

JOINT OIL TARGETS COMMITTEE

(WORKING COMMITTEE)

ATTACK OF OIL RESOURCES REMAINING TO
GERMANY.INTRODUCTION.

At the present time only 20/25% of Germany's original sources of oil supply remain effective. This corresponds to a rate of production of about 300,000 tons per month, of which about 100,000 tons per month probably consist of motor fuel. In the absence of further attacks, production in September would amount to about 525,000 tons owing to the effect of repairs but it may be assumed that in practice the attack of synthetic plants and refineries will be maintained on a sufficient scale to prevent recovery and that henceforth the rate of output will not be permitted to exceed 300,000 tons per month for any appreciable period. In these circumstances only one-third of the total supplies would originate from refineries and synthetic plants. Two-thirds would consist of fuels from miscellaneous sources which have not hitherto been the subject of air attack. If therefore, substantial progress is to be made in reducing Germany's oil supplies further, as opposed to maintaining the present advantage, it is necessary to examine the possibilities of affecting by air attack some of the miscellaneous sources of supply. This paper is therefore concerned with the examination of the target potentialities of this "hard core" of the German oil supply situation.

ANALYSIS OF MISCELLANEOUS SOURCES OF SUPPLY.

The estimated quantities of liquid fuels and lubricants produced by miscellaneous sources are set out in Table I below. This shows that there is a production of motor fuels from such sources of about 50,000 tons per month. Assuming that the present degree of inactivity continues to be imposed on synthetic plants and refineries this may amount to as much as 50% of total motor fuel supplies.

TABLE I.Production of Liquid Fuels and Lubricants from
Miscellaneous Sources.

<u>Source and Nature of Product.</u>	<u>Output</u> (in metric tons per month)	
I. <u>COKE OVENS.</u>		
(a) Motor Benzol	32,000	
(b) Motor fuel from tar	<u>6,400</u>	38,400
II. <u>GAS WORKS.</u>		
(a) Motor Benzol	3,000	
(b) Motor Fuel from tar	<u>600</u>	3,600
III. <u>LOW TEMPERATURE CARBONIZATION.</u>		
Motor Gasoline from Tar (other than products processed in the Hydrogenation plants)	<u>4,000</u>	4,000

TABLE I (Contd.)

IV. ETHYL ALCOHOL.

<u>Total Potential Motor Fuel.</u>	<u>50,000</u>
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V. <u>TAR FUEL OILS.</u>	130,000
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VI. <u>VEGETABLE OILS & REGENERATED OILS FOR LUBRICANTS.</u>	12,000
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<u>Heavy oils and luboils</u>	<u>142,000</u>
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TOTAL	<u>192,000</u>
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(a) Motor Benzol (see I (a) and II (a) in Table I)

Crude benzol is produced by coke-ovens and gasworks at the rate of about 1% of the tonnage of coal carbonized (dry weight). German capacity for the production of crude benzol is therefore determined by coke-oven capacity, and output is reckoned at about 43,500 tons per month. Nearly 65% of the total output is concentrated in the 20 largest coke-ovens, of which 16 are situated in the Ruhr-Aachen district, 2 in the Saar and one each in Central Germany and Austria. The location and estimated output of these plants is shown in Appendix A, which also shows the state of target material.

Crude benzol requires refining before it can be used efficiently as a motor fuel. The general practice in Germany (which differs in this respect from Great Britain) is to carry out refining at the coke-ovens. These are, therefore, direct producers of motor benzol.

It is, however, unlikely that the whole of Germany's benzol output is available for use as motor fuel even in the present emergency. Most of the other uses which remain (e.g. in the explosives industry) are likely to command an equally high priority. It is thought that the quantity of benzol available from German production for motor fuel uses is about 22,500 tons per month; A further 12,500 tons per month of motor benzol has hitherto been available from coke-ovens in Austria and the Occupied Territories (principally Belgium, France and Poland) but the continuance of such supplies is becoming precarious.

