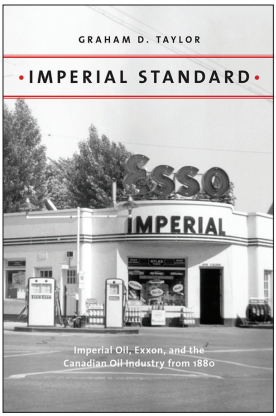

IMPERIAL STANDARD: Imperial Oil, Exxon, and the Canadian Oil Industry from 1880

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DIVERSIFICATION

Research

Technology had always played an important role in the relationship between Imperial Oil and Jersey Standard. Losing the services of Herman Frasch to Standard Oil in 1887 crucially weakened Imperial's competitive position after Frasch perfected his desulphurization process several years later. In 1914, Walter Teagle, as president of Imperial (and Jersey Standard's director in charge of foreign production and marketing) negotiated with Standard of Indiana for access to the Burton-Humphreys thermal cracking process in Imperial's expanded Sarnia refinery. In 1923, Imperial also acquired rights to Jersey Standard's "tank and tube" process that enabled continuous cracking for its new Calgary refinery. Two developments in the mid-1920s were to have an even more substantial impact on the direction of technological development at Imperial Oil.

In 1918 Edgar M. Clark, who had worked with Dr. William Burton at Standard of Indiana, was lured to Jersey Standard to head up a new research effort. The initial focus was to be on further improvements to the Burton thermal cracking technology, but this soon expanded into a plan developed by Clark and Frank Howard, a patent lawyer and engineer, to control research activities throughout the Jersey Standard organization. In 1922 a new subsidiary, Standard Oil Development Co., was established to manage all the patents generated by Jersey Standard's various departments. In the larger reorganization of the corporation in 1926–27, this entity was assigned the task of coordinating research not only for Jersey Standard but for all its domestic and foreign affiliates.[1]

At this point there were only two affiliates with substantial research operations: Humble Oil and Imperial Oil. Humble Oil, which Jersey Standard acquired slightly more than 50 per cent ownership of in 1919, had its own development department working with that company's large refinery at Baytown in Texas. Imperial's research was centered at Sarnia and was in large part produced by the efforts of one man: Dr. Richard K. Stratford.

Born in Brantford, Ontario, Stratford studied agricultural chemistry at the Ontario Agricultural College (Guelph) and Amherst, and earned a doctorate at Université de Lyon in France, where he wrote a thesis on hydrocarbon cracking. In 1924 he was hired by Imperial as Sarnia's first research chemist, working with engineers at the refinery, where his earliest work was on use of clay and phenol in treating lubricating oils, a subject that would become a hallmark for research at Imperial.[2]

The initial plan of the Standard Oil Development Co. in 1927 proposed an arrangement in which affiliates would conduct research on "routine problems," while Standard would provide engineering and research services and would function as a data centre for all research, with the operating companies paying a fee for services. Both Humble and Imperial countered with a proposal in which affiliates would pay a fee to Standard Development for shared patent access, but would also conduct research in selected fields, exchange licenses for patents, and share in the income generated for Standard Development Co. proportional to their investment in the research. This led to the establishment of "mutualization agreements" between Jersey Standard and the two companies in 1929.[3]

Imperial set up a Technical and Research Department in 1928, in part to coordinate work done under the mutualization agreement; Stratford was chief research chemist and then head of the department in 1929. By that point the organization had twenty-five scientists and support staff. The department conducted a wide range of research activities: among the most significant involved examination of asphalt production methods and the treatment of lubricating oils with a hydrocarbon derivative called phenol to reduce the sulphur compounds found in oil being shipped from South America. Both of these areas of research would prove valuable for Imperial's contributions to industrial mobilization during the Second World War. At the same time, the Imperial research department

Figure 8.1. Richard K. Stratford, R.V. LeSueur, 1945. Glenbow Archive IP-14a-282, Imperial Oil Collection.

developed a process of treating US imported oil with ketone to reduce wax content in lubricating oils.

