodity bias of the rail mode and inefficiencies in the road mode has left the chemical processing industries in an uncompetitive situation. It is recognized, however, that as the situation improves, it will increase import pressures.

The pipeline infrastructure, as earlier stated, is good, albeit incomplete, but does not offer the same level of flexibility as the U.S. Gulf Coast and Western Europe. Maritime transportation, both in terminal facilities and carriers, is also not a positive contributor to competitiveness.

6. THE CHEMICAL FIRM AND ITS STRATEGIES

The chemical sector grouping is characterized by a large foreign-owned component, particularly in the basic commodity chemical industry and in the pharmaceutical industry where only a few Canadian-owned companies operate. For the chemical processing industry, there is a stronger Canadian owned presence, but still these are usually the medium to smaller firms; only a few are amongst the larger firms in the industry. For the plastics processing industry, Canadian firms are dominant.

The companies within the chemical sector grouping are trying to adjust to the unprecedented level of change brought about by globalization, liberalized trade and shifts in demand patterns of customer industries and in the attitude of the general public.

As a result of these changes:

- o many branch plants that had been located in Canada, behind tariffs, to access the Canadian market lack economies of scale and are finding it difficult to justify ongoing production in competition with equivalent or larger plants of the same company in the U.S.; many are closing in Canada as companies rationalize;
- o many companies are integrating their structures and functions across North America, with a major trend toward the U.S. This is having an effect on purchasing patterns which are often being centralized in the U.S., thereby making it more difficult for Canadian operations to access their customers;
- o many companies that had previously run highly diversified operations because of the small size of the Canadian market, are finding it difficult to radically change their approach to production by specializing in fewer, but longer-run products for the North American market;
- o many companies in the chemical processing and particularly the plastics processing industries are entrepreneurial in character and largely oriented to regional markets. Because of more intense international competition, they are facing major decisions on adjustment and having to broaden their horizons.

The fine chemicals industry, however, still considers itself poorly integrated with the rest of the grouping, with consequent difficulties for improving its performance.

The commodity-product components of the sector are highly export-oriented because of competitively priced resource-based raw materials and the existence of a number of internationally-competitive world-scale operations. On the other hand, specialty chemicals and the chemical processing industries of the sector grouping still concentrate mainly on selling to domestic markets. Few companies have extra-national outlooks and, as globalization penetrates further, the autonomy of many Canadian operations is diminished as key functions move out of the country.

Very few Canadian-owned companies have established foreign operations and thus are finding it difficult to acquire international intelligence and technology. The problem is exacerbated by their limited R&D capabilities and staff.

Overall, companies are driven by a short-term cost-related focus as opposed to being innovation-driven and long-term oriented. Except for the pharmaceutical industry, a production orientation permeates many companies instead of the marketing orientation which is required for today's global markets. A number of segments of the sector grouping, however, are demonstrating international leadership in environmental responsibility and adapting aggressively to the principles of sustainable development.

7. ROLE OF GOVERNMENT

Governments, at the federal, provincial and municipal levels, have played and continue to play an ever-increasing role in determining the competitiveness of the chemical industry grouping.

The broad policy framework today appears to favour wealth redistribution over wealth creation. Government fiscal policies and consequent deficits have resulted in large requirements for capital to finance the deficits, thereby raising the cost of capital in Canada and adversely affecting the industrial sector. Similarly, exchange rates have reflected more the need to finance government deficits than the true competitive perspective of the merchandise trade.

At the same time, a number of broad framework policies, including energy and transportation deregulation and further trade liberalization through the GATT, FTA and the proposed NAFTA, have had a positive impact, particularly on the commodity segment of the chemical sector grouping. There is a perception, however, that governments, because of the historical importance of the resource sectors in Canada, are mainly geared toward supporting commodity chemicals rather than the chemical products and plastics products industries.

A number of specific policies and regulations create concerns because of their negative impact on competitiveness:

- o The overall level of corporate taxation, federal, provincial and municipal, makes the chemical industry significantly uncompetitive vis-a-vis major competitive regions in the U.S. The proposals in the recent federal budget were an important and significant contribution to resolving this problem. Although the Alberta and Ontario budgets put in place further measures to reduce the corporate tax disparity with the U.S., the combined federal and provincial measures unfortunately were insufficient to resolve the serious corporate tax disadvantage facing the industry;
- o While the chemical sector grouping is adopting a responsible posture vis-a-vis the environment, and is oriented toward greener products and processes, there are concerns that insufficient attention is being placed on the need to maintain short-term competitiveness while adaptation to the long-term is being developed. A part of the problem comes from inadequate evaluations of regulatory impacts while another stems from a lack of international harmonization and federal/provincial coordination. While the Canadian Environmental Protection Act (CEPA) regulations have gone a long way in recognizing the competitiveness factor, there is still a concern that testing required of new chemicals being introduced in Canada puts Canadian industry at a competitive disadvantage. This will impede innovation particularly in the chemical processing industries and in a number of downstream industries;
- o Strategy toward technology development is insufficiently focused on developing national strengths;
- o In the area of enforcement, there are serious differences in treatment at the Canada/U.S. border. Imports into Canada are often not subjected to the same degree of enforcement as are products made

in Canada, and Canadian exports to the U.S. suffer significant harassment at the hands of U.S. Customs authorities;

- o While there is some improvement, competition policy still appears to be overly concerned about the existence of domestic competition rather than recognizing the international level of competition inherent in the liberalized world market and particularly the FTA.

SHARED VISION
OF AN
INTERNATIONALLY COMPETITIVE AND
RESPONSIBLE
CANADIAN CHEMICAL SECTOR GROUPING

The various companies forming the Canadian chemical sector grouping have set for themselves the vision of becoming strategic leaders within North America and perhaps the world. They see themselves not only as innovation-driven engines of economic growth but as corporate citizens accepting responsibility for making a solid contribution to the overall goals of Canadian society. Smaller firms will continue to thrive on narrower regional markets but their societal role will be the same.

THE PATH FORWARD

INTRODUCTION

Having identified the key elements of a vision for the chemical sector grouping, the Committee recognizes that this will not be achieved merely through incremental changes. It will only occur through an intensive, concerted effort by all major stakeholders in the chemical industry. In addition, while the Committee subscribes to the general concept prescribed in the Porter Study¹ of the need for a mutually reinforcing domestic cluster, it believes that, because of limits imposed by the size and geography of Canada, both in terms of markets and society, there will be a need to extend the reinforcing cluster beyond Canada. In fact, excellence through partnerships will need to be pursued wherever it exists in the world.

The Committee acknowledges the trends toward globalization of the chemical sector grouping and realizes that the grouping must meet the challenges inherent in this approach if it is to be an important participant in the future expansion of the industry worldwide. The grouping and Canadian society can also gain much from their affiliation with globalized structures. However, to maximize Canadian benefits from this affiliation, Canada will have to be perceived as an investment environment by the international industry and the Canadian chemical sector grouping will have to secure a full partnership role within the global chemical structure. This does not negate the fact that some companies will still be able to thrive in much narrower regional markets.

CHALLENGES

The vision elaborated for the chemical sector grouping is an ambitious one. In order to achieve it, the Committee foresaw a number of challenges that would need to be faced.

It identified 34 such challenges, of which ten were given the highest priority. These are all listed in Appendix 2. They reflect major concerns related to corporate behaviour, the government environment and the interrelation that should exist between the key stakeholders in the industry.

¹ Michael E. Porter and The Monitor Company, "Canada at the Crossroads: The Reality of a New Competitive Environment", Business Council on National Issues and Minister of Supply and Services Canada, 1991.