Benzol is of very high value as a motor fuel, on account of its high octane rating though, being heavier than gasoline, it leads to starting difficulties if used in undiluted form. It is therefore normally used for blending with gasoline, its high octane rating being a valuable characteristic. Evidence from captured samples suggests that all supplies of benzol available for fuel use are being employed in the manufacture of motor fuels for the Armed Forces. Of the two types of standard fuels for army vehicles and tanks, one is a blend embodying 33% of benzol. With the current shortage of natural and synthetic gasoline, it is not unlikely that benzol is now being added to both of the standard grades of M.T. fuel and for that the proportion of benzol in the blend is being increased.

The importance of benzol supplies, as long as gasoline production from crude and synthetic sources remains at a low ebb, therefore needs no emphasis. They are also fairly vulnerable in

so far as a significant proportion of the total output is concentrated in a manageable number of targets. Moreover the following factors also favour the attacker:-

- (a) Since benzol is a by-product of the manufacture of coke, damage to the target which prevents the manufacture of coke will effectively prevent the manufacture of benzol even in the absence of direct hits on the benzol plant.
- (b) Coke-ovens form a large but fairly compact target which should prove vulnerable to air attack. They are highly inflammable due to the presence of gas-holders and large dismater gas pipe-lines. The fragile brickwork of the coke-oven batteries themselves is susceptible to fracture by blast.

(b) Other Light Oils (see I (b) II (b) and III in Table I)

Coke-ovens and gasworks, as well as low-temperature carbonization plants are also the source of light oils, in addition to benzol, which can be used as motor fuels. Their contribution in this respect is to some extent indirect since such light oils are obtained by the distillation of tar produced by these plants and such distillation often takes place in central tar distilleries rather than at the coke-ovens themselves. The tar output of coke-ovens and LTC plants is of course a source of motor fuel in this manner only in so far as it is not used as feedstock for hydrogenation plants. Although the total amount of motor fuel produced from this source is small (about 7,000 tons per month from coke-ovens and gasworks, and 4,000 tons from LTC plants) there is a certain concentration of production. It is, for instance, estimated that the three large tar distilleries of the Gesellschaft für Teerverwertung in the Ruhr-Aachen district which are listed in Appendix B account for at least 50% of the motor fuel production from coke-oven and gasworks tar, that is to say 3,500/4,000 tons per month. For this reason, they are probably of about the same importance as direct producers of motor fuels as the smaller coke-ovens listed in Appendix A. The individual yields of motor fuels by LTC plants are too low to warrant serious consideration of such plants as targets; they are mainly of importance for the production of fuel oils and are considered in this connection below.

(c) Ethyl Alcohol (see IV in Table I)

The enemy has not made extensive use of alcohol as a motor fuel, although he may well be impelled to make more use of it now owing to the critical situation which has arisen. The small quantities of ethyl alcohol which have been used in the past represented only a minor fraction of his total production. This production is derived chiefly from the fermentation of organic substances (mainly potatoes and molasses) and is scattered over such a large number of plants that no economical targets are offered. Methyl alcohol has not hitherto been used by the enemy as a fuel except in limited quantities for special purposes. Of the total production, the greater proportion is now produced by synthesis and the potential output would be very large if full advantage were taken of all the possible technical processes available regardless of other considerations. A very large fraction of the actual production, however, has been centred in the I.G. plants at Leuna and Oppau, and has probably already suffered seriously as a result of bombing. It is at any rate known that the enemy's supply position in methanol is already

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very tight. Hence it is unlikely, even in current circumstances, that methyl alcohol will be used to any extent as a fuel and for this reason there is no need to consider it as a target.

(d) Tar Fuel Oils. (see V in Table I)

These include both high- and low-temperature tars produced, on the one hand, by coke-ovens and gasworks and, on the other hand, by LTC plants. Although this category includes a small proportion of diesel fuels, it consists in the main of heavy fuel oils, suitable only for naval use and for low-grade furnace fuels for burning under boilers. In view of the limited activity of the German fleet and the immobilization of synthetic plants, which use large tonnages of such tars as feedstock, there must at the present time be a glut of such fuels in Germany and since all the uses are of low priority, no useful purpose would be served by attacking the oil industry at this point.

