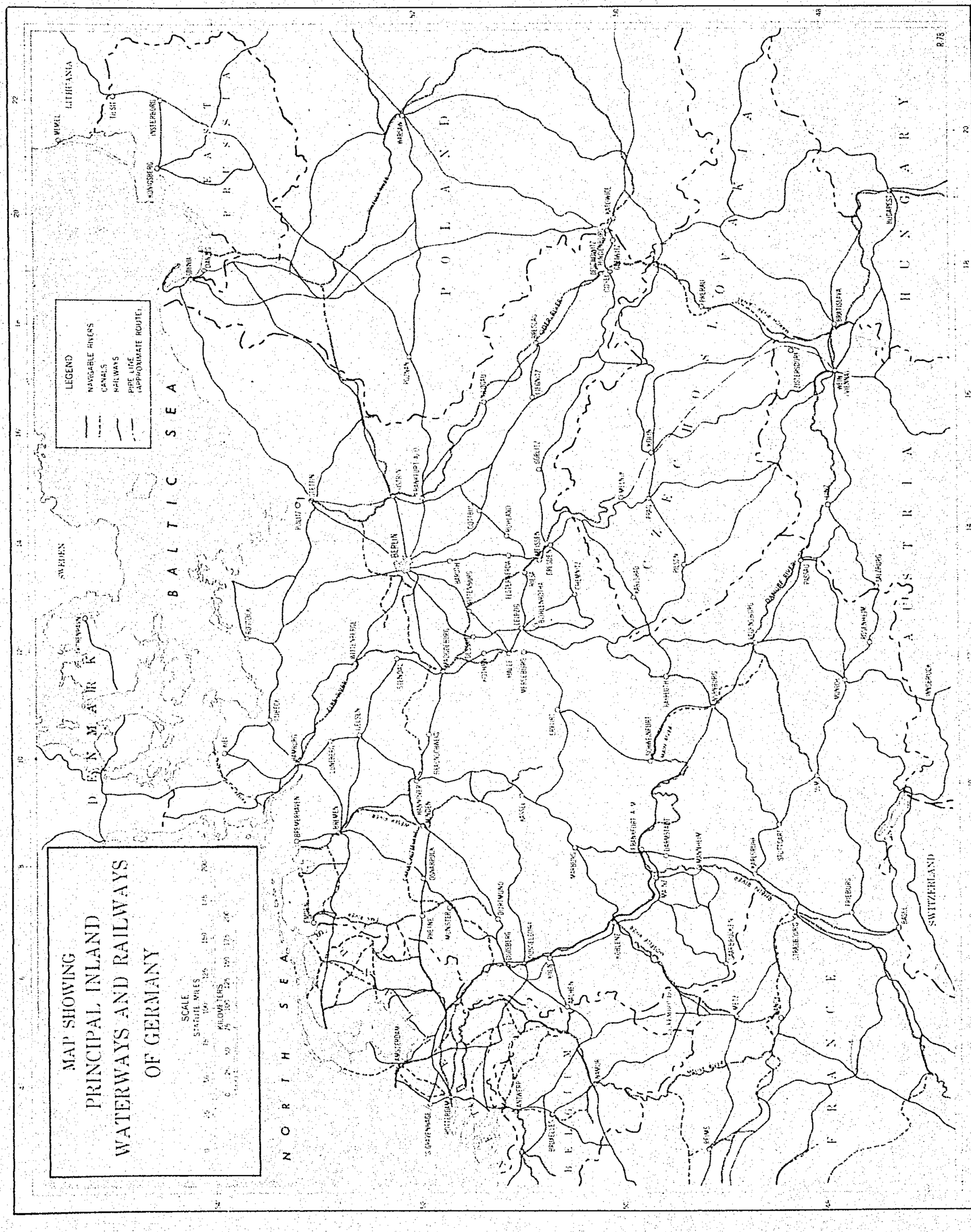
Waterways and railways



5.0 DISTRIBUTING

5.1 INTRODUCTION

This section of the report deals with the consumption of petroleum products and their substitutes and the facilities for the distribution of these products in Germany. Considerable attention is given to estimates of normal and wartime civilian consumption, to the use of substitute fuels, and to the rationing systems employed by the Germans. Available data on storage facilities at ocean terminals, strategic storage centers, and inland bulk plants are presented with, where possible, layout plans and location sketches of the major installations. A summary of the data on storage facilities is given in the tables on pages 310 to 328, and a map showing all points in Germany where the existence of bulk storage is reported appears on page 329. Statistics pertaining to prewar imports and exports of petroleum products are tabulated on pages 222 and 223.

5.2 CONSUMPTION

5.2.1 General

In normal times the per capita consumption of petroleum products in Germany was among the highest in Europe. In 1938 total sales, including bunkers, by oil distributing companies in Germany amounted to something like 51,568,000 barrels (a). In the early part of the war Germany, due largely to supplies obtained from captured and satellite territories, was not obliged to drastically reduce her consumption of oil. However, by early 1943 her prospects for an early victory had vanished and the increasing military demands necessitated a drastic slash in civilian consumption. In 1943 allocations of liquid fuels and lubricants were reduced to a point close to the very minimum necessary for efficient operation of the absolutely essential elements of production and transportation and civilian economy. Qualified analysts by painstaking study of data from a multitude of sources have been able to construct a broad outline of Germany's consumption pattern and of quantities of products consumed that is believed to be fairly accurately indicative of actual conditions in 1943. These conclusions are summarized below and figures are tabulated on page 221.

While no such detailed estimates of consumption in 1944 are available, it is known that available quantities have continued to decrease and have fallen considerably below the more or less basic minimum ration allocations of 1943. In fact, it is believed that by December 1944 the quantities available for civilian and industrial consumption had fallen below one third of the average consumption for 1943. By way of attempted compensation the use of substitute fuels was pushed as energetically as possible, but shortage of equipment, fuel, and manpower retarded this program.

As the war progresses the increasing shortages in supplies of both liquid fuels and lubricants and substitute fuels becomes progressively more serious and there is no doubt that allocations to civilian uses have for some time been reduced to below the level where the economy of the nation ceases to operate efficiently.

5.2.2 Industrial and Civilian Consumption of Liquid Petroleum Products in Germany During 1943

Overall consumption.- Whereas up to 1942 liquid fuel (b) and lubricants consumption in Germany remained at a relatively high level as compared with peacetime requirements, the dire emergency in 1943 compelled the Nazis to sharply slash their

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(a) See statistics on page 292.
(b) Light motor fuel includes power alcohol, motor benzol, and liquid gas (propane and butane) if and when used as motor fuel.

allocations of petroleum products for domestic civilian usages. For example, the basic allowance of motor fuel and diesel oil for dealers and large consumers was reduced as of March 1943, from 75 per cent to 50 per cent of the 1941 level. Estimates of consumption by category of use are tabulated on page 221.

Although the 1943 allocations were probably close to the absolute minimum civilian requirements necessary to maintain the internal civil organization and the essential services such as transportation, fire and air raid protection, and health and sanitation services, the amounts of such requirements are not entirely inflexible. Emergency measures of organization and substitution and the conversion of even smaller passenger cars and trucks, all of which was accelerated in 1943, undoubtedly permitted further reductions in civilian requirements of liquid fuels. Since 1943 an intensive program has been instituted in all cities having tramway lines to convert street cars into freight carriers for local delivery service, thus eliminating many fuel consuming delivery trucks. Also, as Germany is forced back within her borders, some reductions in over-all requirements can be effected. Military requirements obviously remain paramount at all times and may make increasing incursions upon the non-military uses. Such incursions, while not having immediate effect, do impose a cumulative limitation on the over-all output of the economy that supports the military effort. The consequence of insufficient oil supplies in an economy constantly being adjusted to increasing oil-deficiency is not a dramatic breakdown but a gradual process of attrition.

Road transportation.- In September 1942 road transport was organized under the "Amtsgruppe Motorisierung" of the Ministry of Armaments. This reorganization was undertaken to cope with the problems created by the strained motor fuel position of the Reich. A smaller number of vehicles with lower fuel rations per unit had to maintain transportation at practically the same volume as in 1942. In spite of all efforts of reorganization and substitution, however, a slowing up in the whole economy could not be avoided.

Motorcycles.- The number of motorcycles in use in July 1943 has been estimated at 650,000 or about 15 per cent below the 1942 figure. No motorcycles for civilian use have been produced for over four years, and the rate of depreciation must be increasing rapidly. Because of the scarcity of liquid fuel supplies, unit consumption per motorcycle is estimated at .1 metric tons a year, or slightly below the 1942 allocation.

Private cars and taxis.- The total number of private cars and taxis in use in July 1943 has been estimated at 200,000 as compared with 225,000 in 1942. The number of vehicles available for official use (government, police, and Party), emergency services (hospitals, fire services, ARP), doctors, and taxi services was very small. In most towns, for instance, taxis could only be obtained for specific emergency uses. Doctors, who had previously been permitted to use gasoline-driven cars, were no longer able to run them.

However, in June 1943 most private cars still in use were running on liquid fuel. The restrictions imposed on the use of liquid gas prevented any large increase in the use of this fuel between June 1942 and June 1943. Conversions to gaseous and solid substitute fuels did not start on a large scale until late in 1943. It is estimated that of the total number of cars, 175,000 use petroleum, 15,000 liquid gas, and 10,000 gaseous and solid substitute fuels.

The estimated unit consumption per car is .6 tons per year. The use of a relatively low figure for the unit requirements in the case of all liquid fuel using vehicles is justified, because the fuel shortage prevents full utilization of these vehicles. This fact is frequently mentioned in the German press. Moreover, there is no assurance that fuel rations for vehicles employed in essential war work will always be honored.

Busses.- The number of busses in use in July 1943 is estimated at 11,000 as against 12,000 in 1942. By July 1943 probably 5,000 busses (3,000 of them diesel engined) were converted to liquid gas (see Deutsche Bergwerks Zeitung, 31 July 1943), 1,000 to city gas, and 2,000 to solid fuels. About 3,000 were still using liquid fuel, 1,000 of them probably gasoline and 2,000 diesel oil. The unit consumption is

estimated at 12 metric tons a year for gasoline engined busses and 10 tons for diesel vehicles.

Trucks.- There are numerous indications that the number of civilian trucks in use in 1943 was considerably lower than the pre-war figure and also below that for 1942. The total number of trucks in use as of June 1943 has been put at 320,000 units compared with 350,000 units in 1942. This figure does not include some 25,000 vehicles driven by electric motors. Of this total, it is estimated that 105,000 were generator trucks, 12,000 used gaseous fuels, 80,000 were driven by liquid gas, 10,000 by diesel oil and 113,000 by light motor fuel. The decline in the total number of trucks in use was caused by the shortage of liquid fuels, by the increasing rate of depreciation, by the effects of the tire shortage, and by the enormous military requirements for trucks

Because of the large number of less efficient substitute fueled trucks included in this total (117,000 vehicles), the actual decline in the efficiency of road transportation was even greater than indicated by the above figures. If all the 320,000 trucks were fully utilized their efficiency would correspond to that of 280,000 liquid fueled trucks. Though fuel allocations per truck in 1943 were probably at a level of only two-thirds of the peacetime volume, the ton-mileage per truck was probably not much below the prewar figure, as a better utilization of loading space per trip (including return journeys) would compensate for reduced mileage. However, as there are many indications that stringency of fuel supplies has prevented full utilization of all liquid fueled trucks, annual unit consumption in the case of gasoline-driven trucks has been estimated at three tons.

Diesel trucks.- It is very likely that a large part of the civilian trucks which were requisitioned by the army consisted of medium and heavy trucks. Undoubtedly most of the heavy trucks were diesel engined, for diesel trucks were predominant among Germany's heavy vehicles. They were largely used in long distance road transportation, which was cut down severely immediately after the outbreak of war. It is likely, therefore, that the number of civilian medium and heavy trucks has been reduced considerably, and that, in particular, the number of heavy diesel trucks left for industrial uses is very small. The number of diesel trucks in civilian service has been estimated at 25,000 and it is assumed that 15-16,000 have been converted to substitute fuels and that the rest still use diesel oil. Annual per unit consumption is estimated at 3.5 tons.

Due in part to the fact that the German synthetic oil plants have been obliged to concentrate on the production of gasoline to the detriment of other products, diesel oil has been particularly in short supply in Germany.

Since May, 1943, SDKI (Sonderdieselkraftstoff I), a mixture of two parts gasoline and one part gas oil, has been used wherever fire risk does not prevent its employment.

Lubricating oil for road vehicles.- Lubricating oil requirements are calculated throughout as three per cent (by weight), of the motor fuel consumption of road vehicles.

Railways.- Though some minor reductions have been obtained by conversions to substitute fuels, the estimated total reduction of the oil requirements of the German railways is small.

Inland shipping.- In order to relieve the load on other elements of the transportation system, every effort has been made to increase the freight tonnage carried by inland shipping. It is reported that inland waterways carried over forty per cent more traffic in 1942, than in 1940. This was no doubt effected largely by more efficient organization and better utilization of shipping space. Some vessels have been converted to generator gas propulsion and in some cases motor barges have been used as dumb barges in tow of steam tugs.

Bunkers.- No exact information is available on Axis shipping tonnage used in 1943, in northern waters and in the Atlantic Ocean, but it is estimated that not less than two million gross tons were actually in use in 1943. As of December 1942,

approximately 72 per cent of all shipping was operated on coal, 21 per cent on diesel oil, and seven per cent on fuel oil.