From an analysis of these challenges, the Committee decided to focus its attention on seven issues which most affect the competitiveness of the chemical sector grouping. These are as follows and are developed further in the remainder of this document:

1. Corporate Citizenship
2. Government Environment
3. Employer/Employee Relationships
4. Innovation
5. Education
6. Inter-company Relationships
7. Industrial Transition

The Committee wishes to emphasize however, that the limited time available for preparation of the report did not allow for full development of the strategic thrusts. It hopes that other stakeholders will provide an early feedback on these recommendations. The Committee intends, over the next few months to more fully develop an action plan based on the strategic thrusts and present it to government in early fall. This would complement work already in progress or being contemplated by the associations representing the industries within the chemical sector grouping. Action plans offered in the following paragraphs should therefore be considered as preliminary.

The Committee further believes that achievement of the vision of an internationally competitive and responsible Canadian chemical industry will require the commitment of many stakeholders. That commitment will not simply occur upon reading this report. It will require leadership which must come from:

- o company chief executive officers, visibly endorsing and implementing the main thrusts of this report and initiating dialogues with other stakeholders;
- o government ministers at federal and provincial levels, subscribing to the concept of an internationally competitive and coherent policy framework and to the development of a transition policy framework in cooperation with industry;
- o university presidents, joining chief executive officers and other top management in industry in developing enhanced mechanisms between academia and industry for R&D and productivity improvement;

- o association leaders, catalyzing the commitment to act upon the recommendations.

No single stakeholder can achieve the vision alone - it requires joint commitments at all stages. And time is short.

ISSUE 1. CORPORATE CITIZENSHIP

ANALYSIS

Companies in the Canadian chemical industry must be judged and accepted by other stakeholders in Canada and externally as responsible corporate citizens of Canada. They will achieve this status primarily by:

- a. offering stimulating long-term career opportunities in all disciplines. Further implications will be that young students will be attracted to pursue science and management studies because there will be attractive career prospects in a range of disciplines in the chemical sector. As career employees, they will be able to aspire to senior managerial ranks within Canada and internationally;
- b. being well understood and appreciated for the products offered in the market. The industry will be particularly responsive to the need to develop products and processes that are environmentally sound and will use this environmental mentality to be on the leading edge of world development in this aspect. This will be reinforced through the overall commitment of management and the voluntary implementation of management practices for the responsible handling of chemicals, chemical products and plastics products throughout their life-cycles;
- c. being profitable over the long-term for its shareholders. This would enable the industry, in turn, to provide support for Canada's societal goals;
- d. creating and supporting associations which provide leadership to their company members within the chemical sector grouping in achieving the vision.

In order to demonstrate responsible corporate citizenship and to play a key role in economic growth, a nucleus of chemical companies, whether domestic or foreign-controlled, will need to operate within the vision. The direct implication is that a significant number of companies will need to have the strength and support to develop world market positions from their Canadian base.

While this applies equally to Canadian and foreign-controlled companies, the latter obviously face different sets of constraints and opportunities in achieving this objective.

Current trends for many companies in this international industry are to centralize and integrate functions and decision-making, particularly within large regional blocs, to become efficient and cost-competitive. To thrive within this international structure, Canadian operations of multinational companies will have to demonstrate that they can make a solid contribution to the goals of the international company and that Canada has created a highly supportive and competitive environment in which to do so. This implies the meshing of two necessary components:

- o the Canadian operations must have achieved a true strategic partnership within the international structure, being able to demonstrate at the top level of decision-making in their companies that Canadian operations, given the right environment can provide the best overall location for investment;
- o the Canadian operations must have strong strategic and supportive linkages with employees, governments, educational and research facilities, customers, suppliers, related service industries and the general public.

To succeed, Canadian operations of multinational companies do not need to perform all functions in Canada nor must all linkages be with Canadians or their institutions. What is crucial, however, is that there be a critical mass of functions and linkages within Canada, and access to others outside, to allow Canadian operations to be an expanding and profitable part the international chemical structure.

The reality at this time is that many Canadian elements of the industry are losing their critical mass and that the required supportive linkages are not helping sufficiently to create excellence. This lack of linkage is particularly true of the fine chemicals industry. Some companies have striven to build linkages and seek international excellence and they have been successful. On the other hand, some companies have chosen to maintain a course where minimum operations will be carried out in Canada - that is inevitable. We must establish conditions whereby there will be more of the former. The Canadian chemical sector grouping can be a leader among Canadian industries and in the world chemical industry. It has clearly established this in environmental management. The Canadian chemical sector grouping is capable of developing that same excellence across a broad range of functions and strategic partnerships. By the turn of the century concrete steps will need to have been taken in that direction.

The Committee expressed concerns that many companies in the Canadian chemical sector grouping are not assembling the critical operational functions needed to allow them to become competitive, innovative and outward-looking. In addition, the rationalization trend within the international chemical industry structure is in many cases counter to such objectives being achieved. The Committee strongly believes that if the sector grouping is to be perceived as a responsible corporate citizen in Canada, a substantial body of companies will need to:

- a. identify those legitimate aspirations of Canadian society to which they can make a substantial positive contribution;
- b. develop the capacity to be strategic partners in the world chemical structure.

The companies will need to achieve this themselves, but their efforts will be enhanced if the sector pro-actively promotes this through cross-sensitization and mutual support in the same manner as is already being done for environmental responsibility.

CONCLUSION

The Canadian chemical sector grouping must foster within its companies a spirit of responsible Canadian corporate citizenship and support individual members in establishing programs to this end.

STRATEGIC OBJECTIVE

A substantial body of chemical companies operating in Canada as responsible corporate citizens.

Action plan:

1. industry develop guidelines/codes for responsible corporate citizenship in Canada;
2. companies in Canada enlist management, employees, boards of directors and customer/suppliers in charting a course toward responsible Canadian corporate citizenship;

3. management of foreign-owned Canadian operations strive to secure a strategic partnership role within global company structures as a means of enhancing their position as responsible Canadian corporate citizens;
4. companies visibly apply management practices for the responsible handling of chemicals throughout their life-cycles;
5. companies visibly seek out sustainable development options;
6. associations develop means of sensitizing and supporting members in their efforts to become responsible corporate citizens in Canada.

ISSUE 2. GOVERNMENT ENVIRONMENT

ANALYSIS

In this internationalized chemical sector grouping, perceptions about governments can have a determinant impact on the location of investments and continuing operations. It is, therefore, important that Canadian governments at all levels -- federal, provincial and municipal -- operate in a mutually reinforcing policy framework focused on maintaining a level playing field both domestically and internationally. Rather than attempting to pick winners and losers amongst companies or industries, policies must be targeted at creating a competitive framework, within which capital may flow naturally and markets are allowed to work.

To encourage chemical industry efforts toward growth in Canada, it will be crucial that governments first achieve unity, stability, harmony, and fiscal responsibility as policy underpinnings. This is basic.

Seven key government policy elements could underpin efforts by the chemical sector grouping to achieve its vision:

- o industrial costs of capital that are not adversely affected by heavy government deficits;
- o competitive taxation that promote investment;
- o trade policies that liberalize international markets and that are further supported by an internal common market;
- o R&D policies that attract industrial R&D to Canada;
- o deregulated energy and transportation markets that provide competitive raw materials and transportation;
- o competition policies that reflect the international components of competitive markets;
- o regulatory processes that are coordinated between governments within Canada and harmonized internationally.

Overall, the vision for governments should be that Canada be perceived by world decision-makers in the chemical sector grouping as an attractive place in which to operate and invest.

