THE WESSELING SYNTHETIC FUEL PLANT

1. Introduction.

(a) The Wesseling Synthetic Oil Plant is one of the most important plants in Germany for producing synthetic fuel by the hydrogenation of lignite. As such it was a target of prime importance to those investigators who are charged with fuel problems.

(b) The plant was visited on 17, 18, and 19 March 1945. The team representing the U. S. Naval Technical Mission in Europe were: Lieutenant Commander Lloyd H. Mulit, USNR, and Lieutenant Richard C. Aldrich, USNR. A CIOS team visited the plant the same time consisting of : Colonel J. A. Oriel and Major Tilley of the British Army and Messrs. Weir and Jones, U. S. civilians.

(c) The plant was so badly damaged in the air raid of 18 July 1944, that it was never put back into operation. Nearly all the workers were removed and only three men of the administrative staff remained behind and were available for questioning at the time of the visit. These men were:

Dr. Muller von Blumencron - Director.
Dr. Ernst Peuckert - Chief Operating Engineer.
Dr. Sustmann - Chief Chemist in the Analytical Laboratory.

The other important former members of the plant staff who had left were:

Dr. Meissner - Chief Chemist.
Herr Moll - Chief Engineer.
Dr. Miedelmann - Engineer charged with installing machinery.
Herr Neubaner - Assistant to Moll.
Herr Heinrich - Chief Civil Engineer - belonging to the Todt Organization.
Herr Dietsch - Responsible for moving machinery to new sites after the air raid of 18 July.

There were also thirty-five (35) Russian workmen left in the barracks, and a few plant guards.

2. Sources of Information.

(a) As previously mentioned, three of the principal men of the plant's administrative staff remained behind. They were able to give fairly complete information on the plant. However, they were not able to discuss the use of the products after they left Wesseling, as all such matters were kept highly secret by the German Army.

(b) The best source of information was a synopsis written by Dr. Peuckert, containing very complete information on the design, operation and yields of the plant. This most complete and detailed volume is now in the hands of CIOS. The U. S. Navy members were able to get a microfilm copy of this book which has been used as the basis of this report. Other facts were taken down from conversations with the above mentioned Germans.

3. Brief History of the Plant.

(a) The plant is owned by the Union Rheinischen Braunkohle Kraftstoff A. G. It is situated on the west bank of the Rhine, about one mile south of Wesseling, a village roughly half-way between Cologne and Bonn. This company consists of the principal lignite mine owners of the Rhine area (Knapsack). The plant was pushed by the German Government as an important part of the Four-year Plan.

(b) The company was founded on 27 January 1937. Plant construction started on 4 April 1938. The outbreak of war interrupted construction from 8 November 1939 to 1 February 1940. A few pieces of equipment remained to be installed but were all operating by the middle of 1943. These consisted of the last high-pressure stall, the water gas conversion system, the mud coking units and the second butane unit.

(c) The equipment was put on stream in the following order:

(1) Power House.
(2) Hydrogen Production.
(3) Hydrogenation.

3. Brief History of the Plant. (c) (Cont'd.)

The boiler house was ready 10 January 1941 and its electric power units were soon running and able to supply energy to the outside net-work.

(d) While waiting for the hydrogen stalls to be completed, a large quantity of middle oil for pasting was made by the distillation of Esthonian oil shale.

(e) The originally proposed gasoline de-hydrogenation unit and the alkylation unit were never completed due to the 19 July air raid. The methane cracking plant was added to the original design due to the demands of the high pressure hydrogenation unit.

(f) Fuel production began on 31 August 1941 and continued to increase steadily until 18 July 1944, when an air raid occurred that completely stopped production.

(g) Serious thought was given toward reconstructing the plant, but Dr. Geilenbarg, the man personally responsible to Hitler for the construction and rebuilding of hydrogenation plants, decided against it. Accordingly, the workmen were moved away to other jobs, as was some of the equipment. Just what the Germans intended to do to the remaining part of the plant is not clear, but Dr. von Blumencron states that he was ordered to stay behind when the German Army retreated at the specific order of Major General Erdmann.

(h) Some of the hydrogen compressors were to have been shipped to a secret place, known only as JACOB II, supposedly and underground installation in Pinch, Kosswig near Dresden. These were never moved.