The percentage of oil-burning ships in the total declined during 1943. Intelligence indicates that oil-using ships have been replaced wherever possible by coal-burning steamers. There are reports that even in cases of a local or temporary shortage of steamers, available motor-ships have not been used. In very few cases have diesel ships been converted to coal. The use of oil in shipping could not be eliminated altogether, however, since insufficient coal-burning tonnage was available to meet all needs for tankers and certain other types of vessels. Intense use has also been made of sailing vessels with auxiliary motors, especially in the trade with Denmark.

On the whole, it has been assumed that diesel and fuel oil requirements for shipping in 1943 have fallen to 100,000 metric tons. Lubricating oil requirements, including those for coal-burning steamers, have remained unchanged.

Commercial aviation.- In 1941 the German Lufthansa flew 6,970,000 kilometers (4,328,370 miles). It is believed that in 1942 and 1943 the company's activities between Germany and neutral and occupied countries expanded considerably. Consumption for 1943 is estimated to have been 20,000 tons of aviation gasoline.

Agriculture.- There were approximately 130,000 agricultural tractors in use in 1943.

The stringency of oil supplies prevented the farmers from using their tractors with the same degree of intensity as before. The use of tractors for other purposes than cultivation and harvesting, such as for general road haulage and as a source of stationary power, was prohibited in January 1943. Estimated unit requirements per tractor have therefore been reduced by about twenty per cent. This conforms with a statement in Oel und Kohle, May 1943, according to which allocations of mineral oils to agriculture were cut by about twenty per cent on March 27, 1943.

Estimates for the requirements of other agricultural machines have also been reduced by twenty per cent. The program of converting these machines to other sources of power has probably not made satisfactory progress. Moreover, 850,000 farms do not have electric power connections and depend largely on oil engines.

As "Sonderdieselkraftstoff I" has been widely used since May 1943, one quarter of the diesel oil requirements have probably been supplied in the form of gasoline Reports also indicate that to some extent gasoline has been used instead of power kerosene.

Agricultural lubricating oil requirements have been little reduced. Increased consumption of substitute driven engines has probably more than absorbed the savings resulting from the reduced utilization of oil driven units.

Industry.- Substantial reductions are estimated in the quantities of special benzines, gasoline, and gas oil in industry where considerable quantities are normally used as solvents and in numerous other industrial processes. A similar reduction is suggested for the estimated requirements of light motor fuel in movable and stationary industrial equipment. A considerable part of the demand was, and probably still is, supplied in the form of liquid gas.

It is again estimated that, as "Sonderdieselkraftstoff I" is being used wherever possible, one quarter of the diesel oil requirements have been replaced by gasoline.

The estimated aviation gasoline and motor fuel (liquid gas) requirements for the preliminary running in of engines at the factories have been somewhat reduced. It is known that fuel rations for this purpose have been cut and that substitute fuels, especially city gas, are used wherever possible. Aviation gasoline requirements for the testing of airplane engines and for test flights have been considered as military consumption.

The industrial use of fuel oil has been estimated at fifty per cent of the 1938 figure.

In October 1942 new stringent regulations were imposed on the use of lubricating oils and greases. Lubricants may be used only for vital war uses and allocations have to be calculated in such a way as to enforce the greatest possible economy. Consumers who used up to 600 kilograms in 1941 could obtain the same quantity in 1942 and in 1943. However, consumers who used more than 600 kilograms in 1941 could obtain in 1942 only 600 kilograms plus fifty per cent of the excess quantity required over and above 600 kilograms. Intelligence also indicates that the greatest efforts have been made to economize in the use of processing oils. On the other hand, since January 1943, fifty per cent new lubricants have been given without ration cards in exchange for old lubricants delivered to reclaiming plants. Up to that time only forty per cent new oil had been given in exchange, and for half the quantity (twenty per cent) ration cards had to be given up. As of January 1944 it was decreed that formal applications for rations must be made by any consumer using over 60 kilograms of lubricants per year.

Weighing all these factors, it has been estimated that industrial consumption of lubricating oil was reduced to 400 000 tons in 1943.

Household.- Kerosene rations for lighting and cooking for households without gas or electricity have been kept at the 1942 level. The air raids on Germany led, in many cases, to an interruption of utility services and in many cases compelled the Reichsstelle für Mineralöl (Reich Board for Mineral Oils) to raise its allocations of kerosene for essential cooking and lighting. The 1943 estimates for household requirements of kerosene have therefore been placed at 60,000 tons.

5.2.3 Summary of Estimated Consumption 1943 as Compared to 1938

ESTIMATED INDUSTRIAL AND CIVILIAN CONSUMPTION OF LIQUID FUELS AND LUBRICANTS IN GERMANY, 1943 (a)

Figures in Metric Tons

	Light Motor Fuel		Total	Kerosene	Lubricants	Gas Oil	Fuel Oil	Total
	Liquid	Bottled Gas						
Motorcycles	65,000	-	65,000	-	2,000	-	-	67,000
Private Cars	105,000	9,000	114,000	-	4,000	-	-	118,000
Busses	16,000	54,000	70,000	-	3,000	21,000	-	94,000
Trucks	374,000	205,000	579,000	-	43,000	57,000	-	679,000
Total Road Transport	560,000	268,000	828,000	-	52,000	78,000	-	958,000
Railways	-	20,000	20,000	-	27,000	37,000	-	84,000
Inland Shipping and Fishing	25,000	-	25,000	-	13,000	82,000	30,000	150,000
Bunkers	-	-	-	-	8,000	55,000	45,000	108,000
Commercial Aviation	20,000(b)	-	20,000(b)	-	1,000	-	-	21,000
Agriculture	90,000	-	90,000	55,000	44,000	160,000	-	349,000
Industry	220,000	25,000	245,000	-	400,000	155,000	200,000	1,000,000
Household	-	-	-	60,000	-	-	-	60,000
GRAND TOTAL - Metric Tons	915,000	313,000	1,228,000	115,000	545,000	567,000	275,000	2,730,000
GRAND TOTAL - Barrels	7,777,500	2,660,500	10,438,000	908,000	3,815,000	4,082,400	1,787,500	21,031,400

ESTIMATED INDUSTRIAL AND CIVILIAN CONSUMPTION OF LIQUID FUELS AND LUBRICANTS IN GERMANY, 1938 (a)

Figures in Metric Tons

	Light Motor Fuel(c)	Kerosene	Lubricants	Gas Oil(d)	Fuel Oil(d)	Total
Motorcycles	315,000	-	9,000	-	-	324,000
Private Cars	1,190,000	-	35,000	-	-	1,225,000
Busses	225,000	-	9,000	95,000	-	229,000
Trucks	1,294,000	7,000	50,000	395,000	-	1,746,000
Total Road Transport	3,024,000	7,000	103,000	490,000	-	3,624,000
Railways	2,000	-	27,000	65,000	-	94,000
Inland Shipping	10,000	-	10,000	92,000	25,000	137,000
Bunkers	-	2,000	11,000	230,000	647,000	890,000
Commercial Aviation	30,000	-	1,000	-	-	31,000
Agriculture	40,000	45,000	50,000	210,000	-	345,000
Industry	335,000	-	369,000	558,000	401,000	1,663,000
Household	-	116,000	-	60,000	40,000	216,000
GRAND TOTAL - Metric Tons	3,441,000	170,000	571,000	1,705,000	1,113,000	7,000,000
GRAND TOTAL - Barrels	29,248,500	1,343,000	3,997,000	12,276,000	7,234,500	54,099,000

(a) Including Austria and other areas within the boundaries of the Greater Reich as of 1943.
(b) Aviation gasoline includes requirements for air transportation between Germany and occupied countries.
(c) Includes alcohol, benzol, bottled gas and some substitute fuels.
(d) Includes tar oil used as gas oil or fuel oil.

PREWAR IMPORTS OF PETROLEUM PRODUCTS, GERMANY

Figures in barrels

Country	1935	1936	1937	1938 (a)
Crude Petroleum (b)				
Mexico	2,071,000	2,440,000	2,290,000	1,365,000
Netherlands West Indies	-	-	-	530,000
Rumania	137,000	209,000	-	158,000
United States	1,247,000	905,000	1,838,000	1,469,000
Venezuela	-	416,000	1,020,000	1,896,000
Others	152,000	57,000	-	-
Total	3,607,000	4,027,000	5,148,000	5,418,000
Gasoline				
Belgium	5,000	36,000	3,000	12,000
Iran (Persia	44,000	463,000	372,000	472,000
Malaya - British	9,000	10,000	13,000	9,000
Mexico	4,000	172,000	101,000	344,000
Netherlands, The	409,000	122,000	12,000	172,000
Netherlands East Indies	367,000	771,000	1,101,000	1,269,000
Netherlands West Indies	1,727,000	2,368,000	1,987,000	3,437,000
Peru	300,000	254,000	909,000	697,000
Poland	-	26,000	15,000	1,000
Rumania	4,483,000	4,822,000	2,957,000	2,746,000
USSR	1,299,000	620,000	153,000	5,000
United Kingdom	898,000	225,000	77,000	129,000
United States	861,000	1,370,000	1,295,000	2,242,000
Others	1,000	1,000	-	-
Total	10,407,000	11,260,000	8,995,000	11,535,000
Kerosene				
France	-	-	-	10,000
Iran (Persia)	42,000	10,000	-	-
Netherlands West Indies	140,000	63,000	336,000	91,000
Rumania	109,000	259,000	15,000	67,000
USSR	165,000	137,000	23,000	4,000
United Kingdom	47,000	15,000	-	-
United States	81,000	9,000	-	-
Total	584,000	493,000	374,000	172,000
Lubricating and Transformer Oils				
Belgium	-	1,000	2,000	4,000
Czechoslovakia	8,000	6,000	9,000	7,000
France	70,000	2,000	1,000	1,000
Netherlands West Indies	966,000	1,000,000	1,085,000	1,189,000
Norway	8,000	1,000	3,000	2,000
Poland	-	4,000	5,000	-
Rumania	80,000	79,000	83,000	63,000
Switzerland	1,000	2,000	2,000	2,000
USSR	631,000	573,000	491,000	232,000
United Kingdom	2,000	8,000	11,000	17,000
United States	1,296,000	1,028,000	1,215,000	1,198,000
Others	2,000	-	1,000	1,000
Total	3,064,000	2,704,000	2,908,000	2,716,000
Gas Oil and Diesel Oil				
Belgium and Luxemburg	-	-	68,000	47,000
France	69,000	47,000	-	8,000
Iran (Persia)	301,000	179,000	716,000	862,000
Mexico	-	-	-	990,000
Netherlands, The	28,000	44,000	42,000	8,000
Netherlands East Indies	-	-	-	61,000
Netherlands West Indies	2,541,000	1,923,000	2,190,000	3,529,000
Peru	334,000	367,000	312,000	349,000
Poland	-	2,000	3,000	7,000
Rumania	639,000	1,868,000	774,000	469,000
USSR	985,000	1,063,000	1,525,000	321,000
United Kingdom	161,000	30,000	42,000	-
United States	1,342,000	2,511,000	2,964,000	3,982,000
Others	2,000	6,000	8,000	7,000
Total	6,402,000	7,840,000	8,644,000	10,639,000
Fuel Oil				
Estonia	-	-	208,000	210,000
Iran (Persia)	5,000	-	38,000	91,000
Mexico	-	-	-	364,000
Netherlands West Indies	2,086,000	2,348,000	1,914,000	1,904,000
Rumania	76,000	63,000	348,000	133,000
United Kingdom	-	-	14,000	-
United States	2,000	116,000	112,000	-
Others	4,000	-	1,000	-
Total	2,173,000	2,527,000	2,635,000	2,702,000
Tarry, Paraffinic Residues				
Mexico	1,000	-	-	23,000
Netherlands, The	13,000	6,000	6,000	6,000
Netherlands West Indies	1,993,000	2,464,000	2,945,000	3,428,000
Rumania	10,000	103,000	17,000	7,000
USSR	5,000	12,000	-	-
United States	7,000	3,000	-	-
Others	4,000	2,000	1,000	4,000
Total	2,033,000	2,590,000	2,969,000	3,468,000
GRAND TOTAL	28,270,000	31,441,000	31,693,000	36,651,000

Figures in metric tons

Country	1935	1936	1937	1938
Petroleum Asphalt				
Austria	679	38	-	-
Belgium	982	2,841	2,099	5,012
Czechoslovakia	-	127	36	-
Egypt	-	-	100	14
France	731	-	450	1,080
Mexico	25,124	8,705	8,731	1,307
Netherlands, The	8,540	5,575	1,151	1,195
Poland	402	1,753	2,791	248
Rumania	14,778	4,909	9,294	2,351
USSR	2,403	-	-	-
United Kingdom	3,335	601	603	5,984
United States	2,080	1,151	437	376
Others	315	148	-	19
Total	59,369	25,848	25,692	17,586
Natural Asphalt - Solid				
Brazil	-	100	-	-
British America	2,891	1,936	2,679	1,707
Cuba	47	392	588	207
Italy	-	-	-	343
Mexico	-	-	114	29
Syria and Lebanon	25	-	6	12
United Kingdom	37	-	-	23
United States	4,159	1,930	2,983	2,417
Others	4	26	-	-
Total	7,163	4,384	6,370	4,738
Asphaltic Mastic, Etc.				
United States	311	111	x	x
Others	1	-	x	x
Total	312	111	118	68
Paraffin Wax, Crude				
Belgium			29	47
Burma			-	199
France			-	55
India, British			1,296	2,209
Iran (Persia)			-	30
Japan			2	27
Netherlands, The			24	4
Netherlands East Indies			1,040	1,533
Netherlands West Indies			112	13
Poland			697	1,089
Rumania			730	249
Switzerland			21	-
USSR			1,283	651
United Kingdom			1,146	819
United States			11,229	2,579
Others			-	9
Total			17,609	9,513
Ozokerite, Crude, Unmelted				
Belgium	-	-	169	312
Italy and possessions	42	4	132	-
Poland	121	77	183	206
Rumania	340	490	452	273
USSR	71	77	-	-
United States	1,011	1,949	1,903	2,082
Others	38	61	131	9
Total	1,623	2,658	2,970	2,882
GRAND TOTAL	68,467	33,001	52,759	34,787

X = Unknown
- = None

(a) Figures for 1938 include Austria from April 1st and Sudetenland from October 1st.
(b) Converted by varying factors, according to the specific gravity of the crude of each country of origin.