The Committee, however, is seriously concerned about governments in Canada and their apparent reluctance to work together in creating a competitive policy framework. A user-friendly government policy framework that ensures a level playing field domestically and internationally, through to the long term, is imperative if the world chemical industry is to look seriously at major future development in Canada.

CONCLUSION

Canadian governments must cooperate with each other in formulating coherent policies that avoid duplication and must commit themselves to a policy framework which is internationally competitive over the long-term.

STRATEGIC OBJECTIVE

Achieve a coordinated and competitive policy framework at all levels of governments in Canada, and a level playing field internationally.

Action Plan:

government policies should meet competitiveness tests. Every memorandum to Cabinet dealing with government policies, and every regulatory initiative should have a section dealing with "Impact on Competitiveness" and which would include identification of overlaps with other jurisdictions (including other departments of the same level of government and other levels of government) as well as plans to eliminate overlaps.

Key policy thrusts:

1. Develop fiscal and monetary policies to result in competitive taxation rates and costs of capital.

Action Plan:

- o joint industry/government study to determine taxation rates and regimes necessary to promote industrial development of the chemical sector grouping in Canada;

- o provincial and municipal governments, particularly in Ontario and Alberta, to overcome documented uncompetitiveness in tax regimes for the manufacturing and processing sectors;
 - o joint industry/government study of impact of monetary policy on costs of capital to industry.
2. Maintain energy deregulation.
 3. Complete transportation deregulation at federal/provincial levels.

Action Plan:

- o review of National Transportation Act to ensure that competitiveness of users is maintained or enhanced.
4. Trade policies should open markets for Canadian products, improve competitiveness within Canada, and allow access to lower cost inputs from abroad.

Action Plan:

- o elimination of interprovincial barriers to trade;
 - o prompt completion of implementation of FTA initiatives including subsidies and countervail negotiations;
 - o prompt completion of implementation of GATT and NAFTA agreements;
 - o fair enforcement of trade rules in Canada and other countries, e.g. border documentation, movement of people, standards.
5. Apply competition policies in a manner consistent with competition in an open global market.

Action Plan:

- o initiate dialogue between Industry Science and Technology Canada/Consumer and Corporate Affairs Canada and industry on

how competition works in the chemical industry and how competition policies should support efforts to rationalize and specialize operations on a global basis.

6. Promote and communicate a policy framework, much of which exists at the present time, supportive of R&D and innovation efforts by the industry.
7. Develop a regulatory framework for environmental issues (and interrelated occupational and consumer health and safety issues), competitive with those available in other G-7 countries.

Action Plan:

- o environmental solutions that favour voluntary approaches while consolidating any gains achieved through regulations;
 - o environmental regulations that pass short-term and long-term competitiveness tests consistent with the goal of long-term sustainable development. Where a short-term competitiveness test cannot be met, governments should launch international initiatives to enhance standards internationally prior to acting domestically;
 - o regulatory approaches that promote harmonization with other countries in support of competitiveness;
 - o federal/provincial government coordination of policies and their implementation to remove duplications and double jeopardy in support of competitiveness;
 - o federal/provincial government dialogue on regulatory agendas with industry and coordination with voluntary approaches.
8. Ongoing review by governments of impact on competitiveness of all major policy and regulatory measures and development of plans to overcome areas of uncompetitiveness.

ISSUE 3. EMPLOYER/EMPLOYEE PARTNERSHIP

ANALYSIS

Employers and employees will benefit where both can clearly see the advantages of striving for improved productivity, innovation and overall quality.

Employers must demonstrate a long-term commitment to their employees through:

- o development of management skills which will enhance the ability of the company to carry out its vision;
- o creation of knowledge-based jobs that span the full range of functions so as to offer employees long-term career opportunities;
- o implementation of an ongoing learning culture within the company, through both formal and in-house training, which will allow employees to upgrade themselves and benefit from improved productivity and innovation;
- o involvement of the employees in identifying opportunities for improved productivity and innovation, including the adoption of a total quality culture²;
- o the involvement of the employees in securing a healthy and safe work environment.

Employees, for their part, must demonstrate a long-term commitment to employers through:

- o commitment to an ongoing learning culture;
- o commitment to full participation in implementing total quality throughout the company.

² Total quality, as used in this report, whether as a culture or as a management process, involves everyone in improving the quality and value of the products and services they provide their customers--external or internal--, thereby eliminating waste and achieving a more competitive position. By extension, it is also used in this report to include the same pursuit by all elements of Canadian society.

To meet its vision, the chemical sector grouping should strive to achieve a supportive employer/employee relationship, having as its cornerstone an ongoing learning culture, long-term career opportunities and a total quality approach to all functions. The results will be maximized where all employees, including management, become unified in the search for excellence, secure in the knowledge that this will benefit everyone in the long term.

The Committee recognizes that companies in the grouping are facing accelerating rates of change, both internally through globalization and externally through competitive pressures resulting from a liberalized trading environment. The Committee, therefore, strongly recommends that all company personnel be integrated into decision-making processes and continuous improvement so that competitiveness and growth are achieved and maintained.

CONCLUSION

Competitiveness requires the commitment of all company personnel to continuous quality improvement.

STRATEGIC OBJECTIVE

Through partnership, develop joint employer-employee commitment to total quality.

Action Plan:

1. companies develop mechanisms for an open corporate environment whereby all employees are empowered to develop and continuously improve productivity, with accompanying compensation systems that reward productivity improvements;
2. associations provide forums for exchange of information and examples of successful employee partnerships in pursuance of improved productivity;
3. company CEOs champion total quality culture in their companies;
4. companies implement total quality processes with all employees empowered to participate fully in decision making;

5. government and industry jointly develop a framework for total quality standardization and certification in Canada, harmonized with the International Standards Organization, and promote implementation by chemical sector grouping;
6. companies foster an ongoing training culture along with formalized career planning to demonstrate long-term commitment to employees.

ISSUE 4. DRIVE FOR INNOVATION

ANALYSIS

While it is important to increase R&D activity to a level more commensurate with that in other countries, there will be an even greater need to focus the efforts in areas where unique Canadian opportunities and value-added can be secured, and then to integrate the R&D within the total operations of the companies in Canada.

This will require:

- o greater emphasis on long-term research, keyed to internal and downstream customer industries' demands, whereby breakthroughs can be achieved and applied through Canadian manufacturing operations and world mandates. Smaller companies may only find it feasible to seek regional mandates. This will need to be accomplished at the same time as applied process and product development is more solidly entrenched;
- o greater awareness of, and implementation of, new technologies developed throughout the world;
- o development of focused centres of excellence in both industry and universities that are closely inter-related and market-driven. Such centres should strive to achieve critical masses and reduce duplication and fragmentation of efforts.

The Committee acknowledges that the level of research and development and, consequently, of innovation in the Canadian chemical sector grouping, is insufficient to allow entrenchment of the vision. The Committee also expressed concerns that, because of the small size of the Canadian economy, research and development efforts risked being too diffused and fragmented to be efficient.

CONCLUSION

The Canadian chemical sector grouping must intensify its drive toward innovation if the vision is to be achieved. To optimize results, it needs to ally itself with academia in developing a highly-focused, market-driven approach where fragmentation of effort is eliminated and a careful balance is struck between basic and applied research and development.

STRATEGIC OBJECTIVE

An intensified drive toward innovation through more R&D. Part of this effort should be directed to achieving breakthroughs via basic research, and part to a greater focus on applied R&D for more immediate innovative results.