During the 1930s, however, friction emerged between Imperial and Jersey Standard over the costs of patent sharing and development related to agreements that Standard Oil Development Co. made with the German chemical colossus, I.G. Farben, in 1927–29. In 1926 Frank Howard and Teagle had toured the impressive research labs of the I.G. affiliate, Badisdche Anilin und Soda Fabrik (BASF) in Ludwigshafen, Germany. They were particularly taken with the work being done on the conversion of coal into oil through a process called hydrogenation, involving the treatment of coal with hydrogen under high pressure and high temperatures. Teagle, as always, was interested in securing potential new sources of oil, and Howard was anxious to demonstrate the value of the Standard Development Company to Jersey Standard. After convoluted negotiations between Jersey Standard and I.G., several agreements were completed in 1929–30, involving patent exchanges relating to synthetic oil research through the establishment of a Standard-IG Company, and a follow-up agreement dealing with products that fell on the borderline between the oil and chemical industries. This included research on synthetic rubber through another joint venture entitled the Joint American Study Committee (Jasco).[4]

These agreements, and others related to synthetic fuels, would become significant during the Second World War. In the immediate situation, however, their value was more controversial. With the discovery of the East Texas oil fields and with Middle East oil coming on stream at the end of the 1920s, the usefulness of high cost synthetic oil was questionable. Imperial Oil, which was paying 14 per cent of the shared expenses of Standard Development Co. in 1929–32, bridled at the cost of the hydrogenation patents. Unlike the US, with rich coal fields in the Midwest, Canada's coal reserves were far from markets (and refineries) and in any case imported oil was abundant and cheap. Nevertheless, Imperial supported the overall aim of the mutualization agreements and sent Charles Leaver, a former superintendent of the Sarnia refinery, to represent Imperial with the Standard Development Company's coordinating committee in New York.[5]

Meanwhile Stratford's department continued its research into lubricating oils. In 1937 Eugene Houdry, a French engineer supported by Sun Oil of Marcus Hook (Pennsylvania) and Standard of New York (Socony-Vacuum), discovered a process that would accelerate the conversion of crude oil into gasoline fuel, including high octane gas used for aviation fuel, through the introduction of an external "catalytic agent." Jersey Standard researchers had been working on these processes from the early 1930s drawing on feedstock from hydrogenation plants in Louisiana. Stratford and his associates had also begun exploring cracking improvements through the introduction of powdered clay as a catalyst. In 1940 Imperial announced plans to move to commercial operation of a process it designated "suspensoid" cracking.[6]

After Pearl Harbor, the technological agreements between Jersey Standard and the Germans became more salient. Nazi Germany threatened the Russian oilfields on the Caspian Sea. The Japanese Imperial forces overran South East Asia, seizing oil fields in the Dutch East Indies and the rubber plantations in Malaya. Thurman Arnold, the US Assistant Attorney General for Antitrust, asserted that the rubber shortage the US faced in 1942 was the result of the Jersey Standard-I.G. Farben patent agreements that had delayed the development of synthetic rubber. A US Senate committee summoned Jersey Standard executives, including president William Farish, before it, and some senators including the committee chairman, Harry Truman, suggested that this could be considered "treason." Jersey Standard's spokesmen responded that these patent exchanges provided them with technical knowledge that was essential to a successful program in that field. The company also announced, pursuant to an agreement with the US Justice Department, that it would make available all patents received from I.G. Farben relating to synthetic rubber without requiring licensing royalties.[7]

During the 1930s both I.G. Farben and the American chemical company DuPont had experimented with techniques to produce synthetic rubber for specific uses, but the costs involved limited its commercialization. These uses could most readily be derived from by-products of petroleum refining, such as butadiene, combined with polymers—large chain-like molecules formed from chemical reactions in a range of raw materials. The by-products could be derived from other "feedstock"

sources, including ethyl alcohol made from grains, but improvements in petroleum refining through catalytic cracking processes made large-scale production of synthetic rubber (and other polymerized products) more feasible. Shortly before the war broke out, I.G. Farben had developed a general-purpose synthetic rubber called Buna-S, which was made available to Jersey Standard through the Jasco agreements.