PREWAR EXPORTS OF PETROLEUM PRODUCTS, GERMANY

Figures in barrels

Country	1935	1936	1937	1938(a)
Gasoline				
Belgium	19,000	-	-	-
Czechoslovakia	7,000	2,000	2,000	1,000
Denmark	187,000	36,000	22,000	18,000
Estonia	4,000	1,000	3,000	-
Finland	24,000	15,000	-	3,000
Italy and possessions	1,000	107,000	30,000	4,000
Latvia	3,000	6,000	4,000	5,000
Netherlands, The	2,000	10,000	-	-
Norway	17,000	15,000	6,000	8,000
Sweden	42,000	98,000	24,000	5,000
Switzerland	15,000	15,000	9,000	2,000
United Kingdom	124,000	57,000	-	-
Others	16,000	5,000	5,000	2,000
Total	461,000	367,000	105,000	48,000
Kerosene				
Denmark	12,000	2,000	x	-
Finland	21,000	2,000	x	-
Netherlands, The	9,000	-	x	-
Sweden	8,000	5,000	x	-
Others	10,000	-	x	-
Total	60,000	9,000	1,000	-
Lubricating Oil				
Australia	19,000	25,000	28,000	25,000
Austria	11,000	17,000	12,000	-
Belgium	11,000	8,000	14,000	9,000
British India	21,000	31,000	57,000	13,000
Czechoslovakia	32,000	39,000	50,000	45,000
Denmark	27,000	32,000	24,000	27,000
Egypt	17,000	4,000	8,000	6,000
Finland	25,000	41,000	32,000	39,000
France	-	-	5,000	11,000
Hungary	-	-	9,000	10,000
Italy and possessions	23,000	4,000	5,000	7,000
Japan	12,000	14,000	14,000	6,000
Lithuania	-	-	11,000	10,000
Netherlands, The	57,000	57,000	55,000	78,000
Norway	16,000	18,000	20,000	19,000
Spain and possessions	31,000	13,000	-	-
Sweden	82,000	64,000	87,000	79,000
Switzerland	35,000	18,000	22,000	22,000
United Kingdom	92,000	160,000	129,000	116,000
United States	28,000	30,000	16,000	11,000
Yugoslavia	-	-	5,000	10,000
Others	113,000	146,000	141,000	130,000
Total	652,000	721,000	744,000	673,000
Gas Oil and diesel oil				
Netherlands, The	22,000	-	-	-
Sweden	11,000	12,000	30,000	116,000
United Kingdom	36,000	-	-	-
Others	179,000	82,000	124,000	713,000
Total	248,000	94,000	154,000	829,000
Fuel Oil				
Belgium	19,000	-	-	-
Netherlands, The	143,000	152,000	-	-
United Kingdom	7,000	27,000	7,000	66,000
Others	124,000	146,000	3,000	28,000
Total	293,000	325,000	10,000	94,000
Terry Paraffinic Residues				
Austria	32,000	30,000	51,000	-
Czechoslovakia	50,000	24,000	24,000	21,000
Denmark	107,000	139,000	151,000	150,000
Finland	7,000	3,000	4,000	-
Italy and possessions	33,000	-	-	35,000
Netherlands, The	-	-	17,000	2,000
Norway	19,000	9,000	10,000	11,000
Spain and possessions	17,000	16,000	-	-
Sweden	11,000	4,000	1,000	-
Switzerland	79,000	54,000	53,000	57,000
Others	13,000	9,000	9,000	14,000
Total	368,000	288,000	320,000	290,000
GRAND TOTAL	2,063,000	1,804,000	1,334,000	1,934,000

Figures in metric tons

Country	1935	1936	1937	1938
Asphaltic Mastic, etc.				
Belgium	333	293	248	131
Danzig	398	308	155	348
French Morocco	405	410	-	-
Italy	-	-	146	73
Netherlands, The	238	221	225	148
Norway	775	774	757	530
Sweden	3,535	2,414	2,365	1,621
Turkey	-	-	324	64
Union of South Africa	-	-	425	1,010
United Kingdom	4,378	4,490	5,173	4,873
United States	514	985	625	-
Others	712	903	891	173
Total	11,288	10,798	11,334	8,971
Natural Asphalt, Solid				
United Kingdom	3,466	7,006	7,056	6,409
Others	652	871	704	700
Total	4,118	7,877	7,760	7,109
Montan Wax, Bitumin				
Belgium	x	x	62	32
Bulgaria	x	x	44	44
Canada	x	x	143	124
Czechoslovakia	400	228	350	-
France	x	x	40	52
Hungary	x	x	57	49
Italy and possessions	368	141	413	162
Japan	x	x	141	-
Netherlands, The	x	x	70	53
Poland	618	586	443	456
Rumania	x	x	74	81
USSR	x	x	121	123
United Kingdom	488	566	543	474
United States	1,831	1,752	2,129	1,518
Yugoslavia	x	x	68	26
Others	822	954	331	239
Total	4,527	4,227	5,029	3,433
Ozokerite				
Belgium	39	x	x	x
United States	200	x	x	x
Others	55	x	x	x
Total	294	35	26	10
Petroleum Asphalt				
Austria			3,671	-
Australia			-	528
Belgium			190	127
Bulgaria			170	328
Danzig			469	595
Denmark			10,690	7,960
Czechoslovakia			2,367	3,239
Hungary			2,265	1,326
Italy			247	250
Latvia			605	747
Netherlands, The			6,001	2,245
Norway			1,657	1,068
Sweden			273	374
Switzerland			1,070	2,170
Turkey			612	1,915
Yugoslavia			130	566
Others			556	593
Total			30,973	24,031
GRAND TOTAL	20,227	22,937	55,122	43,554

X = Unknown
- = None

(a) Figures for 1938 include Austria from April 1st and Sudetenland from October 1st.

The tables on page 221 give the most reliable estimates available of the civilian and industrial consumption of liquid fuels and lubricants in Germany in 1943 as compared to 1938, the last prewar year. Inasmuch as the current intelligence on 1943 referred largely to the Greater Reich, the area covered by these estimates include Austria, Alsace-Lorraine, Luxembourg, Sudetenland, Danzig and Western Poland. However, these areas, even in normal times, represent a minute consumption as compared to that of Germany proper. Austria, the most important of these areas, had a total annual peacetime consumption of only about 5½ per cent (a) of the total 1938 consumption figure shown in the table on page 221.

In comparing the table for 1943 to that for 1938, it will be seen that the total consumption of light motor fuel was reduced to approximately 36 per cent of the 1938 level, kerosene to approximately 68 per cent, gas oil to 33-1/3 per cent, and fuel oil to 25 per cent. Lubricants, however, stood at about 96 per cent of their 1938 consumption level but the total for all products amounts to only 39 per cent. Further reduction, only partially compensated by conversions to substitute fuels and the relinquishing of occupied territories, have been forced upon the German economy during 1944.

5.3 SUPPLIES

The estimated total production of liquid fuels and lubricants and their substitutes, as of the end of 1943, from resources within the boundaries of Germany proper is summarized below.

Estimated Annual Production on 1943 Basis

Source	Finished Products Metric Tons	Barrels (f)
Products from indigenous crude	630,000(b)	4,725,000
Products from synthetic plants	4,237,000(c)	31,777,500
Products refined from HTC tars	1,500,000(c)	11,250,000
Products refined from LTC tars	380,000(c)	2,850,000
Alcohol	200,000(d)	1,500,000
Substitute fuels, solid and gaseous	625,000(e)	4,687,500
Total	7,572,000	56,790,000

The above rather broad estimates do not reflect declines in current production rates caused by Allied attacks and bomb damage. Though the major production is that of costly and comparatively uneconomical synthetics and substitutes it appears that Germany's internal productive capacity was sufficient to provide for her full peacetime civilian and industrial requirements, based on the estimates for 1938 set forth in the preceding section. Since her minimum civilian requirements, based on the estimates of 1943 consumption, are less than half that quantity the major part of the production, plus imports from occupied or satellite areas, has of course gone to the armed forces. It is again emphasized that figures for consumption and for production are largely estimates and that it is further assumed that they are of the same relative degree of accuracy.

Production of indigenous crude oil and facilities for refining this oil are discussed in the Producing and Refining sections of this report. Details of the

(a) See the report "Petroleum Facilities of Austria" of this series.
(b) On the basis of approximately 700,000 tons of crude per year and allowing approximately 10 per cent for refinery fuel and losses.
(c) Including benzol and liquid gas.
(d) Arbitrary estimate based on 1937-1938 figure.
(e) Estimated quantity of liquid fuel replaced by substitutes.
(f) Approximately. At average conversion factor of 7.5 barrels per metric ton.

Corrigendum:

The paragraph 5.4.1 General, on page 225, should read:

"Apart from the three main sources of liquid fuel supplies, namely, crude oil production, imports of crude and refined oil, and synthetic production, Germany makes use of certain by-products of these processes and also some other home-produced liquid fuels not of mineral oil or synthetic origin. The most important among these are alcohol, benzol, and liquid gas."

estimates of production by synthetic, HTC and LTC plants, are presented in the Synthetic section.

The use of alcohol as a motor fuel in Germany is discussed under "Substitute Fuels-Liquid" on pages 225-226. Estimates of quantities available as fuel are rather difficult to establish and in the future agricultural products could, no doubt, be better utilized as food for the German people. However, considerable quantities of alcohol now being consumed in the manufacture of explosives might be available for civilian industrial uses and perhaps for use as fuel upon the termination of the war and the elimination of the munitions industry.

The principal solid and gaseous substitute fuels and their production and use in Germany are discussed in section 5.5, page 228. While the use of these substitutes has been greatly expanded as a war measure they were known and used to some extent in normal times before the war.

5.4 SUBSTITUTE FUELS - LIQUID

5.4.1 General

The principal solid and gaseous substitute fuels and their production and use in Germany are discussed in section 5.5, beginning on page 228. While the use of these substitutes has been greatly expanded as a war measure they were known and used to some extent in normal times before the war.

5.4.2 Alcohol

In 1930, the compulsory admixture of alcohol with the light motor fuels was legally established in order to give financial aid to distressed potato farmers by opening a new and remunerative market for their surplus crops. The amount of alcohol to be mixed with the motor fuel, originally fixed at 2½ per cent, was progressively raised until it reached 10 per cent in 1937. It was then reduced to approximately 8½ per cent, at which figure it remained until the spring of 1939. The law required importers or producers of gasoline, motor benzol, and kerosene to purchase alcohol from the State Ethyl Alcohol Monopoly up to a certain percentage by weight of their clearance of those products from customs or bonded warehouses. Power alcohol was exempt from taxes applicable to other forms of motor fuel.

The following table shows the published statistics on Germany's consumption of ethyl and methyl alcohol in motor fuel, and consumption of ethyl alcohol in motor fuel compared with consumption for all purposes from 1935 through the first quarter of 1938.

Alcohol Consumption as Motor Fuel

Figures in Hectoliters

	Ethyl Alcohol		Methyl Alcohol	Total Fuel Alcohol
	For all Purposes	As Motor Fuel	as Motor Fuel	Consumption
1935	3,614,000	2,100,000	274,000	2,374,000
1936	3,894,000	1,823,000	653,000	2,476,000
1937	4,056,000	1,594,000	797,000	2,391,000
1938 (January-March only)	Not Available	397,000	199,000	596,000

In the spring of 1939 the program for the compulsory admixture of alcohol in motor fuel was revised. Germany was divided into two major distribution areas lying respectively north and south of a line joining Bentschen in the east (52° 16' N, 15° 55' E) and Bentheim in the west (52° 19' N, 7° 10' E). In the area north of this line, which accounted for about one-third of Germany's motor fuel consumption, the regulation requiring the admixture of alcohol remained unchanged. In the southern area the admixture of alcohol was completely abolished, and tetraethyl lead was to be added instead.

This reorganization resulted in a sharp drop in the consumption of alcohol for fuel purposes and was necessitated by the increasing difficulty of obtaining adequate supplies of ethyl alcohol. This stringency of supply was due, in part, to the rising demand for motor fuel, but more particularly to the increasing consumption of alcohol for industrial and other non-fuel purposes, such as in the munitions industry. The cost of alcohol made from potatoes was high as compared to other fuels and the growth of the movement for increased home food production tended to bring into disfavor the conversion of agricultural products into alcohol. As all these considerations have been accentuated by the course of the war it is likely that even less alcohol has become available for use as motor fuel.