Action Plan:

1. carry out study on how to raise awareness of leading technologies available world-wide and promote their adaptation and adoption in Canada;
2. develop and secure support for focused, market-driven, critical-sized centres of excellence linking universities and industries, with particular attention attached to limiting over-fragmentation due to regional considerations;
3. develop a long-term mentality and approach to R&D through:
 - a. study of government incentives in other countries which foster a long-term approach to R&D with recommendations on how these could be adapted to the needs of the chemical sector grouping;
 - b. industry conduct dialogue with customer industries to identify long-term evolution, with particular focus on sustainable development;
 - c. associations educate members on the benefits of long-term R&D approaches and available government incentives;
 - d. government, with help of industry produce an interpretive bulletin for R&D tax credits adapted to the chemical sector grouping;

- e. companies adopt incentives and personnel policies which reward technical innovators and attract them to long-term careers to the technical area.

ISSUE 5. EDUCATION

ANALYSIS

Learning institutions at all levels will have an increasing impact on competitiveness in the years ahead. Academia touches almost all aspects of industry, from technical and management education to the development of a scientific knowledge base and innovation, and to providing advice and catalyzing forward thinking in many business functions. To facilitate the evolution of an internationally competitive chemical sector grouping, the relationship with academia will need to be intensified where both become more knowledgeable of each other's needs and can provide mutual ongoing support.

The Committee considers that industry and academia have been isolated from each other for too long. There has not been sufficient dialogue aimed at identifying mutual needs and benefits. Also, ongoing learning has not been integrated as a way of life by the industry with its associated long-term commitment to employees. The Committee considers education important and is optimistic that an appropriate dialogue could be initiated which would bring concrete results.

CONCLUSION

Industry and academia, supported by government, must establish closer linkages. The industry must integrate learning into its culture in support of the broader goals stated in the vision.

STRATEGIC OBJECTIVE

Concerted industry-academia focus on integrating learning as the underpinning for achieving the vision of the chemical sector grouping.

Action Plan:

1. initiate dialogue between senior levels of the academic community and industry to develop a better understanding of mutual needs and identify cooperative mechanisms whereby the various elements of the chemical sector grouping's vision may be achieved;

2. governments (Industry, Science and Technology Canada/Labour Canada/Employment and Immigration Canada jointly at the federal level, and provinces), together with academia and industry develop information packages to promote excellence;
3. universities and colleges integrate total quality principles and approaches in business, science and engineering curricula;
4. associations assemble education needs of companies and develop programs/seminars to meet those needs;
5. industry develop dialogue with all levels of academic institutions to secure the supply of future employees.

ISSUE 6 INTER-COMPANY RELATIONSHIPS

ANALYSIS

Most industries of the chemical sector grouping have developed or have the potential to develop significant internal customer/supplier linkages with other components of the grouping. Synergy will enhance both the supplier and customer industries when the relationships are built through joint approaches that reach beyond the simple transfers of material, and encompass all functions from R&D to the eventual final uses of products. Similar benefits may also result from partnerships between companies with comparable product mixes or manufacturing activities. In developing successful cooperation, excellence through partnership will need to be pursued wherever it exists in the world. The proximity of customers and suppliers within Canada implies, however, that additional benefits would result from enhancing Canadian inter-sectoral relationships within the chemical industry grouping, always with the objective of adding to the value of products manufactured in Canada.

The same benefits should accrue from developing similar broader synergistic relationships with major downstream and upstream industries outside the chemical sector grouping.

Particular attention will also need to be given to the major advantages that can accrue from the development of greener products and processes.

In addition to customer/supplier relationships, the chemical sector grouping requires competitive associated services in order to achieve, for itself, international levels of cost competitiveness. Key services including financing, equipment and construction need to be internationally competitive.

The relationship with the financial sector must evolve to a point where firms in the financial community develop a broad understanding of the chemical sector grouping -- its aspirations and its needs, recognizing that some components like biotechnology are unique. Based on this knowledge, the financial community must then promote long-term partnerships, whereby cost-competitive capital is made available and long-term venture commitments are established for ongoing development.

Equipment needs are extremely varied, so it is unreasonable to expect domestic equipment suppliers to meet most of the chemical sector grouping's needs. But, there is an opportunity for associated equipment development in

certain specialized areas which would be mutually beneficial. Industry relationships will obviously be enhanced as Canadian companies become strongly innovation-driven. A necessary component will be improved international access to innovative equipment technology.

The construction sector, for its part, will have to mirror the chemical sector grouping's efforts at productivity improvement and innovation by adopting the same principles that exist between the management in the chemical sector grouping and its employees in order to achieve cost competitiveness.

Finally, because movement of products is so important in a country the size of Canada, the cost-competitive modes of transportation will have to evolve into a total logistics systems approach whereby all phases of material handling are integrated into a cost-competitive system.

The chemical sector grouping should strive to forge a knowledge-based long-term commitment with its financial, equipment, construction and logistics-associated sectors with a view to achieving cost-competitiveness in these key areas affecting the growth of the chemical group.

The Committee strongly believes that individual companies cannot achieve the stated vision in isolation, but must instead develop a corporate culture that promotes strategic partnerships. Cooperation must develop between visionary companies and equally visionary suppliers and customers. Cooperation must extend as well to providers of services, be they financial, construction, logistics or others. While cooperative excellence should be pursued wherever it may exist in the world, added benefits will accrue to companies and to Canada if cooperative alliances are sought and developed within Canada.

CONCLUSION

Cooperative strategic alliances need to be fostered between visionary companies having a global outlook recognizing that increased benefits will accrue to Canada where such linkages can be developed between Canadian operations.

STRATEGIC OBJECTIVE

To enhance competitiveness by the promotion of strong cooperative alliances between manufacturers, customers and their suppliers, and with supportive infrastructure elements.

Action Plan:

1. Strategic customer/supplier alliances

- a. develop approach to encourage and promote cooperative customer/supplier relationships within the chemical sector grouping, as well as between manufacturers with similar activities;
- b. identify sustainable development trends in customer industries and determine how needs could be met by the Canadian chemical sector grouping;
- c. encourage industries within the chemical sector grouping to develop plan or promote existing ones for their industry in support of the vision for the grouping. This will be particularly important for the fine chemicals industry. A plan for the biotechnology industry already exists.

2. Infrastructure partnerships

- a. engage in dialogue with the financial community to enhance its knowledge of, and willingness to meet the needs of the chemical sector grouping;
- b. engage in dialogue with the construction industry with a view to securing cost-competitive services;
- c. engage in dialogue with providers of logistic services to develop a cost-competitive approach to the handling of products of the chemical sector grouping.

ISSUE 7 INDUSTRIAL TRANSITION

ANALYSIS

The Committee recognizes that, with a newly liberalized international market, some companies currently lack elements of competitive strength upon which to build stronger Canadian operations in line with the stated vision. It is not the intention of the vision to artificially support uncompetitive companies. Yet it must be recognized that, given the proper environment, many of these companies can not only survive but flourish, maintaining their roles as providers of jobs for Canadians.

Companies must be the principal agents of change for the transition to be successful, but their efforts could be enhanced through creative partnerships with other companies in innovation, production and marketing.

The Committee believes the role of governments in facilitating such transition should focus on non-financial instruments, although financial support could be provided for initiating government/university/industry alliances and for reducing R&D risks.

However, should governments decide that financial assistance is generally required throughout industry and that this would be to the ultimate benefit of Canadian society, the form of assistance should be such as not to intervene in normal market mechanisms by picking winners or supporting losers; nor should assistance be provided in a manner that could be judged as countervailable under existing trade agreements.

