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OPERATION PLUTO

The existence was recently revealed of a thousand mile oil pipeline in Britain built since the War. It may now be stated that, thanks to the successful accomplishment of Operation Pluto (Pipeline Under The Ocean) an additional system has been laid since D Day under the Channel to the Continent. A continuous flow of petrol is therefore maintained by pipeline deep into Germany from tankers discharging at British ports. More than a million gallons of petrol a day have, for some months, been delivered by this unique method - a quantity which was sufficient to meet the entire requirements of Field Marshal Montgomery's armies.

Operation Pluto thus represents the climax in the battle of oil supplies which has been waged relentlessly against the enemy since the outbreak of the war. The spectacle, which we have recently seen, of vast Allied mechanised armies advancing victoriously hundreds of miles into the heart of Germany, and of gigantic Allied air fleets hammering the life out of the Reich, is evidence which way the Battle of Oil has gone. Field Marshal Runstedt and other German Generals now in captivity, have expressed their conviction that the stupendous Allied superiority in oil supplies was one of the major factors which contributed to their defeat.

How Pluto was conceived

Early in April, 1942, Mr. Geoffrey Lloyd, Minister in charge of the Petroleum Warfare Department (a secret Department set up in 1940 and responsible to the Prime Minister in his capacity as Minister of Defence) arranged a special demonstration of flamethrowers for Lord Louis

Mountbatten, then Chief of Combined Operations. These were the weapons which, two years later proved a brilliant success in the operations that followed D Day. After the demonstration, Mr. Lloyd asked Lord Louis whether, on the petroleum side, anything more could be done to assist the continental operations which were being planned. Lord Louis' reply was "Yes. Can you lay an oil pipeline across the Channel?"

Mr. Lloyd at once consulted the experts and put the proposition to them. Their answer was that it would be "impossible". However, a few days later Mr. A.C. Hartley, C.B.E. Chief Engineer of the Anglo-Iranian Oil Company, suggested that it might be possible to make a pipeline somewhat like a submarine electric power cable without the cores and insulation, and to lay this across the Channel in a few hours from cable laying ships. Sir William Fraser, C.B.E., Chairman of the Anglo-Iranian Oil Company, pledged his Company's and his own full support to the development of the idea, and Mr. Lloyd placed a full scale order for several hundred yards of this pipeline which Dr. Wright, Managing Director of Siemens, agreed the next day to manufacture with the utmost priority. [The name subsequently given to this pipeline was HAIS (Hartley, Anglo-Iranian, Siemens)]

Within the rapid space of a fortnight this trial length was laid in the Thames from a Cable ship made available by Sir Stanley Angwin, Engineer-in-Chief, Post Office. The results were so promising that Mr. Lloyd after consulting Lord Louis Mountbatten, Sir John Cunningham (Fourth Sea Lord), Sir Walter Venning (Quarter Master General) and Sir Christopher Courtney (Air Member for Supply and Organisation, Air Ministry), reported the initiation of the project to Mr. Churchill and received word to press ahead with all speed and to inform him if he should encounter any difficulties which might require his

personal intervention.

Importance of Pluto

The supply of oil to the Armies of Liberation once they had landed was one of the master problems of the whole war. What in effect was required was a Petroleum "Mulberry" - an entirely new method on a scale never before contemplated which would guarantee the delivery without interruption of millions of gallons of petrol at the places and the times needed; that is, bulk petroleum, which normally requires special harbour, dock and extensive storage facilities, should be supplied across the beaches. The supply would have to be, as near as was humanly possible, invulnerable from air attack and sea attack, but at the same time the probability of such attacks on the heaviest scale would have to be taken into account. Moreover, petrol is the most inflammable of all substances, and tankers the most vulnerable of craft, and it was to be expected that the Germans would make the Allied oil supplies a special target for every conceivable weapon. This, in briefest outline, was the problem which had led Lord Louis to pose his original question, and from the outset, there were no illusions about the magnitude of the task.

"HAIS"

Consideration of all the known methods of pipeline construction soon made it clear that even in peace time the proposal would involve a major engineering feat owing to the rapidly varying weather conditions and swift tidal streams in the English Channel. With the added hazards of war, it was clear that revolutionary means would have to be adopted, if the problem were to be solved.

As a first step in the next phase of the task, Mr.

Lloyd placed an order with Siemens and Henleys for two 30 mile lengths, to the original 2 inch diameter design. This design was subsequently modified to provide larger carrying capacity by increasing the diameter to 3 inches and strengthening the cable for working pressures in excess of 1,200 lbs a square inch. The purpose of this crucial decision was to provide enough pipeline for full scale trials; for, in view of the daring innovation proposed, if we were truly to rely on it as one of the important means for nourishing the invasion, nothing could be done "in miniature". At the same time, Combined Operations agreed to a full scale experimental lay across a stretch of the Bristol Channel where the currents and other conditions approximated most closely to the English Channel.