5.4.3 Benzol

An important part in meeting motor fuel requirements is played by German production of benzol, which amounted to 485,000 tons in 1937 and rose to 546,000 tons in 1938. Consumption of benzol for motor fuel purposes amounted to slightly over 400,000 tons in each of these two years.

The production of benzol stands in close relation to the production of coke and improvements in technique are said to have increased the benzol yield from 0.9 per cent of coke output in 1929 to 1.2 per cent in 1939, an increase of over 30 per cent. A portion of the benzol production is employed in industrial processes, and of the larger portion that is used as motor fuel, part is used in the manufacture of aviation gasoline and part is used directly as automotive fuel. Quantities used in or replacing gasoline are included in the production estimates in the Synthetic section of this report.

A leading part in the blending and distribution of motor fuels blended from benzol is played by the Benzol-Verband of Bochum, and the Benzol Vereinigung des Ostens G.m.b.H.

5.4.4 Liquid Gas

Propane and butane are by-products of the synthetic oil industry, though some quantities are also obtained in the refining of mineral oil. These gases consist of the lowest boiling-point fractions of the oil and because of their high volatility are gaseous at ordinary pressures and temperatures. Since they become liquid under very low pressure (2 to 3 atmospheres), they are commonly referred to as liquid gas. In liquid form they may be distributed in relatively light steel cylinders or bottles and provide a very satisfactory motor fuel.

The liquid gas distributed as motor fuel in Germany is a mixture of propane and butane and is commonly designated as Treibgas. The distribution of this fuel is monopolized by the A.G. der Kohlenwertstoffverbände, the Benzin-Benzol Verband, and I.G. Farbenindustrie A.G. Motor vehicles using Treibgas usually carry at least two bottles while busses carry from three to five bottles. Trucks used in long distance transportation carry up to ten bottles. A small number of vehicles have been equipped with steel containers holding about 300 liters of liquid gas each. These vehicles can refill very rapidly, but they can only be used where special filling stations are available. The exchange of an empty bottle for a full one takes about ten minutes.

Liquid gas is usually distributed in steel bottles holding 78 liters or some 33 kilograms of liquid gas (1,315 millimeters long and 317 millimeters in diameter).

The weight of the bottle itself is 40 kilograms. The gasoline equivalent of the liquid gas contained in one bottle is about 56 liters. Occasionally a larger bottle holding 108 liters or 46 kilograms of liquid gas are used.

Instruction for the installing and use of Treibgas apparatus on motors are set forth in a very useful handbook entitled "Treibgas-Fibel", written by Gottfried Riedel and Eduard Schieda and published in 1942 under the auspices of the Zentralbüro für Mineralöl. This handbook also contains data on allowable filling pressures for the bottles. Test pressures of 26 atmospheres, or something over 1.5 times the vapor pressure of the liquid at 40° Centigrade, are required, but actually most of the bottles are constructed to stand pressures of up to around 100 atmospheres. Bottles must be painted red, either partially or wholly. The following table lists the principal German manufacturers of these steel bottles.

MANUFACTURER	ADDRESS	MANUFACTURER'S MARK	TEST-MARK
Deutsche Röhrenwerke A.G. Werk Poensgen	Düsseldorf		
Deutsche Röhrenwerke A.G. Werk Thyssen	Dinslaken		G
Mannesmann-Röhrenwerke Werk Rath	Düsseldorf-Rath		G
Mannesmann-Stahlblechbau A.G.	Abteilung Langschede Ruhr		
Berlin-Seegefelder Industrie A.G.	Falkensee b/Berlin		G
Wilhelm Siebel	Freudenberg Kr. Siegen	WS	
Hager & Weidmann A.G.	Bergisch-Gladbach b/Köln	-	
Carlshutte, Maschinen-und Stahlbau G.m.b.H.	Waldenburg-Altwasser		
Julius Pintsch K.G.	Berlin O 17	Old: or New:	
Eschebach-Werke A.G.	Radeberg b/Dresden	ESCHEBACH	G_2
Mauser-Werke K.G. Werk Waldeck	Waldeck Bezirk Kassel		M

The total number of liquid gas using vehicles in June, 1943 was estimated at 100,000, as compared with 33,000 in 1939 and 4,000 in 1936. Of the 100,000 vehicles using liquid gas, an estimated 15,000 are private cars, 5,000 busses, and about 80,000 trucks. Only a small number of these trucks, probably not more than 5,000, were formerly diesel engined, since the conversion of diesel vehicles to liquid gas presents great technical difficulties. Not until April 1943 was it reported that it was technically possible to convert the largest part of the diesel busses to liquid gas.

Because liquid gas is rationed and because it is mostly used by trucks with up to three tons carrying capacity, there is no reason to assume that the unit consumption of liquid gas using vehicles is very different from that of liquid fueled vehicles.

The rate of conversion since the autumn of 1942 has slowed up considerably, as it appears that the increase in supplies fell behind the increase in demand. In the autumn of 1942 it was actually decreed that trucks of three tons and over using liquid gas should be converted to the use of solid fuels. There is, however, reason to believe that no large scale re-conversion to substitute fuel actually took place though new conversions to liquid gas were delayed. However, permission could still be obtained to convert automobiles used by doctors and for other vital services to liquid gas. The rate of conversion, so it was stated, was limited by the availability of equipment and of fuel. In 1943 liquid gas was referred to as "Germany's third fuel", after natural or synthetic motor fuel and after benzol. This would indicate that the consumption of liquid gas as a motor fuel was below 550,000 tons (the estimated output of motor benzol), though production is much larger.

The expansion of the synthetic oil industry increased the quantities of liquid gas produced, but competing vital uses such as synthetic rubber, aviation gasoline and other war products limited the amount of gas which could be allocated for use as motor fuel. Estimates of the quantities of liquid gas going directly or indirectly into motor fuels are contained in the estimated total production of the synthetic oil plants in section 4.4 of this report. The number of steel bottles available at any one time also could have a limitative effect. The major limiting factor, of course, is the sensitivity of the synthetic oil industry to Allied air attacks.

5.5 SUBSTITUTE FUELS - SOLID AND GASEOUS

5.5.1 General

Substitute fuels in this catagory comprise all solid and gaseous substitutes, with the exception of liquid gas (propane and butane), which are used to replace liquid fuel in internal combustion engines for the propulsion of road vehicles, ships, locomotives, tractors and stationary machines.

Gas generators and other apparatus for the conversion of automobile engines and other internal combustion machines to the use of substitute fuels were used in Europe even prior to the war. The outbreak of the war, with its diversion of normal fuel supplies, caused a great expansion in the conversion of vehicles to the use of substitute fuels, particularly in the non-petroleum producing countries.

The kind of substitute fuels used varies from country to country and district to district. Although in the early stages of the war, wood and charcoal (and anthracite, wherever available) were the main solid substitute fuels, the scarcity of these fuels, coupled with limitations in distribution and transportation, has compelled most countries to develop the use of alternative substitutes such as peat, lignite, and bituminous coal. Information on the efficiency of such fuels and on the quantities needed to replace one kilogram of motor fuel is scanty and contradictory. Moreover, great variations in the quality of even similar kinds of fuels are unavaoidable. Some of the basic technical data for the most commonly used substitutes is given in the following table.

CHARACTERISTICS OF SOLIC GENERATOR FUELS(a)

	Wood	Charcoal(b)	Peat	Lignite			Pro-(b) lignite coke	Bit. Coal l.t.c. coke	Anthra-cite
				Lumps	Briquettes	l.t.c. coke			
Calorific value Cal/kg.	3,700	7,630	3,500	6,800	4,800	5,500	7,100	7,000	8,000
Kg. per cubic m	350	240	300	650	750	630	-	600	800
Energy content per cubic meter (million Cal/m)(c)	1.3	1.83	1.05	3.9	3.6	3.5	-	4.2	6.4
Ash content (weight per cent)	0.8	-	2.2	up to 10	up to 10	10-12	-	8-9	4
Sulphur content (weight per cent)	-	-	up to 0.15	1.0	0.5-2	1-4	-	0.5-1	0.7-1.5
Water content (weight per cent)	25	-	25	4-10	13-16	10	-	6	2-3
Gaseous content (weight per cent)	-	-	-	7-20	40-45	15-18	-	6-10	7
Usual size (in millimeters)	50 x 80	-	25-100	20-50	150 gm	5-20	-	10-18	10-18
1 kg. of gasoline replace by-- kg. of substitutes	3.5(c)	2.2(d)	3.6	2.5	2.9	2.7	1.9	2.3	1.8

(a) Most data taken from "Generator Jahrbuch, 1942". Data probably relates to the best quality of each of the various kinds of fuel.
(b) Information obtained from other sources.
(c) 1 kg. of diesel oil is replaced by about 4 kg. of wood.
(d) About 4 kg. of wood are needed to produce 1 kg. of charcoal. 1 kg. of gasoline replaced by about 2 kg. of carbide.

In the case of gaseous substitute fuels, the following figures (a) show the approximate relationships.

	Pressure (atmosphere)	Weight		Gasoline (kg.)	Equivalent Liters
		Cylinder (kg.)	Gas (kg.)		
Methane	200-340	52	13	13	17.3
City gas	200	70	6	5	6.7

5.5.2 Efficiency of Substitute Driven Vehicles

The manifold technical problems encountered in the use of gaseous and solid substitute fuels need not be discussed herein, but mention should be made of a few outstanding difficulties. Generally the loss of power in a motor amounts to between one-fifth and one-quarter. In addition, the pay load of road vehicles is reduced by the size and weight of the generator equipment and fuel. The direct loss in carrying capacity of each vehicle averages some 33 per cent. The operation of generator vehicles is considerably more difficult for drivers than is the operation of conventional vehicles. Cylinder wear is increased and engine life is much reduced and breakdowns are more frequent. More lubricating oil is needed per mile.

In addition, there are a number of important, though less direct, economic effects arising from the introduction of substitute fuels. A completely new distribution system for gaseous and solid substitutes must be organized, which increases the over-all strain on transportation and manpower. In the case of gaseous fuels, expensive installations have to be built for the compression of the gas and large quantities of steel are needed for the manufacture of steel bottles or containers.

Although the technical problems encountered in the conversion of carburetor engines to gaseous substitutes and to wood and charcoal have more or less been solved, the use of other substitutes, such as peat and lignite, and the conversion of diesel engines to substitute fuels have not yet been completely mastered.

Because of the loss of power in converted engines it is often necessary to use liquid fuels for quick starting and uphill climbing. For diesel engines, a "diesel cum gas" system has been developed which requires the use of diesel oil, in addition to substitute fuels. With this system twenty to twenty-five per cent of normal requirements of diesel oil are needed for long distance hauls and about forty-five per cent for city driving.

5.5.3 Production and Distribution of Solid and Gaseous Substitute Fuels in Germany

Information on the development and utilization of gaseous and solid substitute fuels in Germany is confusing and contradictory. However, certain broad trends are apparent. Up until 1942 the use of substitute fueled motors in the Reich, despite the fact that an elaborate program had been drawn up, lagged far behind that of other European countries. As long as Germany maintained reasonable hopes for the conquest of large oil fields in the Caucasus, the use of cumbersome generator motors was not pushed energetically. Since the autumn of 1942, however, Germany has bent all efforts to convert road vehicles and agricultural engines, inland shipping, industry, and railways to the use of solid and gaseous fuels, and a large expansion in the use of substitute fueled motors has taken place.

In June 1942 the Zentralstelle für Generatoren (Central Board for Generators) was created and charged with the following functions: (1) to organize mass produc-

(a) Published by Dr. Egloff.

tion of simplified types of generators, (2) to supervise and direct the conversion of the majority of all liquid fueled engines, and (3) to provide for the supply and distribution of substitute fuels. One of the first steps taken by the Board was the reorganization of the Generatorkraft A.G. which since 1941 had held a distribution monopoly for substitute fuels.

As available supplies of wood were woefully inadequate for large scale conversion, greater reliance was placed on the use of coal and coke. Also, the Festkraftstoff A.G. was created to encourage and if necessary undertake the production of solid substitutes, especially from new materials.

In early 1943 the Central Board for Generators announced a program for expanding the use of gaseous fuels. The A.G. der Kohlenwertstoffverbände was to undertake the construction of a large number of high pressure gas filling stations while the bus companies were to provide themselves with low pressure gas stations. However, a filling station for the supplying of high pressure gas requires compressors, gas purifiers, cooling equipment, transformers, and high pressure storage tanks. Also, a large number of special high pressure steel cylinders or bottles are required to distribute the fuel. From two to six bottles, depending on the type of gas used and the size of each vehicle, are carried by each vehicle. When empty these bottles are exchanged for full ones (a). Therefore, the original scope of this program probably had to be seriously modified as the materials and manpower required for the construction of the filling stations and steel bottles became more urgently needed for the construction and repair of synthetic oil plants and other primary war programs.

Due to the tightening supply situation for all types of substitute fuels, it became necessary, in April 1943, to submit supplies and distribution of solid fuels to strict government control. Distribution was reorganized and the so-called Festkraftstoffkarte was introduced. The Festkraftstoffkarte prescribes for each user the kind of substitute fuel he may use and the filling station at which he may buy it. Each purchase must be registered on the card. Long distance road transportation was discouraged by limiting the validity of these cards to filling stations within 50 kilometers of the usual home location of the vehicles.

