9.5 g/liter

(d) Miscellaneous.

I. MET AND NOT MET GUARANTEES.

(a) Water Gas Unit	Grarantee Figures	Operating figures at the end of 1943
$CO + H_2$ - content of the water gas	84 %	84 %
Capacity of the generators	5,500 nm^3/hr	5,250 nm^3/hr
Water gas/briquettes	2,030 nm^3/ton	1,900 nm^3/ton
The heating gas required	780 WE/nm^3 water gas	820 WE/nm^3 water gas
Outside steam required		0.12 kg/nm^3

I. MET AND NOT MET GUARANTEES. (a)(Cont'd.)

The guaranteed quantities on gas manufacture were never reached. The deficit amounted to approximately five (5) percent, for which the firm of Pintsch was charged with a penalty. This was particularly due to steam requirements.

(b) Fuel Gas Unit.

The guarantee figures for fuel gas unit were completely met when using H_2S steam injection, and when using CO_2 injection the figures were surpassed. At the same time excess steam in the amount of 0.1 kilograms per cubic meter of heating gas was produced.

(c) Gas Cracking Unit.

No guarantee figures on this unit were set up by the manufacturer, but the operating results exceeded those values anticipated and designed. The most noteworthy points were the high production yields and steam production through waste heat recovery which allowed for steam production equal to the steam requirements.

(d) Hydrogenation.

The hydrogenation plant of I. G. was never covered by a guarantee. However, the operating yields from both unites exceeded the design quantities. The coal requirements were somewhat higher than anticipated. The hydrogen requirement which had been estimated from pilot plant studies of I.G. were originally set too high. The operating differences expected from using a Rhine lignite instead of mid-German lignite were correctly anticipated.

(e) Other Operations.

In all other operations anticipated full loads were either reached or bettered. This is especially true of utility demands. One exception was the C - C unit which did not meet its guarantees; this failure amounted to forty (40) percent of the designed figures. The firm Uhde was going to build another unit in order to meet the original requirements.

I. MET AND NOT MET GUARANTEES. (Cont'd.)

(f) Capacity of the Plant.

The production-time curve shows that in 1944 the unit was capable of producing twenty-seven thousand seven hundred (27,700) tons/month of diesel oil and gasoline or two hundred sixty thousand (260,000) tons/year of gasoline and diesel oil. This meant using the complete gas producing capacity. The raw materials were approximately seventy-five (75) percent coal and twenty-five (25) percent oil. From coal alone, two hundred twenty-five thousand (225,000) tons/year of gasoline and diesel oil were produced which was the designed capacity of the unit. The bottle neck was always the hydrogen production. By the addition of outside oil, the capacity of both sump and gas phases rose to the total of two hundred sixty thousand (260,000) tons/year. This use of oil saved hydrogen, as it requires only half as much hydrogen as coal. The sump phase capacity was raised fifty (50) percent by a slight addition to the gas preheater. The gas phase had sufficient reserve capacity for this additional material since the middle oil made from outside oils has less phenols than the coal oil and could even take a throughput thirty-five (35) percent over the designed figure. In using coal, the capacity of the unit is two hundred twenty-five (225,000) tons/year diesel oil and gasoline while with outside oil it is three hundred sixty thousand (360,000) tons/year of the same. To convert the latter quantity to aviation gasoline, a fifth gasoline stall would have to be built.

II. AIR ATTACKS AND COUNTER MEASURES TAKEN.

(a) Protection for Men and Machines.

When the plant was built, many air raid shelters were included in the work. Besides these, a considerable number of walls were built both inside and outside of buildings to protect machines. The turbines and boiler plant were given special protection. Alletanks containing inflammable material were specially constructed and had extra heavy dykes and run off ditches.

(b) Blackout.

Special means for blacking out the plant were undertaken, either semi- or complete. Under normal blackout conditions,

II. AIR ATTACKS AND COUNTER MEASURES TAKEN. (b)(Cont'd.)

special lights kept buildings in semi-darkness, while only the repair shops were kept fully lit. At the approach of enemy planes, the blackout was completed by cutting off the lighting current. Discipline among the workmen during air raids was excellent. No damage was received due to blackout errors.