CONCLUSION

Companies should be the principal agents of change in this transition period, enhanced where feasible by creative partnerships. Governments should focus on non-financial, transitional assistance.

SECTORAL SCOPE

The industries represented in this grouping provide new and vital products for each other and for virtually all sectors of Canadian society.

- o Petrochemicals are organic chemicals manufactured in large-scale facilities from crude oil and natural gas. These feedstocks are converted into first-stage or primary petrochemicals, the most important being olefins, such as ethylene, propylene and butadiene; aromatics such as benzene, toluene and xylene; and methanol. These primary petrochemicals are upgraded to intermediates such as styrene and ethylene dichloride, and synthetic resins, including polyethylene, polystyrene, and polyvinyl chloride. These in turn are raw materials for a wide range of downstream industries such as synthetic rubber products, plastics products, chemical specialties, paints and coatings and synthetic fibres.*
- o Inorganic chemicals often derived from minerals in the earth's crust, including chlorine, caustic soda, phosphorus, titanium dioxide and soda ash. Other inorganic chemicals are manufactured from gases produced as a result of metal refining and the processing of natural gas and petroleum; these include sulphuric acid. Some 50 inorganic chemicals produced in Canada are used in many industries, such as paints and coatings, chemical specialties, pulp and paper, mining and metallurgy, petroleum refining and the fertilizer industry.*
- o the fertilizer sector produces nutrients to replace and augment those removed from the soil in agriculture. The essential nutrients -- nitrogen, phosphorus, potassium, and sulphur -- are derived from, respectively: natural gas (via the ammonia process) phosphate rock, direct mining of potash, and sulphuric acid (see previous paragraph). This sector also includes bulk blending establishments that custom blend fertilizer formulations for use by farmers.*
- o specialty chemicals, produced in smaller volumes, are derived from animal fats or vegetable oils, such as glycerine, and from natural products from trees, such as rosin and from basic chemicals, such as detergents and plasticisers. These in turn are often formulated into*

cleaning compounds and other chemical specialties, compounds for the plastics products sectors, and additives for a wide variety of final products.

Fine chemicals are usually derived from successive chemical processes in small quantities with very high purity levels. They are used in laboratory processes as raw materials for the pharmaceutical industry, and in certain high-tech industries.

- o the paints and coatings sector, consisting of manufacturers of paints, varnishes, lacquers, shellacs and stains, includes two distinct subsectors. Architectural coatings include interior and exterior house paints, primers, sealers, varnishes and stains; they are sold to contractors and the general public through retail and wholesale outlets. Industrial coatings include automotive paints, can coatings, coil-coatings, furniture finishings and road-marking paints and are usually sold direct to the end-user. Paints and coatings are formulated products using raw materials from the petrochemical, inorganic and specialty chemicals sectors.*
- o the pesticides sector consists mainly of manufacturers of pesticides for use in the agriculture and forestry sectors and for industrial, household and garden applications. The products are used for crop protection, regulation of plant growth, control of various pests, treatment of seeds and plants against diseases, control of vegetation along utility lines, roadways and railways, control of algae in swimming pools and other aquatic systems and as a preservative for wood and fabrics. Manufacturing can be divided into the synthesis of active ingredients and the incorporation of these into formulations.*
- o pharmaceutical products are manufactured by combining active ingredients with a variety of inactive ingredients, which confer bulk, binding, flavour, stability and other properties, to produce formulated dosage products. The ingredients come from the specialty and fine chemicals sectors and are largely imported. Formulated dosage products, primarily made in Canada, can be categorized as human prescription, human non-prescriptions, veterinary and biological drug products.*
- o the chemical specialties sector encompasses a multitude of formulated products, including soaps, detergents and other cleaning compounds, disinfectants and sanitizers, waxes and polishes, aerosol*

products, and domestic-use pesticides and insect repellents. These products are sold to consumers, industrial, commercial and institutional marketplaces.

Other formulated product groups include adhesive and sealants, printing inks, cosmetics, toiletries and fragrances.

- o the plastics products sector produces a wide range of finished products, parts for other manufactured goods, and intermediate products consisting of shapes and forms made by a variety of fabricating methods. Raw materials are mainly synthetic resins from the petrochemical sector. Many products are manufactured by companies in other industries such as luggage, toys and sporting goods, packaging, construction, automotive and electronics.*
- o the chemical distributors sector comprises a number of companies engaged in the distribution functions for chemical products that are either produced in Canada or imported from all parts of the world.*

The grouping of companies and industries assembled in this sectoral consultation has had a long history in Canada.

While individual sectors within the industry vary significantly, it is possible to trace certain major determinants that led to establishment of the industry and stimulated its development. These include:

- o the huge abundance of energy and mineral resources available at competitive prices which could offer a strong raw material base for key commodity chemicals.*
- o significant Canadian tariffs and a limited number of other trade barriers which forced companies outside Canada to establish Canadian and, at times, provincial manufacturing bases to access Canadian and provincial markets.*
- o servicing demands by downstream customer industries, as well as the general public required proximity of chemical suppliers and, in certain cases, this promoted marketing niches.*

The above factors led to a Canadian chemical industry presence, but one major factor worked against it. The Canadian market, small in domestic terms and isolated by significant international tariffs, could not justify the establishment of manufacturing operations in many cases, particularly for many

specialty and fine chemicals as well as for some chemical products. This has resulted in high levels of imports for a multitude of small-volume products and significant gaps in the production structure.

ADDITIONAL
INFORMATION
ON THE
INDUSTRIES FORMING THE
CANADIAN CHEMICAL SECTOR GROUPING

May 28, 1992

Chemical Distribution Industry

Chemical distributors in Canada purchase inorganic and organic chemicals and plastics products for resale from Canadian manufacturers and from manufacturers in the U.S. and other parts of the world. About 25% of all products purchased for resale are from Canadian sources, the balance being from the U.S.A., Europe, Asia, and other countries.

The products purchased for resale are of a wide variety and the customers for these products are in many industry areas, too numerous to mention.

The chemical distributors fill a need in the market place for quality products at competitive prices from strategically located warehouses across Canada. The industry is able to supply to the manufacturing and other sectors, products which are not available in Canada and different versions of Canadian produced materials to fit specific needs.

The 33 members on the Canadian Association of Chemical Distributors probably represent 80% of the chemical distributors in Canada. The association members employ 2,500 people and the shipments of the member companies approximate \$2 billion. A very small portion of the products purchased by the chemical distributors for resale are exported. Historically, 60 to 65% of the products sold are imported.

Chemical distributors depend on manufacturers and processors for their sales. The business of chemical distributors depends on high, consistent sales volumes as profitability, compared to manufacturing, is low.

Chemical Specialties Industry

The chemical specialties industry in Canada comprises many sectors and product categories.

The industry manufactures and markets such products as: detergents, cleaning agents, disinfectants, sanitizers, deodorizers, waxes and polishes, aerosol products and domestic use pesticides.

The industry is generally labour intensive and employs approximately 10,000 people across Canada. The total sales for the chemical specialties sector were approximately 2 billion dollars in 1989.

The industry purchases large quantities of chemical raw materials, both bulk and fine chemicals, sourced in Canada and abroad, packaging materials and services such as laboratory testing.

The products are sold to consumers and to industrial, institutional, agriculture, and automotive accounts. The fact that virtually all Canadians regularly use the industry's products, whether at home or at work, attests to their importance in our society.

In 1989, the industry spent an average of 1.6% on R&D, and exported 4% of its total sales.

The industry in Canada remains innovative and its products can effectively compete from a quality and technological basis with any imports.