5.5.4 Consumption of Solid and Gaseous Substitute Fuels in 1943

Road transportation accounted for over three-fourths of the total consumption of substitute fuels and substitute fuels represented slightly more than two-fifths of the total fuel required by road vehicles during 1943. Substitutes are estimated also to have satisfied about one-sixth of the total fuel requirements for agriculture while the corresponding proportions in shipping and industry remained well below one-tenth.

The total number of German motor cars, busses and trucks in use in June 1943 probably did not exceed 530,000 vehicles, of which some 330,000 were trucks and busses, and 200,000 private cars. At the same time 650,000 motorcycles were probably still in use. Though exact information obviously is lacking, estimates based on all available data have been made of the number of vehicles operating on solid and gaseous substitute fuels in Germany and also of the quantities of liquid fuel saved by the use of these substitutes.

ESTIMATED NUMBER OF MOTOR VEHICLES IN GERMANY USING GASEOUS AND SOLID SUBSTITUTE FUEL AS OF JULY 1943 (b)

Private Cars Using			Busses Using			Trucks Using			Total Road Vehicles		
Solid Fuels	Gaseous Fuels	Total	Solid Fuels	Gaseous Fuels	Total	Solid Fuels	Gaseous Fuels	Total	Solid Fuels	Gaseous Fuels	Grand Total
8,000	2,000	10,000	2,000	1,000	3,000	105,000	12,000	117,000	115,000	15,000	130,000

(a) See pages 226-227 for further details concerning steel bottles.
(b) Excluding military vehicles.

ESTIMATED QUANTITIES OF LIGHT FUELS SAVED BY THE USE OF GASEOUS AND SOLID FUELS IN GERMANY, 1943 (a)
(Figures in Metric Tons)

Road Transport		Railways		Shipping	Agriculture		Industry		Total		
Light Motor Fuel	Gas Oil	Light Motor Fuel	Gas Oil	Gas Oil	Light Motor Fuel	Gas Oil	Light Motor Fuel	Gas Oil	Light Motor Fuel	Gas Oil	Grand Total
432,000	71,000	-	14,000	15,000	55,000	27,000	1,000	10,000	488,000	137,000	625,000

5.5.5 Private Motor Vehicles Using Solid and Gaseous Substitute Fuels

In June and September 1943 regulations were issued by the Reich Traffic Ministry requiring the conversion to substitute fuels of motor vehicles which consumed not more than .3 tons a year (passenger cars, taxis, small delivery cars, hearses) and which were needed for war-work. High pressure gas, charcoal, wood, and in exceptional cases and only if supplies are available, liquid gas might be used for cars with a cylinder capacity of less than two liters. For cars with a cylinder capacity of 2 to 3 liters any fuel except charcoal might be used. The use of large cars (cylinder capacity over 3 liters) was discouraged by the ruling that they can be converted only in exceptional circumstances. Cars are not allowed to use electricity, low pressure gas, acetylene gas, and trailer borne generators. The subsidies for conversion were raised from 25 per cent to 50 per cent of the cost. A light generator weighing between 35 and 100 kilograms is available for this conversion.

In view of the weight and bulk of gas flasks the number of private cars using gaseous fuel is very small.

5.5.6 Busses Using Solid and Gaseous Substitute Fuels

In June 1942 it was ordered that all suitable busses with 25 h.p. and over be converted to substitute fuels. High pressure gas was to be used if filling stations were available within 3 kilometers of the place where the vehicle was garaged. Otherwise, solid fuels were to be used. Exceptions were to be made only for busses used in long distance transportation on routes where no filling stations were available. According to the plans half of the total number of busses should use liquid gas and the other half city gas and generator fuel. Among the towns where busses are reported to have been converted to city gas are: Wiesbaden, Hannover, Nürnberg Frankfurt, Pirmasens, Kassel, Erfurt, Berlin and Posen.

Little information is available on the number of busses converted to solid substitute fuels. Also, many busses are believed to use liquid gas.

5.5.7 Trucks Using Solid and Gaseous Substitute Fuels

The number of trucks running on solid and gaseous substitute fuels by July 1943 is estimated at 105,000 and 12,000, respectively, or a total of 117,000. An additional 80,000 trucks probably use liquid gas and some 123,000 trucks were probably still running on light motor fuel and diesel oil.

It is tentatively estimated that of the 117,000 substitute fuel using trucks, 16,000 were formerly diesel engined and 101,000 were gasoline engined. Converted diesel trucks consume diesel oil to the extent of about one-third of their total fuel consumption (in terms of liquid fuel). Converted gasoline trucks need light motor fuel for quick starting and for uphill climbing and other driving where extra power is needed. It has been assumed that on an over-all basis 5 per cent of their total fuel consumption (in terms of liquid fuel) is still light motor fuel.

(a) Excluding military vehicles.

5.5.8 The Use of Generator Motors on Railroads

Very little information is available concerning the use of substitute fuels in rail cars and diesel locomotives in Germany. It is known, however, that a large number of gasoline-engined rail cars use liquid gas (a). As late as November 1942 the technical problem of converting diesel rail cars to substitute fuels had not been completely solved. The great horsepower of such rail car engines (200 to 650 h.p.) created serious problems. Normal truck generators could not be used and stationary generators were too bulky and weighty. Liquid gas was used by small and a few medium-sized diesel rail cars. It was planned to use solid substitute fuels together with diesel oil for the remaining medium-sized and large diesel rail cars and subsidies for such conversions were promised in September 1943.

The conversion of switching engines to solid fuels created another set of problems; in the course of normal operations the engines must stop frequently and pull greatly varying loads. Wood proved unsuitable for these engines, but some success has been achieved with l.t.c. lignite coke. Because of these difficulties, the production of new oil using switching engines was continued until June 1942.

It has been assumed that most of the rail car requirements of light motor fuel and probably one-third of the requirements of diesel oil have been replaced by liquid gas. Another one-third of the former diesel oil requirements have probably been replaced by solid fuel and diesel oil in the proportion of 2 to 1, or a net saving of two-ninths.

5.5.9 The Use of Generator Motors in Shipping

Not much is known about the actual progress made in the conversion of inland, coastal, and fishing vessels to the use of substitute fuels. However, the plan called for the ultimate conversion of all vessels with less than 50 and more than 1,000 h.p. and subsidies covering the entire cost were proposed.

5.5.10 The Use of Generators in Agriculture

There are many indications that the program for converting agricultural tractors also lagged much behind the original plan. Not before early 1942 did newspapers report that an efficient generator for tractors had been developed, and at that time it was stated that all of the 120,000 tractors in use in Germany which were suitable for conversion to gaseous and solid fuels would have to be converted. On December 14, 1942 detailed regulations were published for the conversion of tractors and other agricultural machines (b). A subsidy was to be granted, which would vary with the type of tractors. The use of liquid gas and of high or low pressure gas was permitted in exceptional cases only. The fuel to be used in most cases was wood or peat from the farmer's own production, or lignite briquettes which were to be supplied by the Generatorkraft A.G. It was stipulated that the generators were to be models capable of using all these three fuels.

The local fuel offices were to direct the conversion of tractors and to decide which tractors should be converted and when. A special permit was necessary for voluntary conversion of tractors. Other agricultural motors normally consuming more than 400 kg. of diesel oil or 500 liters of gasoline, kerosene or other tractor fuel were also to be converted to other sources of power, such as generator, electric, steam, or city gas fueled motors, etc.

(a) Generator Jahrbuch, 1942.
(b) Reichsanzeiger, 1942, No. 293.

By July 1943 only a limited number of tractors had been converted to substitute fuels. The problem of supplying fuel, either coal or wood, imposes further limits to a large scale conversion since a tractor of 20 to 50 h.p. needs 22 to 44 cubic meters of wood a year, an amount equal to the output of fire wood from 60 to 75 acres of forest. Including newly manufactured generator tractors, the total number of substitute fueled tractors by July 1943 probably did not exceed 20,000 of which an estimated 10,000 were formerly diesel engined and 10,000 gasoline engined. Subsequent reports indicate that preparations were speeded up and that the conversion of most of the agricultural tractors to substitute fuels by the spring of 1944 was hoped for.

Converted diesel tractors need one quarter to one third of their total fuel requirements (in terms of liquid fuel) in the form of diesel oil. The average fuel consumption of a gasoline engined tractor for 800 working hours a year is considered to be about 4 tons and that of a diesel tractor (with a higher average horsepower) about the same figure. The total quantities of liquid fuel saved by the conversion of tractors to substitute fuels is therefore estimated at 40,000 tons of light motor fuel and about 27,000 tons of diesel oil.

In addition, savings were achieved by the conversion of agricultural machines to electricity and to other sources of power. A subsidy of 50 per cent of the cost involved was granted for such conversions. In March 1942 it was estimated that 15,000 oil motors, with a total horsepower of 145,000, had been replaced by electric motors, which made possible a saving of 8-10,000 tons of liquid fuel per annum. By June 1943 savings probably reached 15,000 tons. A higher rate of conversion to the use of electricity was probably impossible as the electrical equipment industry was unable to supply large quantities of new electric motors. Moreover, only those farms which have power connections can make use of electric motors.

The total savings of liquid fuel in agriculture in 1943 probably did not exceed 82,000 tons.

5.5.11 The Use of Substitute Fuels in Industry

The conversion of industrial motors to substitute fuels has been subject to as much, if not more, delay than that of motors used in other elements of the economy. In 1941 a subsidy was promised for the conversion to other kinds of fuel of stationary diesel engines using less than 12 tons of diesel oil a year. An order of May 1942 required that by April 1943 all industrial motors driven by liquid fuel be converted to generator operation and promised financial assistance for this conversion. A new order, however, was issued in May 1943 extending the period of conversion to May 31, 1944 and raising the financial assistance to 25 per cent of the conversion costs up to a maximum of 5,000 Reichsmark.

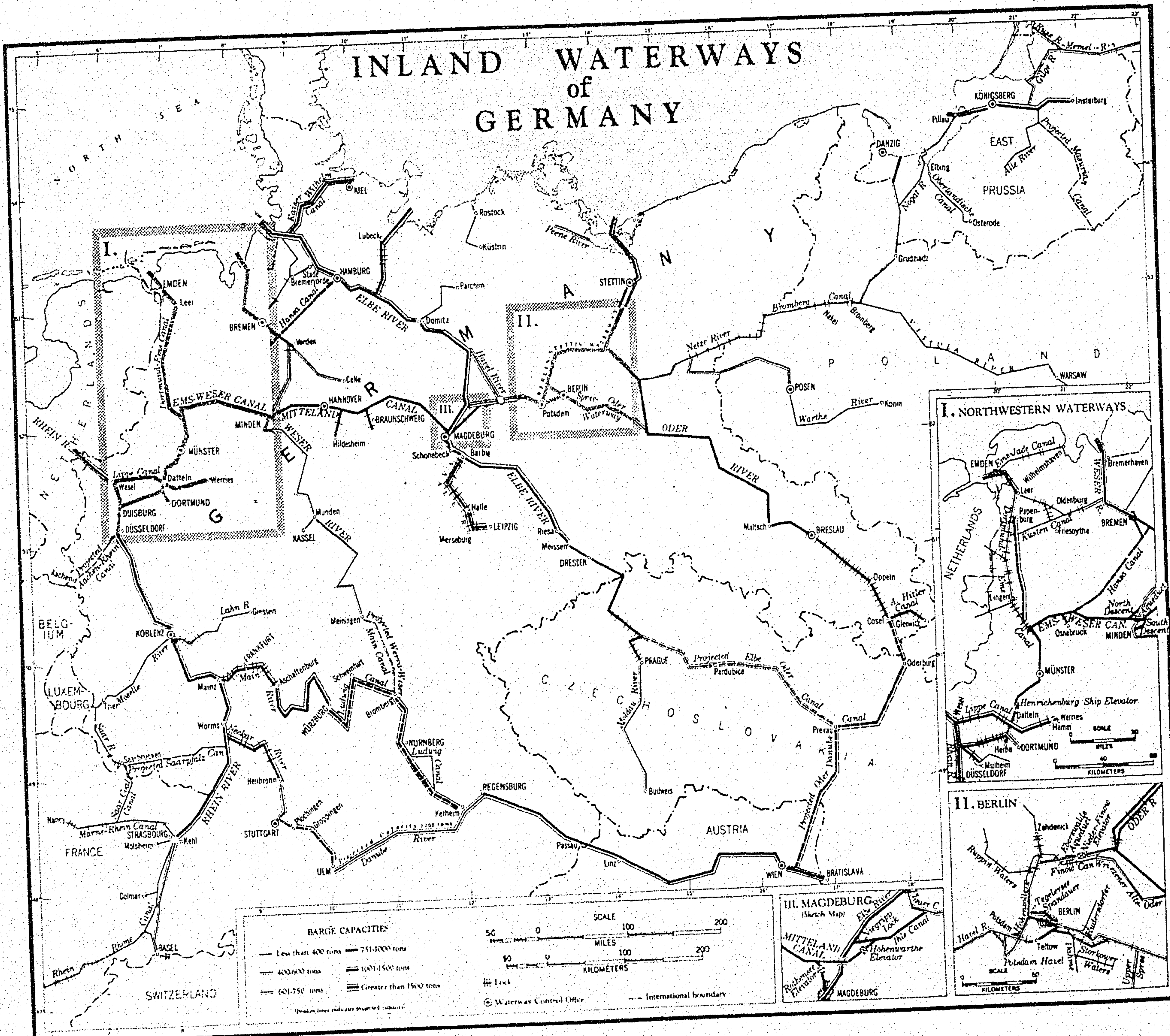
In June 1943, it was again decreed that all stationary motors would have to be converted to gaseous or solid substitute fuels if steam, or electricity, or water power could not be used instead. At the same time, the upper limit for the subsidies was raised from 5,000 to 10,000 Reichsmark. Similar subsidies were promised in September 1943 for the conversion of motors used in the building industry.