Even before the US entered the war, Jersey Standard had begun production of petroleum feedstock for synthetic rubber. In 1940 the company proposed to set up a company with other petroleum and rubber makers that would have access to all the Jasco patents in the field; but this plan was abandoned as possibly running afoul of US antitrust laws. A year later the US Reconstruction Finance Corporation authorized Jersey Standard to set up a pilot plant to produce butadiene and styrene that could be used by chemical companies to produce synthetic rubber. But production targets were much smaller than the country would require, in part because the RFC head, Jesse Jones, believed a synthetic rubber program would only be needed if the US went to war. In the wake of the controversies in early 1942, a US Office of Rubber Production took over a crash program to develop synthetic rubber. Jersey Standard's affiliates, Standard of Louisiana and Humble, produced over 190,000 tons of butadiene as feedstock for the program between 1943–45—slightly less than one-third of the butadiene used by the US government for that purpose during the war. The company also established experimental plants in Louisiana and Texas to develop an alternative form of synthetic rubber, called Butyl, which produced about 48,000 tons by 1945.[8]

Polymer Canada

In Canada the synthetic rubber industry was very much the creation of one strong-willed figure: C.D. Howe. As the federal Minister of Munitions and Supply during the Second World War, Howe had sweeping authority to expand Canada's military production and he used these powers extensively, creating a range of crown corporations to boost output of aircraft, ships, ordnance, and much else. In 1941 Howe had set up an organization to stockpile natural rubber from scrap materials—everything from auto tires to garden hoses, erasers, and rubber bands. But, as had happened in

the United States, it soon became clear that supplies from these sources could not keep up with the country's military requirements. In January 1942 Howe set out to establish synthetic rubber production from scratch.

Sarnia would be the site of Polymer, the crown corporation Howe set up on February 13, 1942 for this purpose. A number of reasons were cited to justify this decision: Sarnia was of course the location of Imperial Oil's largest refinery, with secure pipeline supplies of crude oil from Ohio. The Saint Clair River and the confluence of the Great Lakes enhanced the shipment of coke from Hamilton, to be used to produce styrene, which was vital to synthetic rubber. US rubber companies had also located their major Canadian operations in southern Ontario. But certainly a major factor was that Imperial Oil had immediate access to Jersey Standard's patents for Buna-S and Butyl, and could bring in technical people from the US already familiar with the processes required. Although Howe was pressured to look at alternative feedstocks from grain alcohol, Imperial's Sarnia refinery already had the capabilities of producing butadiene using the "suspensoid" cracking technologies that Stratford's research team had been developing there.[9]

Imperial also donated land for the site of the Polymer plants adjacent to its refinery. Construction began in August 1942 and was completed a little over a year later, employing more than 5,500 workers at a cost of $50 million (CAD). Meanwhile, Polymer was able to bring in the Michigan-based Dow Chemical Company to operate a styrene conversion plant. Imperial Oil agreed to operate two plants connected to the Polymer project: one to produce sufficient butadiene to fuel the production of 30,000 tons of Buna-S rubber; and a second smaller plant that would produce 7,000 tons of Butyl rubber, using the Jersey Standard process. The two operations were managed during the war by an Imperial subsidiary, Saint Clair Processing Corporation. Both plants were located on the Polymer site, as was the Dow styrene processing operation.[10]

The president of Saint Clair Corporation was Leo McCloskey, who had headed Imperial's manufacturing department, and the general manager was F.C. Lantz from the Sarnia refinery; C.E. Carson was the superintendent of Sarnia; Stratford was also a director. In later years consortia of this type became more common in the Canadian petroleum industry, but this one was particularly complex, requiring coordination of the work

of a Canadian crown corporation, an American chemical company, and Jersey Standard's research operation with the Imperial refinery and a subsidiary. A plethora of coordinating committees emerged, while Imperial tried to keep its own structure simple by setting up a technical committee comprising the managers of the Sarnia refinery and the Saint Clair Corporation, and developing a fee for service arrangement with the other companies.[11]

By the end of the war in 1945, Polymer had produced 80,000 tons of Buna-S rubber and 15,000 tons of Butyl rubber. Many of the crown corporations created for wartime purposes were scheduled for closure and, in some cases, sales to private enterprise. Polymer was presumed to be among them, particularly as there was an expectation that natural rubber would once again be flowing in from Southeast Asia. Imperial Oil might have seemed to be an obvious interested party, but that company's postwar strategy was focused on securing new crude oil in Alberta. In April 1946, the assets of the Saint Clair Processing Corporation (but not its charter) were turned over to Polymer.