(i) Documents were removed from the plant and sent to Fabrikant Projahn in Waldbrohl, fifty (50) kilometers from Wesseling. Essential parts of the compressors were hidden at Alster, west of Bonn, in a tube working plant.

4. Present Condition of the Plant.

(a) The plant is very badly wrecked. The great bombing attack of 18 July 1944 reduced its capacity to twenty (20) percent of the total production which was rebuilt to forty (40) percent when a small attack on 6 October completely shut it down. At that time, the German Government decided to abandon it.

(b) Nearly every building has been damaged to some extent, while some are completely destroyed. The gas holders are all smashed. The boiler house was not too badly damaged, but much of its equipment had been removed. The hydrogenation stalls are standing, but the pre-heaters are badly injured. The pipe lines for steam, water and product are wrecked. The laboratories are standing, though damaged, and their equipment had been removed. The compressor house was also hit, but many compressors can be used.

(c) It would be impossible to operate this plant without a very complete reconstruction and replacement of equipment.

5. Description of the Process.

(a) The Wesseling Plant works on the I. G. high pressure hydrogenation process, as shown in the accompanying flowsheet (Fig. 1). In this, heavy hydrocarbon molecules and hydrogen are combined to produce light hydrocarbons. The process uses very high pressures, seven hundred (700) atmospheres, and various catalysts to obtain these results. The transformation occurs in two or three steps depending on the final products; two for Diesel oil alone and three if motor gasoline and aviation gasoline are to be made.

(b) The first stage is known as the "sump" phase. Here coal is pulverized and mixed into a paste with heavy oil and catalyst. The heavy oil is either obtained from the outside, i.e. tar distillation, or is a recycle product from the process itself. The product from this sump phase is distilled into two cuts, middle oil and heavy oil. The average coal through-put in this stage is approximately twelve hundred (1200) tons per day. This coal upon hydrogenation yields about six hundred fifty (650) tons of

5. Description of the Process. (b) (Cont'd.)

middle oil, which is further processed in the gas phase. The heavy oil is recycled for pasting of coal in the sump phase.

(c) The gas phase operates at three hundred twenty-five (325) atmospheres pressure. The catalyst is in pellet form and is kept on screens in the reactor, as opposed to the sump phase catalyst which is injected in the paste. Three types of gas phase catalysts are used:

(1) Hydrogenating Catalyst.
(2) Cracking Catalyst.
(3) Catalyst combining both the above operations.

This phase of the process had a total capacity of about six hundred eighty (680) tons of oil in the first gas phase stage per day. The gasoline production of one hundred eighty (180) degrees centigrade E. P. averaged about three hundred ninety (390) tons/day. The final product from this process is high in aromatics, naphthenes and iso-paraffins, thus making it an extremely valuable fuel for aviation engines.

A. HYDROGEN PRODUCTION.

(a) Hydrogen is produced by two methods:

(1) The Pintsch Hillebrand system - yielding water gas by directly gasifying lignite briquettes.

(2) A methane cracking unit which cracks the residual methane and ethane from the hydrogenation into raw hydrogen.

(b) The products of the two above processes are converted to raw hydrogen over a conversion catalyst and are then purified by CO and CO_2 removal. To supply the endothermic heat of reaction required in the conversion process, fuel gas is manufactured in a producer gas generator. The CO from the final gas purification is also used in this gas stream.