There have been few reports on the actual progress of conversion to gaseous and substitute fuels in industry by the middle of 1943. Actually, most of the savings were achieved by using liquid gas wherever possible. The use of gaseous and solid substitute fuels in industrial motors in 1943 probably resulted in savings of less than 5 per cent of the 1938 industrial requirements of light motor fuel and diesel oil. This figure would also include the savings achieved by using substitute fuels for the breaking in of new engines.

5.6 TRANSPORTATION

5.6.1 General

With very minor exceptions the area of Germany proper comprises level country,


INLAND WATERWAYS of GERMANY
NORTH SEA
NETHERLANDS
BELGIUM
LUXEMBOURG
FRANCE
SWITZERLAND
CZECHOSLOVAKIA
AUSTRIA
POLAND
EAST PRUSSIA
GERMANY
I.
II.
III.
KIEL
Kaiser Wilhelm Canal
Lubeck
Rostock
Küstrin
Peene River
STETTIN
DANZIG
KÖNIGSBERG
Pillau
Insterburg
Russ R.-Memel R.
Gilge R.
Projected Masurian Canal
Alle River
Elbing
Nogat R.
Oberlandische Canal
Osterode
Grudziadz
Bromberg Canal
Nakel
Bromberg
VISTULA RIVER
WARSAW
Netze River
POSEN
Warthe River
Konin
EMDEN
Leer
Dortmund-Ems Canal
BREMEN
Stade
Bremervorde
HAMBURG
Hansa Canal
ELBE RIVER
Domitz
Parchim
Verden
Celle
Havel River
BERLIN
Spree-Oder Waterway
Potsdam
EMS-WESER CANAL
MITTELAND CANAL
HANNOVER
BRAUNSCHWEIG
Hildesheim
MINDEN
WESER RIVER
MAGDEBURG
Schonebeck
Barby
MÜNSTER
RHEIN R.
Lippe Canal
Wesel
Datteln
Wernes
DORTMUND
DUISBURG
DÜSSELDORF
Munden
KASSEL
Halle
LEIPZIG
Merseburg
Riesa
Meissen
DRESDEN
ODER RIVER
Maltsch
BRESLAU
Oppeln
A. Hitler Canal
Cosel
Gleiwitz
Oderburg
Aachen
Projected Aachen-Rhein Canal
Lahn R.
Giessen
KOBLENZ
Moselle River
Trier
Meiningen
Projected Werra-Weser Main Canal
FRANKFURT
Main River
Aschaffenburg
Mainz
Schweinfurt
WÜRZBURG
Ludwig Canal
Bromberg
NURNBERG
Worms
Neckar River
Saar R.
Saarbrucken
Projected Saarpfalz Can.
Heilbronn
Saar Coal Canal
Nancy
Marne-Rhein Canal
STRASBOURG
Kehl
Molsheim
RHEIN RIVER
STUTTGART
Plochingen
Groppingen
ULM
Projected Danube River
Kelheim
REGENSBURG
PRAGUE
Moldau River
Projected Elbe Oder Canal
Pardubice
Prerau
Canal
Projected Oder Danube
Budweis
Passau
Linz
WIEN
BRATISLAVA
Colmar
Rhine Canal
BASEL
Rhein
BARGE CAPACITIES
Less than 400 tons
400-600 tons
601-750 tons
751-1000 tons
1001-1500 tons
Greater than 1500 tons
(Broken lines indicate projected capacity)
SCALE
MILES
KILOMETERS
Lock
Waterway Control Office
International boundary
III. MAGDEBURG (Sketch Map)
Elbe River
Niegripp Lock
Ihle Canal
MITTELAND CANAL
Hohenwarthe Elevator
Rothensee Elevator
I. NORTHWESTERN WATERWAYS
Ems-Jade Canal
Wilhelmshaven
Bremerhaven
Oldenburg
Papenburg
Kusten Canal
Friesoythe
Lingen
Ems Canal
North Descent
Aqueduct
South Descent
EMS-WESER CAN.
Osnabruck
Henrichenburg Ship Elevator
Hamm
Herne
Mulheim
II. BERLIN
Zehdenick
Eberswalde Aqueduct
Nieder-Finow Elevator
ODER R.
Ruppin Waters
Finow Can.
Wriezener Alte Oder
Havel R.
Potsdam
Tegelersee
Spandauer
Rudersdorfer
Teltow
Potsdam Havel
Storkower Waters
Upper Spree

covered by a dense network of multi-tracked railroads, and possessing some of the best natural waterways in the world, which have been linked together by a remarkable development of canals. A map showing the main routes appears on page 216. Strategically, this highly developed transportation with its multiplicity of alternate routes is highly advantageous to the Germans and renders the stoppage of their flow of supplies, through Allied air attack, extremely difficult.

Most of the deep water ocean ports of Germany lie on the North Sea. Hamburg, some 60 miles up the Elbe River, is the largest and the most important port of entry. Next in order of importance are Bremen and Bremerhaven on the Weser River. The Kaiser Wilhelm, or Kiel, Canal provides a convenient passageway between the North Sea and the Baltic for deep-sea vessels. Most of the Baltic ports, including Stettin, are comparatively shallow and difficult for large vessels. Facilities at the various ports and of the Kaiser Wilhelm Canal are described in detail in section 5.7 beginning on page 239.

5.6.2 Inland Waterways

In considering the internal transportation system of Germany, the important part played by the inland waterways deserves emphasis. The total length of these inland waterways is about 13,000 kilometers, of which some 7,500 kilometers are of primary importance. Of these major waterways, canals account for approximately 2,500 kilometers. The system lies within the framework of four main rivers, the Rhine, Weser, Elbe and Oder, running south to north, and their intercommunicating canals, generally with east to west axis.

This system may be divided into two main sections:

(1) The Western section, formed by the Rhine and its supplementary canals.

(2) The Eastern section comprising the Elbe, Oder, and their connecting canals.

The two sections, previously separated, were linked in 1938 upon the completion of the Mittelland Canal. In addition to traffic of an entirely domestic nature these waterways provide direct water born traffic arteries into adjoining territories.

Considered from west to east, the important waterways are: The Rhine-Maas river system, with its tributary canals in Holland, Belgium and the Ruhr. This system connects on the north, via the Weser-Ems Canal, with the Weser River system of north Germany, and on the south the Rhine system is connected with the Mainz and thus the Danube system, although the connecting canals will take only barges of moderately small draft. By means of the large Rhine River barges, the Dutch port of Rotterdam is closely tied in with the German transportation system.

East of the Weser system in north Germany is the Elbe River, which crosses Germany from northwest to southeast, and is navigable into Czechoslovakia. In eastern Germany the Oder River forms a north-south water highway the length of the country.

In northern Germany, the Mittelland Canal links from west to east all the above-mentioned routes, and affords access to the Vistula River system in Poland, and to the tributaries and canals of this latter in East Prussia. Through the Vistula-Bug Canal, access is afforded to the Dnieper River in Russia, and thus to the Black Sea. The use of the north Germany waterways and their connections therefore makes it possible to go by inland waterway from the Atlantic Ocean to the Black Sea.

The western section, for the most part, is navigable by barges of 1,000 tons capacity, and nearly all the new canals are designed to take barges of this size. In the east navigation still is largely limited to barges of 400 to 500 tons capacity. The size of the locks as well as the depth of the canals are the limitating factors. The locks are, of course, important features of any canal system and if damaged or destroyed would render portions of the canal useless. A schematic map showing details of the inland waterway system appears on page 234.

Ice restricts movements for a limited period, varying between one and three weeks, during normal winters, particularly in eastern Germany. The western rivers are less affected, but in the severe winter of 1941/42 the Rhine was icebound for almost a month.

Germany's prewar river and canal barge fleet, both self propelled and dumb, was numerous and of great variety in size and carrying capacities. In 1942 it was decreed that, henceforth, only barges of the following standard dimensions were to be built:

	Length	Breadth	Draft	Tons
Tanker barge	67 meters	8.5 meters	2 meters	734
General cargo barge	67 meters	8.5 meters	2 meters	740
Ore and general cargo barge	80 meters	9.05 meters	2 meters	920 to 952

A number of the prewar Rhine River barges measure up to 120 meters in length, 14 meters in breadth, 2.85 meters in draft and have a 3,500 ton cargo capacity.

The number of barges available in Germany probably stands at a high figure, since barges offer small targets for an attack and their number no doubt has been augmented through requisitions from occupied territories.

5.6.3 Oil Transportation

In considering the relation of the German transportation system to oil production and supply, the country may roughly be divided into Western, Central and Eastern districts.

Western Germany.- The important sources of liquid fuels in the west German district are the oil fields of the Hannover area and the Fischer-Tropsch, hydrogenation, and coke plants of the Rhine-Ruhr district. Crude oil is produced in the northern part of the area in two important fields at Reitbrook near Hamburg and at Nienhagen near Hannover, and from a dozen small fields scattered through the same general region. The Reitbrook field is located almost on the banks of the Elbe River and is also connected by pipe line with the main railroad lines to Hamburg at Bergedorf. Oil from this field need travel only a few miles by rail or inland waterway to the refineries at Hamburg.

The bulk of the oil produced at Nienhagen is, or was, treated in the Misburg refinery at Hannover, and the balance is sent over good rail connections to refineries at Bremen and Hamburg. Although the Mittelland Canal is not more than ten miles distant, it is unlikely that oil from Nienhagen would be transshipped to water for the comparatively short trip to Bremen or Hamburg.

The production of synthetic oil, benzol, tar oils, and bottled gases in the Ruhr and Rhineland regions of southwestern Germany comes from plants essentially all of which are located on the Rhine-Ruhr inland water system, and in addition are connected with all northwestern Europe by a dense, multi-tracked railroad network.

Representative routes for the distribution of products originating in the west German district are as follows:

Railroad routes:

a) Hamburg - Bremen - Osnabruck - Duisburg
b) Hamburg - Hannover - Kassel - Frankfurt - Mainz
c) Bremen - Hamburg - Wittenberge - Berlin
d) Hamburg - Luneburg - Ulzen - Stendal - Magdeburg - Halle - Leipzig - Dresden.

The foregoing are representative multi-tracked main routes. Numerous alternatives are available.

Water routes:

By barge from Hamburg via the Elbe River to the Mittelland Canal near Magdeburg, thence eastward on the Mittelland Canal to points in Central and Eastern Germany; or west on the Mittelland Canal via Hannover, to connections with the Weser River (Bremen) at Minden and with the Dortmund-Ems Canal at Rheine, thence northward on the Dortmund-Ems waterway to the North Sea at Emden; or southward to the Rhine-Ruhr waterways at Dortmund. Via the Rhine-Maas Rivers and subsidiary canal system direct barge traffic with The Netherlands and Belgium is possible.

The smallest of the above mentioned waterways will accommodate barges of 500 tons deadweight; all possess modern locks and passing facilities.

The refineries and synthetic plants of Western German district produce substantial surpluses of all categories of liquid fuels except diesel and fuel oils. Sufficient of these latter products to cover the local deficit must be transported from Central Germany.

Central Germany.- The important sources of liquid fuels in the Central German district are the hydrogenation and Fischer-Tropsch plants and the associated coking industries. A million and a half tons of low temperature coal tars are required yearly as raw materials for the hydrogenation plants. However, the coal carbonization plants are in no case located more than 30 kilometers from the hydrogenation plant which they supply, and an average distance from source of tar to consuming plant within the district is about 15 kilometers. The transport of these tars is usually by railway tank car.

All the hydrogenation and Fischer-Tropsch plants are served by a network of multi-tracked railroads, and in addition most of them are on or near the excellent inland waterway system of Central Germany, as follows:

Water routes:

a) Products from the Leuna plant can move by barge up the Saale River to the Elbe, thence via the Elbe to its junction with the Mittelland Canal, on which they can move either east or west across all Germany; or shipments may continue on the Elbe to the Hamburg district.

b) Products from the plant at Zeitz-Tröglitz must to be carried 38 kilometers by rail or truck to Merseburg whence they can continue by route (a) above.

c) The output of the plant at Böhlen-Rotha can reach the Saale River via a 40 kilometer rail or truck haul, and thereafter move by barge up the Saale to the Elbe and wider distribution.

d) Products originating at Lützkendorf require 30 kilometers of rail or truck transport to reach the Saale River at either Halle or Merseburg.

e) The output of the plants at Ruhland-Schwarzheide must be moved by rail or truck about 50 kilometers to reach the Elbe River at either Meissen or Riesa.