As a result mainly of the Free Trade Agreement, the industry is currently undergoing an important restructuring, and several branch plant operations have been eliminated. In some cases, Canadian affiliates of multinational companies have been given mandates to supply the North American market. On the whole, due to the effects of rationalization and mergers, the industry has suffered from a significant loss of jobs at all levels, from upper management to research and development.

The industry is represented by the Canadian Manufacturers of Chemical Specialties Association (CMCSA) which supports its one hundred and two member companies through effective lobbying and information dissemination.

For the purpose of the Prosperity Initiative, this report includes data which relates to other industries not normally included under the Chemical Specialties heading. These industries include the Cosmetics, Toiletries and Fragrances and the Adhesives and Sealants sectors. The statistics given on page 5 include figures for these activities in the chemical specialties column.

Chemical Manufacturing Industry

The chemical manufacturing industry is an integral part of what Statistics Canada defines as the chemicals and chemical products industry, Canada's fifth largest manufacturing industry with shipments of \$24 billion in 1989. The chemicals and chemical products industry has grown faster than both the Canadian economy and the manufacturing sector as a whole. The real annual compound growth rates were 3.4% for chemicals, 2.9% for the Canadian economy and 2.0% for manufacturing between 1980 and 1990.

Chemical manufacturers are engaged in activities involving the chemical transformation of basic hydrocarbon and mineral resources to create value-added chemicals. Most of these chemicals are sold to other industries at home or abroad, and few, if any, reach final consumers directly. For instance, the chemicals and chemical products industry also includes chemical formulators which are key customers of chemical manufacturers. Chemical formulators mix and blend chemicals to create a wide variety of products such as paints, drugs and medicines, soaps, toilet preparations and fabricated plastics products.

Canadian manufactured chemicals are produced in locations centered primarily in Ontario, Quebec, Alberta and British Columbia. The major sub-sectors of the chemical manufacturing industry are petrochemicals, inorganic chemicals, organic and specialty chemicals and fertilizers.

Petrochemicals are organic chemicals that are derived from crude oil or natural gas whereas organic and specialty chemicals are higher value-added products created from hydrocarbons such as crude oil and natural gas as well as from animal fats and vegetable oils. Inorganic chemicals are derived from materials in the earth's crust, such as minerals, metals and salt or from by-products of metal refining and petroleum processing while fertilizers are derived from natural gas based ammonia, phosphate rock and potash. Petrochemical, inorganic chemical and organic & specialty chemicals producers are represented by the CCPA while fertilizer manufacturers are represented by the Canadian Fertilizer Institute.

Primary petrochemicals are combined in a multitude of compounds and derivatives that are upgraded by many industries into a vast array of industrial and consumer products, for example, adhesives, plastics, coolants, paints, cosmetics, rubber products and fibres. Typical examples of the organic and specialty chemicals industry are producers of surfactants, plasticizers, pigments, pesticides, fine chemicals, water treatment chemicals, lube and fuel additives, oil field chemicals, flotation agents and corrosion inhibitors. The inorganic chemicals industry produces more than 50 commodity chemicals, which are used directly or indirectly in virtually all industrial processes as

bleaches, detergents, solvents, absorbents, dyes, degreasing compounds, and disinfectants.

Sales for chemical manufacturers excluding fertilizers were approximately \$12 billion in 1989 of which 38% were to export markets with 63% of exports going to the United States. This contrasts with 1970 when sales were \$1 billion with 18% exported and with 44% of exports going to U.S. markets. Of total sales in 1989, 68% were petrochemicals, 22% were inorganic chemicals and 10% were organic and specialty chemicals. Total imports were \$4.9 billion with purchases from the United States constituting 75% of the import bill. This resulted in an overall adverse trade balance of \$0.9 billion where petrochemicals and inorganic chemicals both posted positive trade balances of \$0.8 billion and \$0.1 billion respectively whereas organic and specialty chemicals had a negative trade balance of \$1.8 billion.

The manufactured chemicals industry is capital intensive with fixed capital expenditures in 1989 totalling \$0.8 billion. Total investment amounted to almost \$13 billion, equivalent to approximately \$500,000 per employee in 1989. It is estimated that the industry achieved a capacity utilization rate of 88% in 1989.

The manufactured chemicals industry had profits before taxes of \$1.9 billion while net profits after taxes amounted to approximately \$1 billion in 1989. This represented after tax returns of 13% on net investment and 19% on equity.

The manufactured chemicals industry had one of the highest productivity rankings of all manufacturing sectors with a value added per employee of \$200,000 in 1989. Over the period 1969 to 1990, the companies had the highest productivity growth rate, growing at a real annual rate of 3.7%. The approximately 31,000 employees of the manufactured chemicals industry rank among the highest earners in the manufacturing industry with wages and salaries averaging \$43,000 in 1989.

The chemicals and chemical products industry is a major high-tech industry. In the area of research and development, the industry ranks third in total dollars spent yearly (\$303 million in 1989) and second in terms of spending as a percentage of shipments. The manufactured chemicals industry reported that R&D as a percentage of sales was 1.5% in 1989. Also, 28% of employees are university or college graduates.

Fertilizer Industry

Plants need some 13 different plant nutrients from the soil in quantities ranging from a few grams to a few hundred kilograms per hectare, depending on the nutrient, crop variety, moisture and anticipated yield.

Mineral fertilizers are designed to meet both the requirements of various crops and the wide range of soil types and moisture conditions. The role of mineral fertilizers is therefore to supplement natural soil fertility so as to allow crops to grow optimally and to yield their full genetic potential.

Nitrogen, phosphorous and potassium constitute the so called primary nutrients which are needed in larger quantities. In addition there is a requirement for secondary nutrients such as calcium, magnesium and sulphur. Plants also need micro nutrients or trace elements e.g. iron, manganese, boron, copper, zinc and molybdenum all of which are required in very small quantities.

A deficiency in any single nutrient will have a limiting effect on plant growth and yield.

Mineral fertilizers are manufactured from natural raw materials which contain the plant nutrients nitrogen, phosphorous and potassium.

Although the components of the finished fertilizer materials are relatively simple chemicals, manufacturing technologies are highly developed and production plants and mines are very capital intensive.

The basic intermediate for nitrogen fertilizers is ammonia (NH_3) which combines nitrogen extracted from the air with hydrogen from natural gas.

Anhydrous ammonia can be used directly as a fertilizer or converted to downstream nitrogen products such as urea, ammonium phosphate, ammonium nitrate, ammonium sulphate and nitrogen solutions.

Phosphate rock and sulphur (sulphuric acid) are the raw materials from which all types of phosphate fertilizers are produced. Phosphate rock, as such, is seldom used as a fertilizer. To ensure the availability of the phosphorous nutrient and to obtain a more concentrated product, phosphate rock is processed using phosphoric acid or in some countries nitric acid. The acidulation by means of sulphuric acid produces either phosphoric acid, an intermediate for concentrated superphosphate and ammonium phosphate production, or single superphosphate. Canada has an abundance of elemental sulphur and byproduct sulphuric acid, but no indigenous deposits of phosphate rock that can be economically processed to phosphate fertilizers.

Potash occurs in ores, either in combination with the chloride or sulphate ion. After purification it can be applied directly or used in blending mixed fertilizers.

Canada has one of the world's largest reserves of potash ore in Saskatchewan with smaller deposits in New Brunswick.

