ROYAL DUTCH/SHELL GROUP AND SIR ROBERT WALEY COHEN (1877-1952)

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The first fuel tanks built in Haifa for the opening of the Kirkuk-Haifa pipeline (1935).

Shell traces its history back to the curio shop started in London's East End in 1833 by Marcus Samuel, an orthodox Jew. A large part of the trade was based on his invention of the decorative shell box, popular in Victorian England, made from seashells that he imported from the Far East. The shells were also sold as ornaments and for collecting. The successful business was continued on by two of his children, Marcus Samuel (same name as that of his father and later The First Viscount Bearsted) and Samuel Samuel. This start in the import of seashells was the beginning of an import-export trade that led to the transport of kerosene used for lighting and then to the production, transport and refining of oil. Marcus Samuel (the son) kept on the name Shell for sentimental reasons.

In 1901 Robert Waley Cohen started to work for the small and recently organized Shell Transport and Trading Company Ltd., led by the Samuel brothers. Waley Cohen was from one of the leading Anglo-Jewish families. He held a degree from Cambridge where he studied chemistry. In 1903 Shell Transport and Royal Dutch jointly formed the Asiatic Petroleum Company, Ltd., and in 1907 the two parent companies became purely holding companies and were amalgamated, with Royal Dutch holding 60% ownership and Shell Transport holding 40% ownership, which remains the same today. Waley Cohen was one of the small group that laid the foundations of the company. (R. Henriques: Sir Robert Waley Cohen (1966) and Marcus Samuel (1960), and references therein; J. A. Oriel, JCS, 1953)

J.A. Oriel: "In those early days of the petroleum industry, when the possibilities of using 'petrol' or 'gasoline' in the internal combustion engine were beginning to be appreciated, it was thought the petroleum from whatever source had roughly the same chemical composition, and that the lower the specific gravity the better it would generally behave in the engine. Sir Robert was not satisfied with these generalities and set about tackling the problem from two angles - the composition of the petrol and its efficiency in the engine.

On the chemical side he interested Humphrey Owen Jones, of Cambridge, in the chemical composition of a variety of petrols and, on the other side, collaborated with Mr. (now Sir) Harry Ricardo, who developed the variable compression engine…it was clear at the end of these researches that the aromatic content of

the petrol played a considerable part in increasing the highest useful compression ratio possible in the internal combustion engine, and if the criterion of a specific gravity was to be used to specify a petrol, the higher specific gravity and not the lower must be looked for.
The collaboration with Sir Harry Ricardo continued for many years, not only in petrol engines, but in diesel engines and, latterly, in development of the gas turbine."

Humphrey Owen Jones (1878-1912) :

In 1901 Waley Cohen asked Humphrey Owen Jones to analyze a sample of Shell's Borneo crude oil. Waley Cohen recalled 30 years later: "…for a long time the industry had been accustomed to ask for analyses of petroleum, and all that happened was that is was put into a flask, and you were told some temperatures at which some parts of it boiled and you were told its smell and its color, not always in very illuminating terms. This was, I think, the first occasion on which a scientific chemical analysis was made of a petroleum distillate...In the course of his experiments he found some aromatic hydrocarbons, and was the first to announce that aromatic hydrocarbons were found in large quantities in nature in the form of petroleum. That experiment had another economic consequence, namely that a petrol which at that time was called inferior, and which was being sold at a discount of 25 per cent, immediately became superior and was sold at a premium of 10 per cent, so that the economic consequences of the first really scientific work that was done upon petroleum products were very great indeed. I remember Mr. Jones, in those famous experiments he carried out, showing me 350 pure chemical compounds which he had isolated from that single distillate of crude petroleum." Jones showed that Shell's Borneo crude was richer in toluene than any other oil yet discovered, a fact that was to have major consequences later in the First World War. In 1912 Jones was killed in a mountaineering accident while on his honeymoon.