(c) Air Raid Wardens and Their Work.

Suitable air raid defence was always available. No one shirked his responsibility and the posts were always completely manned. The air raid protection procedure was minutely worked out and was constantly being improved. Warning from the outside was conveyed quickly and efficiently to the central station by the Army, with whom good cooperation always existed. The information was relayed to the whole plant by a siren alarm except to the high pressure unit and boiler house which was by telephone, giving the latter instantaneous notice.

(d) Operation Procedure.

The most important detail is the blowing down of the unit. This was done in two stages "Safety Operation" and complete depressuring. The former assumed on receipt of warning that planes were near, while the latter was only resorted to just before or after bombs started to fall. "Safety operation" requires isolating the units in the plant from one another, hence making indirect damage impossible or unlikely. It disconnects the main plant from outside power supply and stops the feed to the gasoline stalls of the gas phase. It also stops the coal paste injection in the sump phase, and substitutes diluent oil for the same. Under extreme conditions even these units can be disconnected from the power plant in a few seconds. The procedure was so well executed that "safety operation" could be carried out in two minutes and complete blow down in another few seconds. Such results were made possible by placing all control valves and power switches in one air raid shelter and at one switchboard in the power house. The same reliability in blowing down the unit existed in resuming operations. Production was completely restored after four (4) to five (5) hours. Hence operations were broken and resumed thirty-one (31) times. The methods were carried out that damage was limited to one gas holder and one small explosion in the gas plant.

II. AIR ATTACKS AND COUNTER MEASURES TAKEN. (Cont'd.)

Loss of Production Due to Enemy Air Raids		Loss of Finished Product
5/29/42	Safety operation (attack on Cologne, loss of outside power - several days)	300 tons
10/15/42	Bombs dropped on gas plant	8,300 "
1/23/43	Safety operation (outside power off)	600 "
2/14/43	Safety operation (outside power off)	250 "
2/23/43	Loss of all outside power	450 "
6/27/43	Blow down complete (1 stall coked up and had to be taken down	700 "
7/4/43	Safety operation with loss of power	300 "
7/9/43	Safety operation with loss of power	100 "
7/30/43	Safety operation with loss of power	150 "
8/12/43	Safety operation with loss of power	150 "
8/13/43	Complete power failure (all stalls coked up despite quick operation)	5,000 "
8/17/43	Safety operation - twice	150 "
8/22/43	Safety operation	100 "
9/10/43	Outside power failure	100 "
9/15/43	Several days outside power lost due to damage to public utility	800 "
10/3/43	Damage to briquette conveyor	20 "
10/14/43	Safety operation	120 "
10/20/43	Safety operation	80 "
10/23/43	Several days lack of briquettes (main water conveyor in mine damaged)	200 "
11/3/43	Safety operation	150 "
11/19/43	Safety operation	150 "
11/27/43	Outside power failure (oil circulating pumps out)	200 "

II. AIR ATTACKS AND COUNTER MEASURES TAKEN. (Cont'd.)

Loss of Production Due to Enemy Air Raids		Loss of Finished Product
11/30/43	Safety operation	150 tons
1/7/44	Safety operation	100 "
1/24/44	Safety operation	150 "
3/4/44	Safety operation	150 "
4/22/44	Safety operation	150 "
5/20/44	Safety operation	100 "
5/24/44	Safety operation	100 "
5/26/44	Safety operation	100 "
5/28/44	Safety operation	100 "
6/6/44	Safety operation	150 "
6/13/44	Safety operation (failure of outside power transformers)	2,080 "
6/22/44	Safety operation and blow down	970 "
6/27/44	Safety operation	250 "
7/10/44	Safety operation	150 "
7/11/44	Safety operation	150 "
		23,220 tons

The total production during this time was 455,356 tons, so that air raids caused a loss of 5.1 percent.