In any case, C.D. Howe had a different perspective. Re-elected to Parliament with the Liberals in 1945, he was appointed Minister of Reconstruction with a broad mandate to use government powers to develop a postwar economic development strategy for Canada. Polymer figured prominently in those plans as the catalyst of a petrochemical industry in central Canada, and was retained as a crown corporation. To that end it was empowered to expropriate more land in the Sarnia area to attract chemical companies, and was provided with a research department to look beyond the diminishing market for synthetic rubber. Dow Chemical was one of the early entrants, building an ethylene glycol plant near the Polymer plants, followed by Fiberglass Canada, Standard Chemical, Ethyl Corporation, and Sun Oil, which built a refinery in Sarnia in 1950. By this time the St. Clair region was being called "Chemical Valley" and held out as an example of economic development through public-private partnership.[12]

After the war Imperial's Research department resumed development work on the "suspensoid" cracking process, but this was terminated abruptly in 1951. During the war Standard Oil Development Co. had introduced a new process called fluid catalytic cracking, developed by

W.K. Lewis and E.R. Gilliland, two MIT scientists, which became the prevailing method used by Jersey Standard. In this process a powdered catalyst would be treated so that it functioned as a liquid that could be moved more efficiently through pipes. In 1948 Imperial set up a fluid-cracking unit at its Montreal refinery, and it soon became the industry standard.

After the initial mutualization agreements on research expired in 1948, Jersey Standard began moving toward a more consolidated global approach under "Standard Research Agreements" in which affiliates would establish areas of research specialization, relying on Standard Oil Development Co. to provide access to technical knowhow in other areas. This was an approach that led eventually to the concept of "research mandates" adopted by other multinational companies in the 1970s–80s.

In the immediate situation, Imperial's Research department continued its earlier work on phenol extraction in treating lubricating oils and waxes, processes adopted by other Jersey Standard refineries. In 1951, Stratford retired and was succeeded by his assistant director, George Gurd. During the 1950s research focused on improving fuel applications in cold weather conditions—an obvious Canadian issue. As Imperial's orientation shifted to heavy oil recovery in northern Canada in the 1960s, the research focus moved in that direction as well, although the company continued to be involved in the more mundane issues of building materials and petroleum by-products, particularly polyvinyl chloride plastics. One of the department's achievements in this period was a process called DILCHILL that replaced earlier work with ketone dewaxing of lubricating oils developed under Stratford. Jersey Standard awarded Imperial a corporate-wide mandate in this field. Among the researchers on DILCHILL was Jim Livingstone, who later became president of Imperial Oil, as well as John Tiedje, who took over the research department, which had grown to over 650 staff with operations in Montreal and Calgary as well as Sarnia.[13]

Esso Chemical Canada

Despite the dramatic growth of the petrochemical industry in Sarnia and in Alberta—where a number of companies including Royalite used natural gas to produce ammonia after the Second World War—Imperial did not enter the field until 1955. To some extent this may have resulted from

the company's strategic preoccupation with, and capital investment in, expanding crude oil production in Alberta and developing infrastructure to support that part of the industry. But the delay may also have reflected the cautious perspective toward petrochemicals adopted by Jersey Standard in this period.

Jersey Standard had always pursued a strategy that focused on the oil industry rather than expanding its scope of operations into ancillary businesses. As technology prodded the oil and chemical fields closer, Jersey Standard opted for partnerships and agreements—with General Motors for Ethyl Gasoline, for example, and the patent exchanges with I.G. Farben rather than seeking to incorporate what was seen as an external field into its organizational fold. A subsidiary called the Enjay Co. marketed chemical products that emerged from refining operations in the US, and of course Standard Oil Development Co. was keen to put chemical patents they had acquired to wider use. But even advocates of greater diversification in the parent company "never dreamed that some day we would wear shirts of petrochemical origin."[14]

After the Second World War Jersey Standard faced impediments to building on its achievements in developing synthetic rubber. The US Alien Property Custodian held the Jasco patents, and the federal government owned the properties, showing no sign of disposing of them in the immediate future. In any case, the company needed to attend to rebuilding its European refineries, and, like Imperial, expanding its commitments to developing large crude oil fields in Venezuela and the Middle East. In 1945 Frank Howard, the president of Standard Oil Development, presented a strong case for expansion of the "oil chemical business." But Howard stepped down as vice president of Jersey Standard soon thereafter, although he continued to press the board to give greater priority to petrochemicals.