Sir Harry Ricardo (1885-1974):

Ricardo (1944): "During the 1914-1918 War, I came into contact with Sir Robert Waley-Cohen of the Shell Company, who, at that time, was chairman of a committee dealing with fuel supplies. To him I told of my experiments on detonation, of the very great importance I attached to it, and of my belief that it was largely a function of the fuel. He immediately sent me samples of a wide range of fuels of different origin, which I tried out on my supercharging engine, and I was able to show him very great differences in their behavior as regards detonation. Of these sample fuels, by far the best was one hailing from Borneo. He told me to my amazement, that hundreds of thousands of tons of this particular petrol were being burnt to waste in the Borneo jungle merely because it did not comply with the existing specification as to specific gravity. On the strength of these observations, he invited me to undertake, as soon as the war was over, a comprehensive research into the behavior of liquid fuels." Based on his studies of engine efficiency, Ricardo had rediscovered the special value of Borneo crude oil.
One outcome of the cooperation between Shell and Ricardo was the flight in June 1919 of the first direct airplane crossing of the Atlantic by RAF pilots John Alcock and Arthur Whitten-Brown in a Vickers Vimy bomber powered by two Rolls-Royce Eagle engines. Ricardo recalls them telling him "that even a small increase in power or fuel economy might make all the difference between success and failure, for it was touch and go whether they could take off with enough fuel for the crossing." The flight of 16 hours and 27 minutes duration from Newfoundland to Ireland was made possible by the use of the new highly aromatic high octane aviation fuel refined from Borneo crude. When they landed there was scarcely enough fuel left in their tanks for a further mile of flight. (J. Reynolds: Engines and Enterprise, The Life and Work of Sir Harry Ricardo, 1999)

World War I:

"It was a war that was fought between men and machines. And these machines were powered by oil - just as Admiral Fisher and Winston Churchill had foreseen, but to a much greater extent than even they or any other leader had expected. For, in the course of the First World War, oil and the internal combustion engine changed every dimension of warfare, even the very meaning of mobility on land and sea and in the air. In the preceding decades, land warfare had depended on inflexible railway systems that could carry troops and supplies to a railhead, as had occurred in the Franco-Prussian War of 1870-71. From the railhead onward, the troops' movement had been circumscribed by physical endurance, muscular capabilities, and the legs of man and beast. How much could be carried, how far and how fast - all that would change with the introduction of the internal combustion engine.

The extent of this transformation far outpaced anything conceived by strategists. Horses were still the basis of planning at the outbreak of the war - one horse for every three soldiers. Moreover, the reliance on horses greatly complicated the problems of supply, for each horse required ten times as much food as each man. At the beginning of the war, at the First Battle of the Marne, one German general cursed that he did not have a single horse that was not too exhausted to drag itself forward across the battlefield; by the end of the war, whole nations would lie exhausted; for the oil-powered engine, while simplifying the problems of mobility and supply, also multiplied the devastation." (D. Yergin, The Prize, 1990).

During the War, the British admiralty did not realize until late in 1916 that there was a lack of sufficient oil supplies. It became apparent that Britain could very well lose the war due to an oil shortage resulting from insufficient tanker tonnage. This shortage was brought about by the rapid increase in the demand for oil and by the success of German submarine warfare. Shell started to carry oil in the double bottoms of tankers, a space usually loaded with water ballast. This decision, despite being proposed by Sir Marcus and Waley Cohen already in 1915, was taken by the Admiralty, as Waley Cohen later wrote, "but they had four or five days in hand when they took their decision, almost two years after the scheme had first been put to them, on 21st June, 1917." The number of weeks of remaining reserve oil was about to go below the number of weeks that it took to modify the cargo ships so their double bottoms could carry oil. There were 10 weeks of liquid fuel left in tank installations in England. From the time the plan took effect until the armistice was signed on November 11, 1918, over one million tons of oil was carried in the double bottoms of 761 converted ships.

To make additional tonnage available quickly, Waley Cohen was given a free hand in the rapid conversion of existing British cargo ships into tankers. This involved selecting and taking cargo ships from their owners, converting them into tankers, and then managing them.

During the War, Waley Cohen and Samuel Marcus ensured the supply to the Allies of three essential oil products, available only from the Dutch East Indies and which only Shell could provide: toluene, for the manufacture of TNT from Borneo; Sumatra gasoline which was unique for aviation; and the Borneo liquid fuel with its exceptionally low viscosity- a factor of utmost importance for a fleet operating in cold near-arctic waters in which the viscosity of other fuels rose to an unworkable level.