In 1989 there were 17 primary fertilizer producers operating 24 manufacturing complexes with fixed investments of over \$5 billion. These establishments employed 5700 people and produced 19 million tonnes of fertilizer material of which 77% was exported. In 1989 plant value of shipments was at \$1.9 billion of which phosphates accounted for 10%, nitrogen 40% and potash 50%. In 1989 exports of finished fertilizers was \$1.63 billion and import of finished fertilizers and phosphate rock at \$244.6 million.

The nitrogen segment of the primary industry, with plants located in B.C., Alberta, Manitoba, and Ontario produced over six million tonnes of nitrogen materials in 1989 with a plant value of \$767 million. Domestic sales were \$415 million and exports \$352 million. Capital investment in nitrogen fertilizer plants and equipment is \$2 billion with 2,000 permanent employees. The pre-tax return on investment in 1987, 1988 and 1989 was 1.3%, 4.0% and 1.6% respectively.

The phosphate segment of the industry in 1989 has a gross fixed investment of \$194 million. 1989 production at four operating plants was 951 thousand tonnes of ammonium phosphate with a plant value of \$259 million of which \$34 million was exported. The pre-tax return on investment was a negative 9.4% in 1987 and a positive 10.5% and 6.4% in 1988 and 1989.

In 1989 the potash segment of the industry had production of 12.4 million tonnes with a plant value of \$916 million of which 94% was exported. The capital investment in potash mines was over \$2.5 billion in 1989. The pre-tax return on investment in 1987, 1988 and 1989 was 2.9%, 17.5% and 17.2% respectively.

The majority of Canadian production is from large high-grade deposits in Saskatchewan. In addition two mines are operating in New Brunswick. The Manitoba provincial government is continuing to explore development of potash deposits in that province.

Fertilizer mixing and distribution to supply farmers is an important service component of the industry. In 1989 there were approximately 1200 blending plants deployed across Canada to service local markets. Basic fertilizer materials used in these plants are sourced from both domestic and foreign suppliers.

Individual plants have a fixed capital investment in plant property and equipment of 400 to 800 thousand dollars. Plants custom blend liquid and dry fertilizer materials and ship to local or in a few cases regional markets. Retail blenders provide a range of services such as soil testing, agronomic advice as well as bulk and bagged fertilizer delivery and custom application.

Some of the blending facilities are very small entrepreneurial business while other are vertically integrated with primary producers and still other are owned by large co-operatives and grain companies.

An estimated 6,000 people are employed on a permanent basis with many more seasonal jobs during the spring planting season.

In 1989 Canadian farmers consumed over four million tonnes of mineral fertilizers with a farm value of \$1.24 billion.

Paint and Coatings Industry

The Canadian paint and coatings industry is a major chemical processing industry. There are around 150 manufacturers, employing over 8,400 Canadians. These manufacturers are found coast to coast, from Victoria, B.C. to St. John's, Newfoundland.

Canadian paint and coatings manufacturers represent a mix of wholly Canadian owned and international companies. While the Canadian owned companies are well represented among the medium and small industry members, several of the largest are wholly Canadian owned.

Canadian paint and coatings manufacturers draw upon thousands of raw materials: pigments, polymers, solvents and additives, to manufacture the hundreds of thousands of products they sell. While the Canadian paint and coatings industry is an important customer of the Canadian chemical industry and the Canadian distribution industry, it also plays an important supplier role in the Canadian economy. Thousands of Canadians depend upon employment in the numerous industries which use paints and coatings to beautify and protect the products, buildings and structures which are an integral part of these industries.

The Canadian paint and coatings industry is divided into two categories. The first category is often identified by several names: "trade sales paints", "decorative paints" or "architectural paints". These products are sold to the do-it-yourself consumer or painting contractor for application to homes and similar structures. This category includes such products as interior and exterior paints, wood stains, wood preservatives, primers, varnishes, lacquers, etc., all of which have decorative and/or protective uses.

The other major segment of the industry is broadly identified as producing "industrial coatings". This segment of the industry supplies products for application to a broad range of downstream manufactured goods such as automobiles, furniture, appliances, aircraft and farm equipment. These customer industries of the paint and coatings industry provide many Canadians with employment.

In 1991 the Canadian paint and coatings industry had estimated total sales over 1.6 billion dollars – divided almost equally between the trade sales paint market and the industrial coatings market.

The industry is represented by the Canadian Paint and Coatings Association (CPCA), the national trade association which has been representing those interests since 1913. CPCA member companies include major paint and coatings manufacturers and the prime suppliers of raw materials to the paint and coatings industry.

Pesticides Industry

The pesticides industry in Canada consists of subsidiaries of multinational life sciences companies who, for the most part, import active ingredients or finished products, provide local marketing, sales, field development, formulation and packaging services. Distribution is done through local wholesale and/or retail outlets. Manufacture of active ingredients in Canada is very limited.

Most products are for agricultural use (87%) and consist primarily of herbicides (73%), insecticides (8%) and fungicides (6%). Other markets include forestry, amenity areas, industrial and home use.

Current value of sales at the manufacturing/formulator level is about \$750 million. The value of exports is less than 5% of total sales. The products contribute to the production of low-cost, high-quality food and are essential for Canadian farmers to compete in international trade. Value added to agriculture is probably in excess of \$1.5 billion per year.

The industry experienced good growth during the period from the mid 70's to mid 80's. The market is now mature, with sales fluctuating from year to year in response to weather related needs and the farm economy. The future trend is towards lower use due mainly to environmental pressures.

Businesses are caught in a cost-price squeeze as expenses increase especially for new product introductions, and selling prices remain fairly flat due to the inability of customers to pay more. As a result, firms are consolidating, downsizing and experiencing more direct management from outside the country. Costs for safety measures and waste reduction are escalating.

Pesticides, except for small packs for home use, enter Canada duty free. The industry is highly regulated; major legislation is the Pest Control Products Act.

The industry employs approximately 1,000 people on a permanent basis, and considerably more seasonally. In addition, approximately 2,000 people are employed in downstream distribution. Formulation is carried on at twelve locations.

Industry members are extending their activities to biopesticides, seeds and genetic engineering.

Pharmaceutical Industry

The pharmaceutical industry can be defined as the aggregation of firms falling into the Standard Industrial Classification 374 Drugs and Medicine Industry with the exclusion of producers of veterinary products and biologicals. The industry researches, develops, manufactures and markets products for the prevention and/or treatment of disease. Products can be divided into two broad categories; prescription or ethical drugs, which are available only under authorization of a qualified medical practitioner and not marketed to the general public, and over-the-counter (OTC) or "self-medication" products, which are generally available without restriction and may be advertised to the public.

The companies manufacturing prescription medicines are broadly grouped into original brand and generic firms. OTC products are manufactured by firms specializing in the self-medication market and are generally divisions of brand-name firms.

The operations of the pharmaceutical industry fall into the following three components; research and development, manufacturing activities, and education/promotion/distribution.

Research and Development: The process of drug discovery begins with basic laboratory research, drug discovery and progresses through clinical or applied research steps. Clinical research constitutes the bulk of the expenditures required to develop and market a new medicine.

Manufacturing: The manufacturing of pharmaceuticals is conducted in two distinct steps; chemical synthesis or fermentation processes to manufacture the active ingredients contained in medicines (fine chemicals industry), and compounding of these with other inactive ingredients (excipients) into the final dosage form (tablet, capsule, vial, etc.).

There is little chemical synthesis conducted in Canada although this activity has been slowly expanding. For many products the active ingredients are imported into Canada and compounding is done domestically. An increasing proportion of drugs are imported in their final form.