Rail routes:

a) Merseburg - Halle - Wittenberg - Berlin
b) Böhlen Rotha - Leipzig - Dessau - Berlin
c) Ruhland - Schwarzheide - Elsterwerda - Baruth - Berlin
d) Chemnitz - Leipzig - Halle - Köthen - Magdeburg

The rail routes serving the synthetic oil plants of Central Germany are multi-tracked steam lines, with numerous alternative or secondary routes. The rail net is so closely spaced that the routes cited above must be considered as representative only.

Eastern Germany.- In Eastern Germany the liquid fuel and petroleum products come from the synthetic oil plants at Pölitz near Stettin, Blechhammer and Deschowitz (Odertal), and Austrian oil imported from the oil fields of the Vienna Basin. The very important quantities of oil obtained from these sources, when added to the local supplies from alcohol, benzol, tar oils, etc., afford a substantial excess of production over consumption in Eastern Germany, particularly with respect to aviation gasoline and motor fuel.

The principal routes involved in the distribution of oil products and raw materials in Eastern Germany are summarized below.

The Pölitz hydrogenation plant is unique among German synthetic plants for its location remote from any source of raw materials. This is compensated for by its excellent situation for the distribution of products via the Baltic Sea and the rail and waterways of northeastern Europe. As raw materials the Pölitz plant must receive an annual supply of about 700,000 tons of tar oils from the carbonization plants of the Silesian coal basin. This material must be brought an average distance of about 400 kilometers.

The principal routes for supplying raw materials to Pölitz are listed below; the water route is probably used almost exclusively.

a) By barge on the Oder River and its tributaries from Katowice, Waldenburg, Hindenburg, etc. to Pölitz.

b) By rail over the general route: Gleiwitz - Breslau-Glogau - Frankfurt a/d Oder - Stettin.

Raw materials for the Blechhammer hydrogenation plants, insofar as these are not produced within the plants themselves, are probably obtained from carbonization plants at Krappitz, Moravska Ostrava, Waldenburg, Katowice and similar coking centers in Silesia. The average railroad haul in such cases might amount to 75 kilometers and the quantities currently involved may be as much as 200,000 ton per year.

The Blechhammer plants are located on the Adolph Hitler (Klodnitz) Canal, giving them barge connections with the Oder River on one hand and the Vistula system on the other. The water routes are probably most important for the distribution of products, but raw materials can be brought from the many local sources by this means also.

The Deschowitz Fischer-Tropsch plant near Gleiwitz obtains its materials locally and is so situated as to have ready access to all the rail and water routes noted above.

Transportation from Austria.- Germany has drawn heavily on the production of the Austrian Zistersdorf oil fields. The Zistersdorf area is located some 45 kilometers NNE of Wien (Vienna) (a).

It is reliably reported that a pipe line has been constructed from Zistersdorf to Kolin to transport important quantities of the paraffin-base crude oil discovered in the Zistersdorf area in 1941. The dimensions, capacity, and route of this line are unknown, but its length must be of the order of 300 kilometers. It is also reported that this or a parallel line was extended to Melnik, Czechoslovakia, which point is approximately the head of navigation for large oil barges on the Elbe River.

Products from the Austrian refineries at Wien (Vienna) also are shipped to southeastern and southwestern Germany. The principal center of consumption in southeastern Germany is the industrial district of eastern Silesia, bounded approximately by the triangle Breslau, Gleiwitz, and Odertal. The main routes for the distribution of oil products for Germany from Austria are probably the following:

Vienna District to Silesia and Sudetenland (rail and water routes).

a) Via the Danube River from Vienna or Bratislava to the March River Canal,

(a) See the report, "Petroleum Facilities of Austria", of this series.

which joins the Danube near Bratislava; via the March Canal to Odertal, whence products can be distributed locally, or carried north to the Baltic to the Oder River, or east to the Vistula River over the Adolph Hitler (Klodnitz) Canal.

b) From Vienna via the rail route Vienna-Breclav-Prerau-Moraveska Ostrava-Hindenburg.

The canalization of the March (Morava) River to form a link between the Danube and Oder waterways had only begun in 1939, but in view of the importance of this water route, and the absence of natural obstacles, it may reasonably be assumed that this work was completed by 1942. As originally planned, the canal would accomodate barges with a maximum deadweight capacity of 400 tons. The Danube and its tributaries rarely freeze over for as much as a month in Central Europe and Southern Germany, so that the water route is normally usuable at least 11 months of the year.

Vienna district to southwestern Germany (rail and water routes).

a) By barge on the Danube River from Vienna or Bratislava to Passau, Regensburg, Ulm, or Mainz, depending on the size of the barge used.

b) By railroad over the routes:

Vienna - Linz - Salzburg - Rosenheim - Munich;
Vienna - Linz - Passau - Munich - Ulm - Karlsruhe;
Vienna - Linz - Regensburg - Nürnberg - Frankfurt.

Danube barges of 700 tons capacity can ascend the river as far as Regensburg, which is the main breaking point for the transfer to railroad of water-borne goods brought up the Danube from Balkan sources. Rumanian oil formerly entered Germany by this route. A similar, but less important, breaking point with oil transfer facilities exists at Passau. Barges of 400 tons maximum deadweight capacity can ascend the Danube as far as Ulm and transfer cargoes to rail at that point. Barges of 400 tons maximum capacity can also pass through the canal connecting the Danube and Mainz Rivers, which leaves the Danube some 50 kilometers upstream from Regensburg, and passing via Nürnberg enters the Mainz at Bamberg. Once such barges have entered the Main, they may continue on the Rhine waterway system to almost any desired point in western Germany, the Low Countries, and northern France.

The railroad routes noted above are the most direct of a large number of alternative lines, except for the stretch Vienna-Linz, which affords the only direct link between Austria and southwestern Germany. This is a double-tracked main line, but there are no alternative routes except those involving a large detour.

The Danube and Rhine waterways in southern Germany are open practically all year, and it is to be expected that maximum use is made of them, particularly as much of the subsecuent secondary distribution of the products moved can also be effected by water.

5.7 OCEAN TERMINALS

5.7.1 General

The majority of Germany's ocean terminal facilities lie on the North Sea, as shown on the map on page 240. Germany's greatest seaport is Hamburg, on the Elbe River, and a large number of her oil refineries and commercial terminals are located there. Terminal facilities also exist at Schulau and at Stade on the Elbe River below Hamburg.

Next in importance are the Weser River terminals, some commercial and some government owned for strategic purposes, that are situated along the Weser River from Bremerhaven to Bremen.

LOCATION MAP SHOWING GERMAN NORTH SEA PORTS AND KAISER WILHELM CANAL BULK TERMINAL AND BUNKERING POINTS

SCALE

0 10 20 30 MILES

0 10 20 30 40 KILOMETERS

LEGEND:

KIEL - Bulk Terminal or Bunkering Point

Norden - Other localities

Railway

Motor Highway

Road

NORTH SEA

Husum
Schleswig
Friedrichstadt
RENDSBURG
FLEMHUDE
KIEL
Heide
Kaiser Wilhelm Canal
SCHAFTSTEDT
Neumünster
Bad Segeberg
BRUNSBUTTEL
OSTERMOOR
Itzehoe
Bramstedt
CUXHAVEN
NORDHOLZ
Elbe River
Elmshorn
Stade
Wedel
SCHULAU
HAMBURG
Norden
WILHELMSHAVEN
BLEXEN
BREMERHAVEN-WESERMUNDE
Bremervörde
NORDENHAM
Jade Busen
HARBURG
Elbe River
Aurich
EMDEN
Delfzijl
Dollart
Ems River
BRAKE
FARGE
Weser River
Oldenburg
BREMEN
Rotenburg

R-80

Other terminal facilities, mostly Naval (a), exist at Emden, Cuxhaven, Wilhelmshaven and in the vicinity of Kiel which is accessible from the North Sea via the 53 mile long Kaiser Wilhelm, or Kiel, Canal.

The only German port on the Baltic that is accessible to deep sea tankers is Stettin and limited terminal facilities exist there. Other Baltic ports such as Flensburg, Königsberg, and Rostock are sometimes visited by coastal tankers, but they are of relatively shallow depths and without important deep sea petroleum terminal facilities.

The principal ports are briefly described below in alphabetical order (b). Available data on terminal facilities at each port are listed and, where possible, layout plans and location sketches are given. Detailed data on many of the plants are meager and exact storage capacity figures are lacking. Also, the possibility of the existence of unreported underground tankage having been installed at known plants or at undetected new localities cannot be entirely ruled out. However, most of the major plants have been photographed by aerial reconnaissance and this has aided in establishing descriptions and capacity estimates. Furthermore, many of these plants have been severely bombed and serviceable tankage actually remaining may now be considerably reduced. For the sake of uniformity, storage tankage capacities are given in cubic meters (M^3) and barrels though the original sources did not always employ these units. In many cases figures from British sources when given as metric tons appear to mean a metric ton of water or the equivalent of one M^3. Therefore, in cases of doubt metric tons have been interpreted as the equivalent of M^3 when referring to storage capacities and the factor of 6.3 used in converting the figures to barrels.

5.7.2 Cuxhaven

Cuxhaven, latitude 53° 52' N., longitude 8° 30' E., is an extensive and well sheltered harbor with a depth at low water of 26-1/2 feet. It has no commercial oil installations, but is an important Naval bunkering point and connects by pipe line with the large strategic storage installation between Nordholz and Ludingworth 6-1/2 miles south, latitude 53° 49' N., longitude 8° 40' E.

The tankage at Cuxhaven consists of four 170-foot diameter tanks buried in a line along the waterfront. Their location is shown on the map on page 242. Total capacity amounts to approximately 80,000 M^3 (504,000 barrels).

The main storage installation is adjacent to the northeast side of the Nordholz-Midlum air field between Nordholz and Ludingworth, 6-1/2 miles south of Cuxhaven. This installation consists of 36 tanks, 175 feet in diameter and 40 feet high, with an approximate capacity of 24,000 M^3 each or a total capacity of 864,000 M^3. Tanks are of circular steel construction surrounded with concrete walls. They contain metal supports for the roofs which are covered with concrete slabs and equipped with ventilators. The tanks are buried with only the ventilators above ground.

There are also what appear to be two pumphouses and two small service tanks. The storage is primarily for black oils, though some white products may be handled. Pipe lines between the tanks are contained in conduits five and six feet in diameter.

The layouts and locations of these installations are shown on the map on page 242.

(a) The term Naval, as used throughout this report, refers to the German Navy.

(b) In normal times certain quantities of Germany's foreign oil imports from the Americas also entered the country via the Rhine River system, being transshipped at the Dutch port of Rotterdam. Some oil also was imported from Rumania and Austria via the Danube. These routes are discussed under "Transportation" on pages 235 to 239.

Map Showing
PETROLEUM FACILITIES
CUXHAVEN

SCALE
100 0 200 400 600 800 YARDS
100 0 200 400 600 800 METERS

LEGEND

A. BUNKERING PLANT. RHENANIA OSSAG MINERALOLWERKE A. G.

B. STRATEGIC STORAGE INSTALLATION CONSISTING OF 4 BURIED TANKS OF AN APPROX. TOTAL CAP'Y. OF 80000 M³, 504,000 BBLS. THIS INSTALLATION IS CONNECTED BY PIPELINE TO THE MAIN STRATEGIC STORAGE PLANT AT NORDHOLZ.

AMERIKA HAFEN
A
B
ELBE RIVER
RITZEBUTTEL
NEUFELD

Plan of
STRATEGIC STORAGE PLANT
NORDHOLZ

SCALE
100 0 200 400 600 800 YARDS
100 0 200 400 600 800 METERS

PROBABLE SITE CLEARED FOR FURTHER TANKAGE
TANK SITES
TANKS NOT YET BURIED
PROBABLE PUMPHOUSE
BURIED TANKS
BURIED SERVICE TANKS
PROBABLE PUMPHOUSE
BURIED TANKS
Nordholz-Midlum Airfield

ELBE RIVER
CUXHAVEN
SPANGEN
BERENSCH
ALTENWALDE
LÜDINGWORTH
OXSTEDT
NORDHOLZ
R 111

LOCATION MAP

SCALE
MILES 1 0 1 2 3
KILOMETERS 1 0 1 2 3 4 5

Details of Tankage

Place	No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
			M^3	Barrels	M^3	Barrels
Cuxhaven	4	170	20,000	126,000	80,000	504,000
Nordholz	36	175	24,000	151,200	864,000	5,443,200
T o t a l					944,000	5,947,200

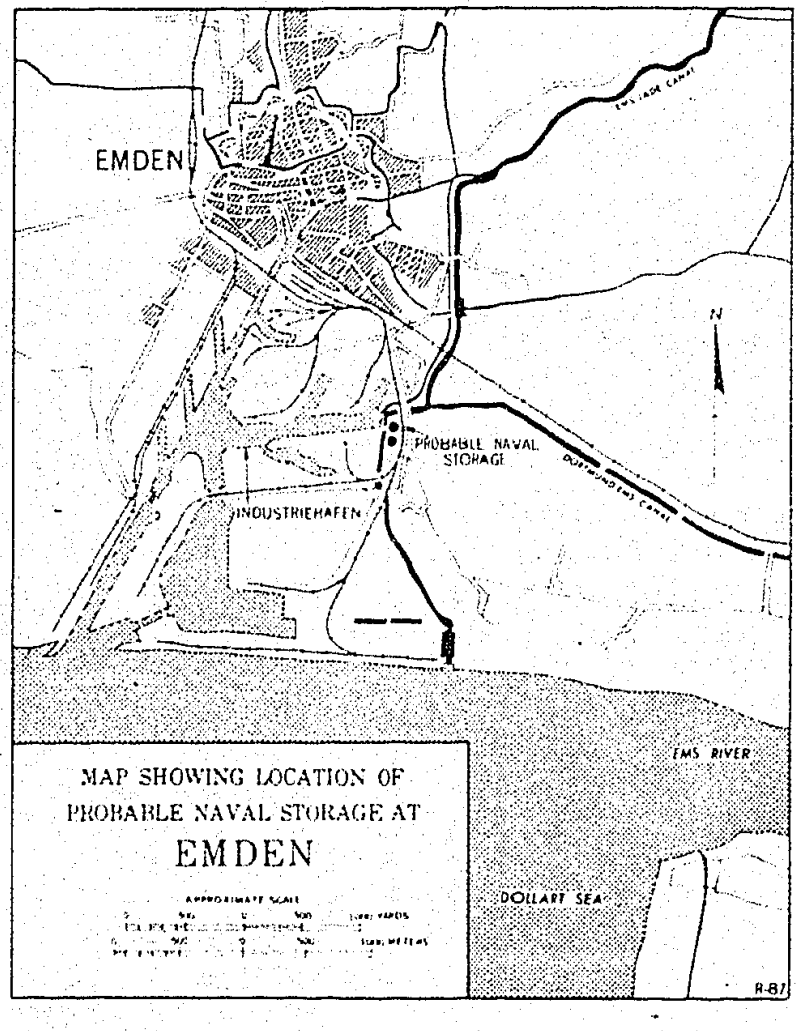
A pipe line leads from the north end of the installation and runs nearly parallel to the railway past Altenwalde and thence to Cuxhaven where it appears to connect with the buried tankage on the waterfront.