No existing cable ship was large enough to carry a full length of this unusually heavy cable and the S.S. "London", a coaster, was fitted out with cable gear and became the Cable Layer H.M.S. "Holdfast". An experimental cable was laid by this ship in December, 1942, from Swansea to Ilfracombe by Combined Operations, and this, after considerable difficulties were overcome successfully, delivered petrol from one shore to the other. Consumers of petrol in North Devon and Cornwall did not realise that, for more than a year, their supplies of petrol had been pumped across the Bristol Channel from Swansea. Large supplies of Hais cable were ordered when this test had proved the feasibility of the scheme.

"HAMEL"

Meanwhile, a second proposal made at the end of April, 1942, by Mr. B.J. Ellis, Chief Engineer of the Burmah Oil Company with Mr. H.A. Hammick, Chief Engineer of the Iraq Petroleum Company, who had been seconded by their Companies to the Petroleum Department, was being developed and this was

called HAMEL Pipe (Hammick/Ellis). With the help of Messrs. Stewarts & Lloyds, the A.I. Welding Company, and the National Physical Laboratory, it was soon proved that 20 ft. lengths of 3 inch diameter steel pipe could be welded automatically into any required length, and could be wound on to a drum like cotton on a cotton reel, and pulled off again relatively straight, provided only that the drum were 30 or more feet in diameter.

The Director of Naval Construction at the Admiralty developed Mr. Ellis' idea and designed H.M.S. "Persephone" which, from being a hopper barge, was converted to a craft with a "great wheel" rotating in trunnions on her deck, capable of carrying many miles of 5 inch Hamel pipe, and of paying it into the sea. After H.M.S. "Persephone" had shown that Hamel pipe could be "packed" in this way for delivery where required in one piece, the development was undertaken of the idea of the floating drum capable of carrying the full length of pipe which might be required for the Channel crossing, and which model tests made by the National Physical Laboratory in their ships' tanks had showed capable of being towed like a large bobbin, paying off pipe as it went. Sir Allan McDiarmid, Chairman of Messrs. Stewarts & Lloyds arranged for his Company to proceed with the construction and later with the management of a special factory for welding 20 ft. lengths of pipe into 4,000 ft. lengths at the rate of 10 miles a day, and of facilities for storing these lengths to a total of 350 miles.

Arrangements were made for mooring the floating drums, to be named "H.M.S. Conundrums" or, more briefly, "Conuns", in deep water at the end of the pipe racks, so that the 4,000 ft. lengths might be welded into a continuous length of 30 or more miles and wound neatly on the Conuns while they were rotated. The Conun is 90 ft. long and more than 50 ft in

diameter overall and, when fully wound, weighs 1,600 tons - the weight of a destroyer - and can carry 70 miles of pipeline. The drum around which the pipe is wound is 40 ft. in diameter and 60 ft. long.

Trials successful

After the successful trials of the Hais Cable in April, 1943, Mr. Lloyd arranged that the manufacture of Hais cable and of Hamel pipe and the co-ordination of the whole scheme together with the provision of pumping stations on the English shore should be the responsibility of the Petroleum Warfare Department of which Major-General Sir Donald Banks is Director-General. The responsibility for laying the pipes at sea was accepted by the Royal Navy.

Force "Pluto", under Captain J.F. Hutchings, C.B.E., D.S.O., R.N., was then formed. Three merchant ships in addition to H.M.S. "Holdfast" were fitted out with cable laying machinery made available by the Post Office. Two of the ships were capable of carrying 100 miles of 3 inch Hais cable and the other ship 30 miles. Thames barges were converted for handling cable at the shore ends where the large ships could not operate. Six "Conuns" were constructed for handling the Hamel pipe. New pipe lines were run from the British system to take petrol to the coast. Special high pressure pumping stations were cleverly camouflaged in an old fort, a modern amusement park and in a row of seaside bungalows.

Operation "Pluto"

The Prime Minister had kept in closest touch with all these developments, and his earlier decision directing that the scheme should be pressed ahead ensured the closest inter-departmental co-operation, and the flow of priority

materials. Shortly before D Day he made a personal inspection of the apparatus.

Operation Pluto began a few weeks after D Day as soon as the mines had been swept to the approaches to the tip of the Cherbourg Peninsula. Several lines were established and petrol pumped to Normandy.

Soon, however, with the rapid opening of Cherbourg Harbour, the pipelines from the Isle of Wight to Cherbourg became less important than the quick establishment of Pluto lines across the narrow part of the Channel in order to supply bulk petroleum to the Allied armies sweeping up to Belgium and Holland, and to avoid the great strain of supplying them by long lines of communication running back to Cherbourg and the Mulberry Harbours.

As soon as Boulogne was captured - an operation in which the flamethrowers developed by the Petroleum Warfare Department played a conspicuous part - and the mines on the Dungeness-Boulogne route had been cleared, pipelines were laid. In a short time oil began to flow to the Continent and the Royal Engineers rapidly constructed land pipelines leading from Boulogne to Ghent, Antwerp and Eindhoven and soon a million gallons a day were being pumped from the Mersey to the Rhine.

Operation Pluto may be claimed as another outstanding example of British ingenuity. It achieved complete surprise even the majestic "Conuns" sailed unscathed across the Channel, the Germans assuming them to be devices not worth attention.

Operation Pluto continues to be a main artery of supply to the Continent, thus releasing tanker tonnage for use in the far-flung Pacific War.