In 1952 the Jersey Standard board undertook a review of the company's policy in the field. By this time other US oil majors had advanced into chemicals: Texaco had set up a joint venture with American Cyanamid, and both Socal and Standard of Indiana had established chemical affiliates. The review acknowledged that Royal Dutch Shell "threatened its leadership in the oil-chemical field." Finally, in 1955 a second review identified petrochemicals as a "rapidly growing and profitable business throughout

the world" and urged affiliates to "move aggressively to make the most of investment opportunities."[15]

By this time Imperial Oil had a powerful in-house advocate for moving in this direction. J. Kenneth Jamieson was an Imperial vice president, but more significantly, he was already on the fast track to a leading position in Jersey Standard. Born in 1910 in Medicine Hat, Alberta, son of a veteran of the North-West Mounted Police, Jamieson studied engineering at University of Alberta and MIT, but also worked for a time as a labourer at Imperial's Calgary refinery. During the Second World War Jamieson liaised between the US and Canada on oil issues, then resumed a career with Imperial Oil. On Imperial's board in 1952, he pushed for investment in petrochemicals, and was assigned the task of setting up a program to that end a year later. Jamieson would go on to become head of International Petroleum, and then president of Humble, Jersey Standard's largest affiliate, in 1961. Four years later he was president of the parent company, and became chairman of the board in 1969, steering it through the difficult shoals in the Middle East in the early 1970s.[16]

Jamieson brought in Clay Beamer, who was assistant general manager for chemical products for Jersey Standard's principal US affiliate, Esso Standard Oil Co., and had been sales manager for the chemical division of Enjay Company to head a new Chemical Products department. In 1956, Imperial's president, Jack White, announced with great fanfare that the company would build a $28.5 million (CAD) plant to produce ethylene, propylene, butylene, and butadiene as feedstocks for petrochemicals—"the first big venture of any oil company in the Canadian petrochemical field." At the same time, however, White was meeting with C.D. Howe—attempting, unsuccessfully, to persuade him to sell Polymer Corporation to Imperial in order to kick-start their company's entry into the field. Polymer Corporation subsequently announced its intention to build a butadiene plant in Alberta, which Imperial regarded as an unfair move "in competition with private enterprise."[17]

Despite an ambitious startup, Imperial's Chemical Products Department floundered for some time while seeking a role beyond supplying intermediaries for other companies in the chemical industry. In 1959, Humble Oil began producing polypropylene for plastics, and Imperial was offered the opportunity to develop production capacity in Canada, but the

Board felt this was beyond the capabilities of its in-house organization, and arranged to purchase the product from Enjay.[18]

In 1961, Beamer provided a laundry list of potential areas for expansion, including plastics, resins, oil additives, and "agricultural products." A year later, Chemical Products joined with the producing department in exploring the potential for development of potash production in Saskatchewan. Meanwhile, Jersey Standard, encouraged by reports on the potential "green revolution" in agriculture in Latin America, was supporting diversification into fertilizers and related agricultural chemicals. This also appeared to be a promising market in Canada where demand for fertilizer was predicted to grow from 460,000 tons in 1965 to over 1.4 million tons by 1970, with "higher enlarged nitrogen fertilizer" leading the way. Imperial already had more than 500 agents supplying petroleum needs to farmers in the Prairies, and fertilizer sales could be handled through these agents. The project would soak up extra Redwater capacity; production and marketing costs would total $110 million (CAD) over fifteen years, with a 14 per cent return on investment.[19]