Education/Promotion/Distribution: Medical education plays a major role in determining how physicians choose alternate therapies. This results from direct contact between the company representatives, commonly referred to as detail persons and physicians and pharmacists. The representative normally has a science or medical background along with company sponsored training. They can draw on support from within the company to answer specific detailed questions from physicians. Competition among original brand firms is based on the development and promotion of new medicines which may have real or perceived advantages over existing products. Generic firms market copies of existing medicines and use price as a means of gaining market

share. Hospital buying and government reimbursement plans have been designed to encourage price competition.

Pharmaceutical products are distributed in the following ways: directly to retail pharmacies, hospitals and institutions, via distributors or agents who bill pharmacies under the manufacturer's name, and via wholesalers.

Concentration: Original brand drug manufacturers have the largest market share, holding 77% of prescription and OTC sales. Generic firms were estimated to have 10% and firms selling only OTC products about 13%.

Ownership: Of the total domestic market (prescription and OTC), 8.5% is controlled by Canadian-owned firms. All of the major original brand companies in Canada are foreign-owned. Approximately two-thirds of these are American and the remainder are European. Japanese companies currently limit themselves to licensing their products to firms already established in North America.

Centres of Activity: In 1988, there were 148 pharmaceutical companies in Canada, of which 78 (53%) have head office or manufacturing establishments located in Ontario. The majority of other head offices and manufacturing are located in Quebec and a few operations are in British Columbia. The headquarters of the two largest generic drug firms, which control 90% of the generic market in Canada, are in Ontario.

Linkages with other Industries: Brand name pharmaceutical firms are, for the most part, fully integrated and do not rely on arms-length suppliers for active chemical ingredients or other corporate services. Generally, firms use domestic suppliers for packaging materials and other non-medicinal ingredients along with specialty laboratory chemicals. They also use the services of contract manufacturers which compound active ingredients into final dosage form. Firms holding patents maintain strong ties with university, hospital and private laboratories in their research efforts.

Pharmaceutical firms also use advertising agencies and wholesalers and draw on a range of other goods and services as diverse as automobiles and the hotel industry. In addition to the direct linkages with suppliers, the pharmaceutical industry has been a source of capital for the fledgling Canadian biotech companies. The brand firms offer access to international markets through strategic alliances.

Employment Levels and Education: In 1988, the Canadian pharmaceutical industry employed 19,300 people. Of this total, 8,100 worked in manufacturing activities and approximately 1,000 in research functions and the remainder in marketing and administrative functions. The industry has highly trained supervisory and quality control personnel manage the facilities. Moreover, the industry's marketing activities require highly trained people to explain the benefits of new products to physicians. Most people employed in this area have a university degree, generally in science.

The industry has more than double the average employment of university level employees than that in manufacturing in general.

Plastics Industry

Canada's plastics industry is composed of 2,800 companies engaged in the production of plastics material and additives, in processing them into semi-finished and finished products, suppliers of machinery, moulds and dies, and recyclers and reclaimers of plastics waste products. Such economic activity is an integral element of the entire manufacturing sector. The success of the food, construction, transportation, furniture and electrical and electronics industries and Canada's plastics industry are interrelated.

Over the past twenty years, plastics has been Canada's fastest growing manufacturing industry in terms of employment and output. In 1990, the industry employed 120,000 people and had shipments valued at \$17.6 billion. Real growth in the plastics industry has averaged 2.2 times real GDP.

The dramatic growth in the plastics industry has been driven by the versatility of plastics compared with other materials. In areas such as energy efficiency, processability, light weight and corrosion resistance, plastics continue to demonstrate their superiority as the material of choice. The case of energy efficiency is a case in point. Studies conclusively show that it takes less energy to make a product from plastics than just about any other material. For example, it takes less energy to make a plastic bottle than a glass bottle; vinyl siding than aluminium siding; plastic pipe than steel pipe; and so on. The three major markets for plastics are packaging - 39%, construction - 27%, and transportation at 11%

The future prospects of Canada's plastics industry are bright as new technologies open up new opportunities. For example, conductive polymers are an indication of technology driven advances in the use of plastics. Newly developed materials can make plastics conductive, thereby presenting the prospect that a silicone chip will ultimately be a plastic product. Likewise, advances in membrane technology allows the kidney dialysis machine to be the size of a small tube rather than a large table. An important new development is the alloying and blending of various plastics, producing characteristics that are highly desirable such as greater strength and higher resistance to heat.

For Canada's plastics industry, the need to develop education and training infrastructure remains a number one priority. The constant advancement of new technologies in the area of robotics, statistical process control and computer assisted design and manufacturing along with the emergence of new resins makes education and training imperative in order to be internationally competitive. In response to this challenge, SPI has worked closely with the federal and provincial governments and agencies like the National Research Council, in an effort to collectively enhance the human resource base and technological know-how of Canada's plastics industry.

The following is a highlight of SPI's activities on the education and training front:

- o The introduction of plastics as a topic of study into the Ontario, B.C. and Quebec school system involving the training of 8,000 teachers reaching over one million students in grades 7, 8 and 9.
- o The development of a Training Centre for plastics processing in cooperation with industry, Humber College, Employment and Immigration Canada and the Ontario government.
- o Active in working with the Northern Alberta and British Columbia Institutes of technology to enhance and promote plastics training programs.
- o The signing of a Memorandum of Understanding with Employment and Immigration Canada which provides for the channelling of federal government expertise, funding and policy advocacy towards the education and training needs of the plastics industry.
- o The offering of in-plant traineeship for entry level workers in the plastics industry funded by the Ontario Ministry of Skills Development.

Preliminary List of Challenges

Facing the Chemical Sector Grouping

1. Need for multinational subsidiaries to be good corporate citizens and strategic players in global corporate structures.
2. Need for a competitive tax regime.
3. Need for a harmonized regulatory environment both internationally and domestically (Canadian common market).
4. Need to unify employees behind the competitive approach.
5. Need to instill a total quality culture throughout companies.
6. Need for improved industry/academia interaction.
7. Need to make Canada attractive for product mandates and the accompanying need to promote that internationally.
8. Need for fiscal incentives to promote long-term R&D.
9. Need for fiscal policies that will not exert a negative impact on costs of capital available to industry.
10. Need for a stable public policy framework.

The remaining issues identified are listed below. The time available did not permit an exhaustive review and definition of these issues and their relative importance, but they are attached to illustrate the breadth of the challenges being faced.

Innovation

- o Need for compensation which promotes long-term payback.
- o Need to improve access to foreign technology.

- o Need to develop creative culture in company to foster long-term strategy.
- o Need to reduce fragmentation of institutional excellence.
- o Need to promote Canada as an attractive place to carry out research and development.
- o Need to develop global market intelligence as the driver of innovation.
- o Need to harness employee creativity.

Learning

- o Need to improve basic education.
- o Need to promote an understanding of science.
- o Need for better educated management groups.

Financing

- o Need to improve financial community's understanding of the chemical sector.
- o Need to generate a positive cash-flow through productivity.

Trading

- o Need to learn more about international market place.
- o Need for government/industry cooperation to access foreign markets.
- o Need cost effective transportation/logistics system.
- o Need export promotion and trading company for the development of export cultures.

Strategy of Firms

- o Need to break with past domestic focus and go outwards.
- o Need to adopt a long-term focus.
- o Need to develop sector specific action plan.
- o Need to develop company specific strategies within sectors.

Competitive Domestic Market

- o Need to foster better mutual understanding between industry and government.
- o Need to develop a value-added culture.
- o Need to re-adjust competition laws to reflect the global reality of competition.

- o Need to simplify regulatory approval process through "account executive" or "one-window" concept.

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