Despite warnings to the British government by Samuel Marcus in 1902 and again in 1914, no plant in England was available in time to meet the urgent wartime need of toluene for the manufacture of TNT. Britain was on the verge of running out of explosives. Waley Cohen organized the operation that was to alleviate the shortage. On the night of January 30, 1915, the entire Shell toluene refinery at Rotterdam in neutral Holland was secretly dismantled, camouflaged, sent to the docks and loaded onto a ship. The plant was reassembled in England. In less than nine weeks the Rotterdam plant was in full working order at Portishead in Somerset. This saved the English at least one year's time over what it would have taken

to build an entirely new refinery. Information about the operation was "leaked" to the Germans, but the date of sailing of the SS Laertes was given as one day later. On that night, a similar ship, the Moordrecht, was torpedoed at the mouth of Rotterdam harbor. Using the Somerset plant as a guide, a duplicate plant was quickly built at Barrow-in-Furness, Lancashire. These two plants supplied 80 percent of the TNT used by the British during the war. The Germans themselves had been using the "neutral" Rotterdam refinery to supply toluene for the manufacture of TNT. Lord Birkenhead counted the battle of toluene as among the three decisive victories of the war.

Had the problem of the shortage of toluene not been alleviated otherwise, The Ministry of Munitions was to put into operation plans for the large scale production of toluene by synthesis from butyl alcohol, the problem having been worked out by Dr. Chaim Weizmann. (Reinharz, J., chapter in The Interaction of Scientific and Jewish Cultures in Modern Times, 1995).

Waley Cohen served as Petroleum Advisor to the War Office (Honorary) for the period 1917-1919. Shortly after the Armistice France's Commissioner General for Petroleum said that without Shell "the war could not possibly have been won by the Allies." Waley Cohen was knighted in 1920 in recognition of his contributions to the war effort.

Palestine and the Haifa Refineries:

Waley Cohen wanted an ocean installation for Shell in the area around Haifa. He chose the location of the Haifa Oil Refinery, a site between the Kishon River, the railway, and a projected new road.

The construction of two oil pipelines, one from Kirkuk to Tripoli and one from Kirkuk to Haifa, was completed within a month's time of each other. The massive project required 8 million person-hours of work. The Royal Dutch/Shell group held a 23.75 % interest in the project. The Kirkuk-Haifa pipeline was 628 miles. The pipeline was buried 2 ½ feet underground. To provide corrosion protection, the steel pipeline was coated with bitumen surrounded by asbestos paper. It took 10-11 days for the oil to reach Haifa. At Haifa, the oil flowed into tanks and then was pumped into tankers from a jetty with two loading points about a mile off the coast. 85% of the pipes were 12" with a working pressure of 50 atmospheres and 15% were 10" pipes with a working pressure of 62 atmospheres. The Kirkuk-Haifa pipeline had 8 pumping stations. The Haifa pipeline contained a 5 mile length of 8" pipe on the slopes leading from the Arabian plateau to the Jordan Valley. The purpose of the narrower pipe was to slow down the flow, which would otherwise have been too fast in the last 55 miles which had a fall of 2,000 feet. The pipeline was in operation from 1935 through 1948. (R. J. Forbes and D. R. O'Beirne: The Technical Development of the Royal Dutch/Shell 1890-1940 (1957))

In 1935, as the representative of the Royal Dutch/Shell group, Waley Cohen attended together with his wife the opening ceremony of the Kirkuk-Haifa pipeline held at the Haifa Refinery. After the ceremonies, their car collided with a truck near Jerusalem, a result of which Robert's wife Alice died and Robert was severely injured.

Waley Cohen was acknowledged as the head of the Anglo-Jewish community and played a leading role in almost all aspects of Jewish Community life. He was active in the fight against the establishment of a Jewish State. He saw political Zionism as a conflict with what he felt it meant to be both English and of the Jewish faith. Despite this, he understood the need for economic development in Palestine. Among his other efforts, he founded The Palestine Corporation. The Palestine Corporation aided in the establishment and financing of the Nesher Cement Company, the King David Hotel in Jerusalem, the diamond industry in Palestine, the Union Bank, the Ihud Insurance Agencies, the Palestine Salt Company, the Levant Bonded Warehouses, and the Agricultural Mortgage Company, among others.