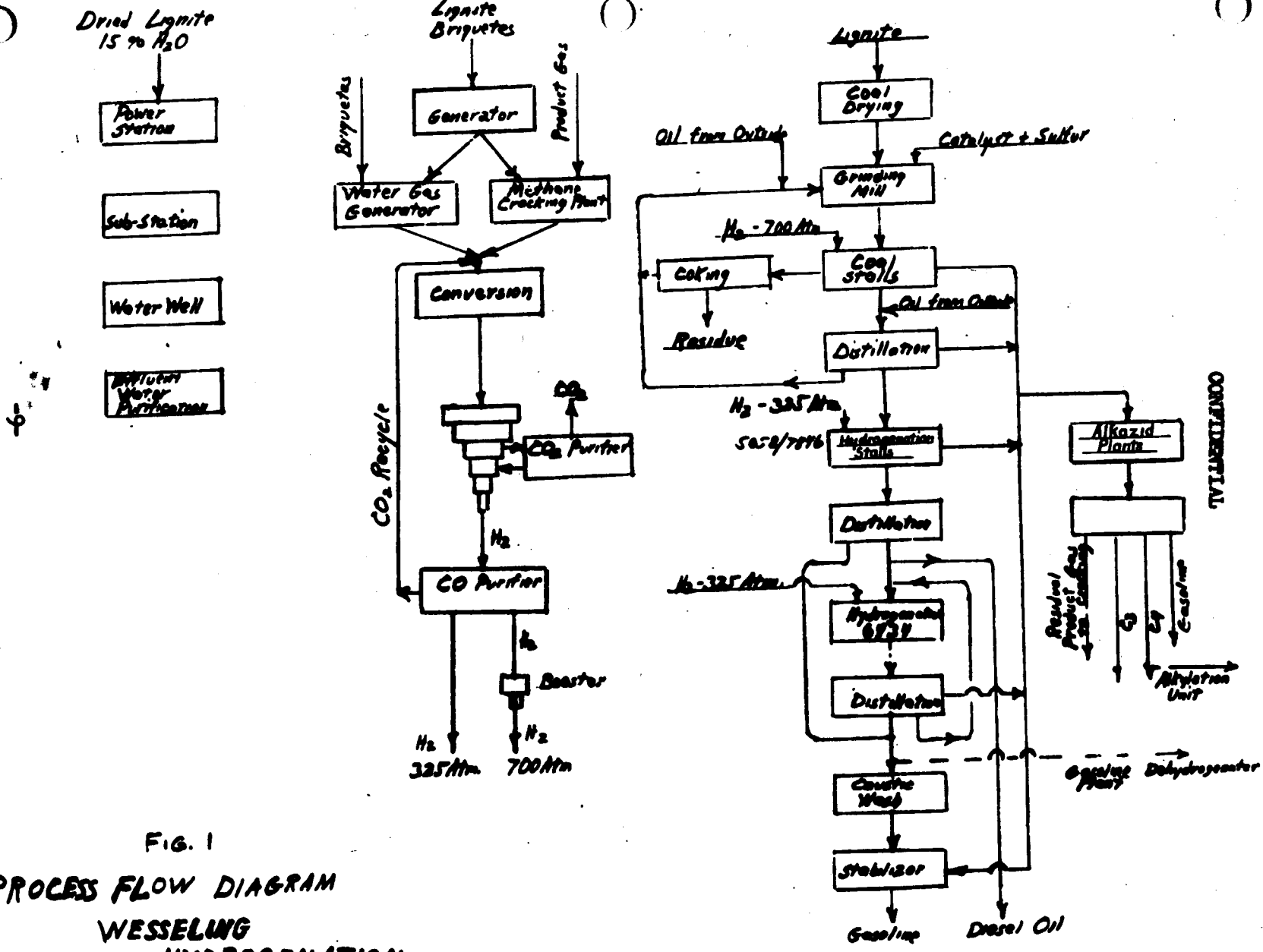


FIG. 1

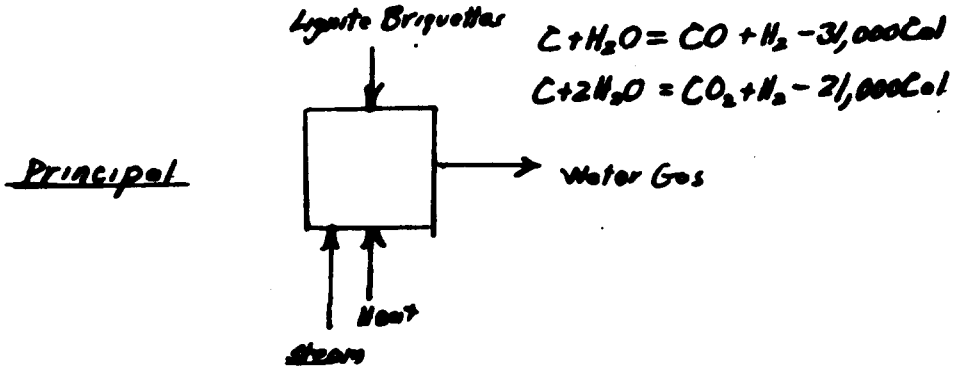
PROCESS FLOW DIAGRAM

WESSELING

LIGNITE HYDROGENATION.

FIG. 2

PINTSCH-HILLEBRAND UNIT



Flow Sheet