(e) Miscellaneous lubricants (see VI in Table I)

The only item of importance in this category is the small quantity of volatilized vegetable oil produced by the Voltol or Elektrion processes which is used for blending with high-grade aviation lubricants. Of the only two known plants in German Europe employing this process, one, at Freital near Dresden, has recently been heavily damaged by the U.S. 8th A.F.. The other, at Ghent, may not be in German hands much longer.

CONCLUSIONS.

(i) Of the hard-core of 192,000 tons of products from miscellaneous sources, the element of greatest importance to the enemy in present circumstances, is the output of 35,000 tons per month of motor benzol. This is a motor fuel of high quality, used probably exclusively by the armed forces and may constitute about one-third of the motor fuel supplies currently available to the enemy. Of this total, about 12,500 tons per month is derived from coke-ovens in Austria and the Occupied Territories, the bulk of which will be lost with the loss of France, Belgium and Poland. The output of motor benzol in Germany and Austria however (about 25,000 tons per month) may still account for as much as 25% of the enemy's motor fuel supplies. Two-thirds of the German and Austrian output is probably drawn from the twenty largest coke-ovens of which 16 are situated in the West in the Ruhr-Aachen district. As producers of motor fuel, the larger coke-ovens are as important as many crude refineries of capacities up to 10,000 tons per month, operating on normal crude feedstocks, which are already considered of sufficient importance to be treated as primary targets.

(ii) Second in importance is the output of about 7,000 tons of light oils derived from the distillation of tars. In so far as these tars are produced by coke-ovens, the attack of coke-ovens would automatically affect the production of these oils as well as the output of benzol. A large proportion of these tons is, however, treated centrally in tar distilleries. Three large distilleries in the Ruhr-Aachen district probably account for at least half of the output of these oils. Since these distilleries draw their tar mainly from the smaller coke-ovens and gasworks which are not included in the twenty plants considered under (i), the effects of the attack of these distilleries would in the main be complementary to the attack of the larger coke-ovens and would not merely duplicate them. As producers of motor fuel each of these distilleries is probably as important as any of the smaller
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of the twenty leading coke-ovens and hence of many small refineries which are already treated as primary targets.

(iii) In addition to their significance as producers of motor fuels, coke-ovens and tar distilleries are the source of a wide range of by-products of vital significance to the explosives, plastics, pharmaceutical and general chemical industries. Although the impact of their destruction on such industries at this stage of the war would probably have no material effect on its outcome, it would be the cause of widespread confusion and dislocation the moral implications of which would not be altogether without significance.

RECOMMENDATIONS.

It is recommended that the twenty coke-oven plants listed in Appendix A should be adopted as targets for the continuation of the offensive against enemy oil supplies. The priority accorded to them should not in any circumstances be such as to interfere with the task of maintaining the immobilization of the synthetic plants and the principal crude refineries. But as long as these priority targets remain out of action, the larger coke-ovens will be significant contributors to the diminished supplies of motor fuel and hence are worth-while targets for surplus effort. The destruction of the three large tar-distilleries in the West is calculated in the main to reinforce the effects of the attack of the leading coke-ovens and may in some degree cover the omission of the smaller coke-ovens and gasworks. Hence it is recommended that the targets listed in Appendix B receive equal priority for attack with those listed in Appendix A.

J.O.T.C. (Working Committee)
4th SEPTEMBER, 1944.

APPENDIX A.