As with many such projections, this one proved to be premature. Prairie grain exports faltered in the late 1960s; by 1970 retail sales from the Redwater fertilizer operation were running at little more than one-third the forecast levels. Furthermore, because of the low cost of oil in North America, Imperial faced stiff competition from US fertilizer importers. Nevertheless, in 1969 Imperial had transformed the Chemical Products Department into a new division, Esso Chemical Canada, optimistically anticipating a growth in synthetic fertilizer market share from 15 per cent in 1971 to close to 20 per cent by the middle of the decade. Providentially, the 1973 energy crisis boosted oil costs for all competitors, enabling Imperial to draw on its lower-cost feedstock supplies and its well-organized network of dealers. Recovery in the fertilizer market provided a more stable base for Esso Chemical's overall operations, which by now embraced a wide range of basic chemicals, intermediates, and retail products, ranging from alkylates in detergents to polyvinyl chlorides to plastic moulds. Sales grew dramatically from $107 million in 1972 to over $314 million by 1975, and earnings before taxes rose from a loss position to $16 million in that period.[20]

The emergence of Esso Chemical reflected another significant trend that affected many large businesses in this era: the urge to "diversify." Fuelled in part by the largest sustained stock market boom since the 1920s, companies were lured beyond their comfort zones. At the extreme end were the "conglomerates" of the 1960s to early 1970s such as Gulf + Western and Ling-Temco-Vought in the US (and Argus Corporation in Canada) that cobbled together disparate business ventures marketed to the investing public as examples of "synergy." But even staid and well-established enterprises in fields such as telecommunications and petroleum were setting up "New Product Lines" and exploring unfamiliar terrain. The petrochemical market with its porous boundaries provided an attractive arena for these adventures.

Jersey Standard had begun exploring the prospects for diversification in 1960; moving in its characteristically cautious and deliberative manner, the company did not get around to unveiling its plans to affiliates until 1963, at which time it set up a new subsidiary, Jersey Enterprises, to undertake "New Investments." Imperial Oil would play an important role in the early development of this new strategy. One of the areas of new applications that had been reviewed by Esso Research involved a process called Fluid Iron Ore Reduction (FIOR), for heavy fuel injection in blast furnaces. The Canadian steel manufacturer, Dofasco, was interested in the process, and in 1961–62 Imperial's sale of heavy fuels for this purpose accounted for one-sixth of the total output for Jersey Standard companies. The new entity, Jersey Enterprises, funded construction of a FIOR pilot plant at Imperial's Halifax/Dartmouth refinery, and later pursued large-scale projects in Venezuela and India.[21]

Imperial followed up on this initiative in 1964 with the acquisition of Building Products Ltd., which was well positioned in the construction materials market, and whose projected move into plastic laminates and extrusions would provide an outlet for Imperial's chemical intermediates as well as asphalt from the company's refineries. Over the next two years this new subsidiary acquired a resilient flooring manufacturer and a Quebec company that specialized in making precast concrete panels for commercial building siding. Although Building Products was tied to the business cycles in the construction industry, which slumped in the late

1960s, it provided an in-house buyer for PVC products generated by Esso Chemical Canada.[22]

Imperial's quest for diversification was not always as successful as these early ventures. In 1965 Industrial Estates Ltd., a Nova Scotia crown corporation set up to promote industrialization in that province, approached Imperial with a proposal to take over the construction and operation of a heavy water project at Glace Bay, that would supply Atomic Energy of Canada with nuclear fuel. Imperial had no experience in this field, and the projections of costs were suspect: the projection of a $46 million cost for a 400-ton capacity plant seemed low. The company's Executive Committee was reluctant to respond to pressure for a quick commitment, which proved to be a good decision: the Deuterium Ltd. project overran its projected cost and was eventually taken over by A.E.C.L. in 1968; the entire operation was closed down in 1985.[23]

Imperial Oil also investigated the possibility of investing in the pulp and paper industry in Quebec, a notoriously risky market with many larger players on the field. This particular initiative may have been prompted by Jersey Enterprises, which was also looking into forestry products, despite the fact that there was little to connect it to the petroleum industry. In the end Imperial decided not to proceed, in part because the capital investment required to upgrade the processing technology exceeded the benefits in terms of competitive advantage.[24] But a company of Imperial's size could afford some missteps. By 1975 the chemical and building products divisions were contributing close to $20 million to the company's net earnings, about half as much as the refining and marketing operations.