COKE OVEN PLANTS

<u>Target No.</u>	<u>Plant.</u>	<u>Company</u>	<u>Location</u>	<u>Estimated output of Benzol tons per month</u>
	<u>Ruhr</u>			
GQ 1845	Nordstern	Gelsenkirchener Bergwerks-A.G.	Nordstern pit $3\frac{1}{2}$ m. W.N.W. of Gelsen- kirchen str. along- side Rhine-Rhine Canal.	2,100
GQ 1892	Hansa	Gelsenkirchener Bergwerks-A.G.	2 m.N.W. of Dort- mund str.	2,000
<u>GF 2229C</u>	Bruckhausen	Gelsenkirchener Bergwerks-A.G.	Fried. Thyssen colliery, 1,900 pit $3\frac{1}{7}$. $1\frac{1}{2}$ m.S.W. of Hamborn str. $4\frac{1}{2}$ m.N.W. of Duisburg.	1,900
GQ 1791	Prosper	Rheinische Stahlwerke A.G.	$1\frac{1}{2}$ m.N.E. of Bottrop str.	1,700
GQ 1834	Meiderich	Gelsenkirchener Bergwerks-A.G.	Fried. Thyssen colliery, 1,700 pit $4\frac{1}{8}$ Westerhof, $1\frac{1}{2}$ m. S.S.W. of Hamborn str.	1,700
GQ 1881	Osterfeld	Gutehoffnungs- hütte.	1 m.W. of Osterfeld str., 2 m.N.N.E. of Oberhausen str.	1,500
<u>GF 2267 D</u>	Kaiserstuhl	Hörsch A.G.	2 m. N.E. of Dortmund str.	1,500
<u>GO 1041 B</u>	Scholven	Bergwerksgesell- schaft Hibernia A.G.	Scholven colliery, Zweckel, $1\frac{1}{2}$ m.N.N.E. of Gladbeck E. str.	1,400
<u>GQ 1534C</u>	Victor	Klockner-Werke A.G.	Victor colliery, pit $3\frac{1}{4}$, $1\frac{1}{2}$ m.N.E. of Rauxel str.	1,300
GQ 1871	Ewald-Fortset- zung.	Ewald-König Ludwig Bergbau A.G.	Ewald Fortsetzung colliery, Erkenschwick, $3\frac{1}{2}$ m.N.E. of Beckling- hausen str.	1,200
GQ 1811	Robert Muser	Harpener Bergbau A.G.	Heinrich-Gustav colliery, $3\frac{1}{2}$ m.E. of Bochum N. str.	1,200
GQ 1829) GQ 1830)	Consolidation	Mannesmann-Röhren- Werke A.G.	Consolidation colliery, pit $1\frac{1}{6}$, $1\frac{1}{2}$ m.N.W. of Gelsenkirchen str.	1,100
GQ 1818	Gneisenau	Harpener Bergbau A.G.	Gneisenau colliery, $\frac{1}{2}$ m.W. of Dorne str., $1\frac{1}{2}$ m.N.E. of Dortmund str.	1,000
GQ 1826	Alma-Pluto	Gelsenkirchener Bergwerks A.G.	Alma colliery, $\frac{1}{2}$ m.E. of Gelsenkirchen str.	1,000
GQ 1890	Minister Stein	Gelsenkirchener Bergwerks A.G.	Minister Stein colliery 2 m.N. of Dortmund str.	1,000

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<u>Target No.</u>	<u>Plant.</u>	<u>Company</u>	<u>Location</u>	<u>Estimated output of Benzol tons per month.</u>
<u>AACHEN</u>				
GQ 1799	Grube Anna	Eschweiler Bergwerksverein A.G.	Aldorf, 7 1/2 m. N.W.E. of Aachen	1,300
<u>MIDDLE GERMAN</u>				
<u>GF 2250A</u>	Salzgitter	Reichswerke Hermann Goering.	Just E. of Hallendorf village 7 1/2 m.N. of Salz- gitter.	1,600
<u>SAAR</u>				
GQ 1894	Völklingen	Reckling'sche Eisen- und Stahlwerke	7 m.W. of Saar- brücken.	1,100
GF 2203 B	Neunkirchen	Neunkircher Eisenwerk A.G.	1 m.W. of Neun- kirchen town and 11 m.W. of Saar- brücken.	1,100
<u>AUSTRIA.</u>				
<u>GS 2206 A</u>	Linz	Hermann Goering- werke.	3 m.S.E. of Linz	1,100
Total				<u>217,800</u>

APPENDIX B.

TAR DISTILLERIES.

<u>Target No.</u>	<u>Plant.</u>	<u>Company.</u>	<u>Location</u>
	<u>RUHR.</u>		
GQ 1532	Duisburg-Meiderich	Ges: fur Teerverwertung.	3 miles N.N.W. of Duisburg main station.
GQ 1531	Castrop-Rauxel	ditto.	1/2 mile N. of Rauxel station, N. of railway line to Victor Hafen on the Zweig Canal.
	<u>AACHEN.</u>		
GQ 1533	Alsdorf-bei-Kohlscheid	ditto.	5 miles N.E. of Aachen.