5.7.3 Emden

Emden, latitude 53° 21' N., longitude 7° 13' E., is primarily a Naval and submarine base. The depth of water in the channel is 33 feet at ordinary high water. There is a tidal basin 4,600 feet long, 430 feet wide, and 31 feet deep on the sill at ordinary high water. The tidal rise is about 10 feet.

The inner harbor is entered through a sluice chamber, 360 feet long, 50 feet wide and 25 feet deep. Vessels of 24 feet draft can enter at high water. The dock is a mile long. There is a large new harbor, entered through a lock 852 feet long, 129 feet wide and 43 feet deep on the sill at ordinary high water. Depth in the new harbor is 34-1/2 feet.

There are two small bulk storage terminals here, both thought to be Naval bunkering installations. Few details are available but estimated capacities are as follows.



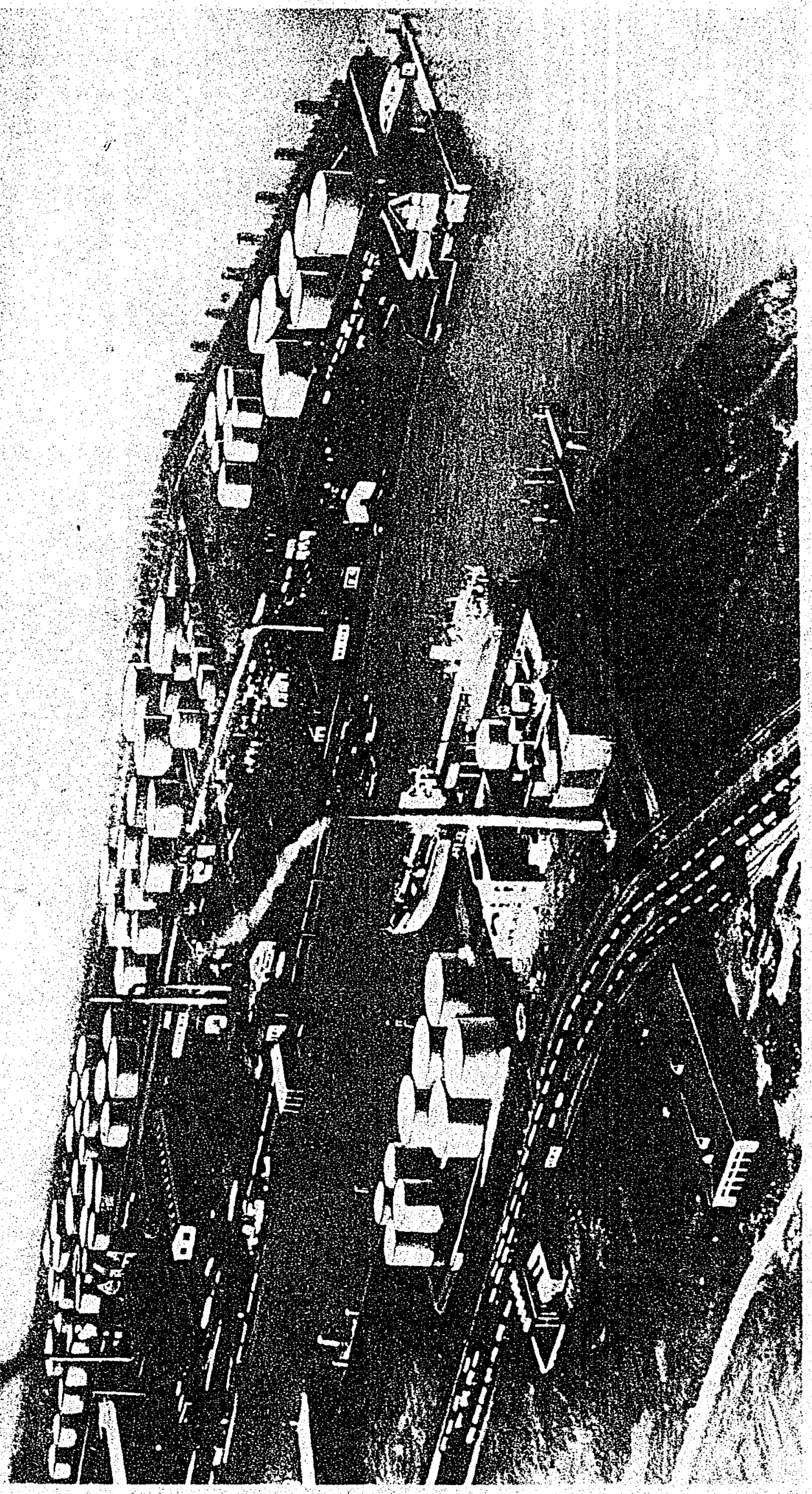
	No. of Tanks	Total Capacity	
		M^3	Barrels
Southwest end of outer harbor	3	3,500	22,050
South of entrance to Dortmund-Ems Canal	2	40,000	252,000
Total	5	43,500	274,050

5.7.4 Elbe River Terminals - Hamburg, Schulau, Stade

Hamburg

Hamburg lies approximately sixty miles up the Elbe River and there is a good deep water channel all the way. Hamburg is Germany's largest commercial port and a large number of her commercial oil terminals and refineries are located there, particularly in the Grasbrook, Harburg, and Wilhelmsburg areas of the port.

Neuer Petroleumhafen, Hamburg



VIEW OF NEUER PETROLEUMHAFEN, HAMBURG
(Old Photograph)

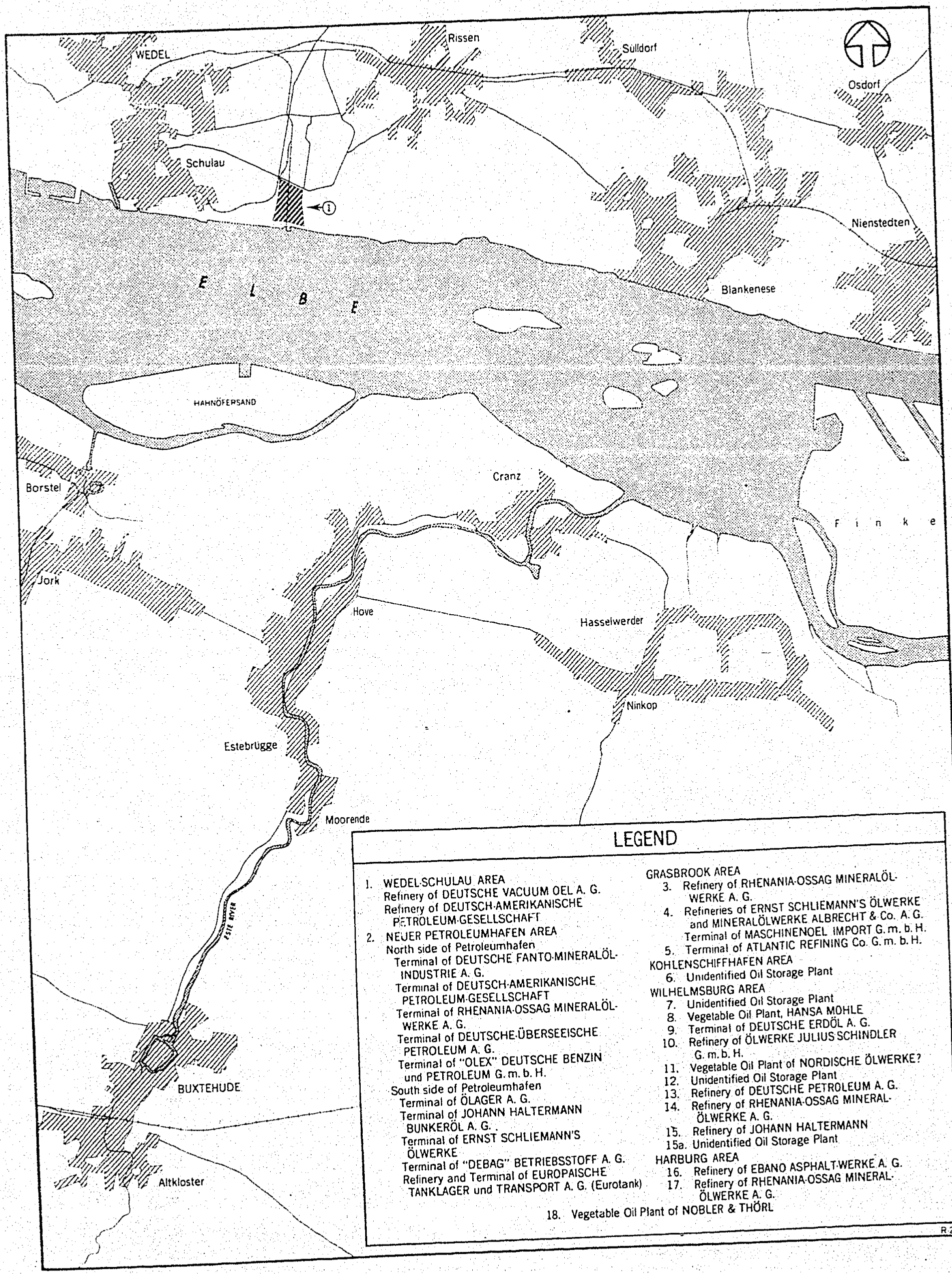
There are numerous basins and connecting channels and canals throughout the port area. The basins vary in depths from 24 feet to 40 feet at normal high tide. The normal difference between high water and low water is 7 ft., 2 in. A map of Hamburg harbor showing the locations of the bulk storage installations listed below appears on pages 246-247

Summary of Terminal Tankage at Hamburg

No. on Map		Type of Plant	Estimated Capacity	
			M^3	Barrels
	Neuer Petroleumhafen			
2	Various companies	Terminals & refinery	681,237	4,291,795
	Grasbrook			
5	Atlantic Refining Co. G.m.b.H.	Terminal	10,188	64,184
4	(Maschinenoel Import G.m.b.H. (Ernst Schliemann's Ölwerke (Mineralölwerke Albrecht & Co.	Terminal Lub. oil refinery) Lub. oil refinery)	80,000	504,000
3	Rhenania-Ossag Mineralölwerke A.G.	Refinery	46,250	291,375
	Neuhof			
9	Deutsche Erdöl A.G.	Terminal	46,000	289,800
10	Olwerke Julius Schindler G.m.b.H.	Lub. oil refinery	40,000	252,000
8	Hansa Mohle	Vegetable oil plant	10,000	63,000
6	Unidentified	Oil storage	16,400	103,320
	Wilhelmsburg			
7	Unidentified	Oil storage	24,500	154,350
13	Deutsche Petroleum A.G.	Refinery	75,000	472,500
14	Rhenania-Ossag Mineralölwerke A.G.	Refinery	19,191	120,903
12	Unidentified	Oil storage	3,000	18,900
11	Nordische Ölwerke (?)	Vegetable oil plant (?)	2,000	12,600
15	Johann Haltermann	Benzol refinery	17,000	107,100
15a	Unidentified	Oil storage	5,000	31,500
	Harburg Area			
16	Ebano Asphalt-Werke A.G.	Refinery	108,500	683,550
18	Nobler & Thorl	Vegetable oil plant	109,000	686,700
17	Rhenania-Ossag Mineralölwerke A.G.	Refinery	124,000	781,200
	T O T A L		1,417,266	8,928,775

Detailed data on most of these terminals are very meager and tankage figures, at best, are only estimates based on prewar reports and Allied air reconnaissance. Some of the plants are refineries and in those cases the tankage estimates above refer to the storage tanks exclusive of working tanks. These plants are described in greater detail in the Refining section of this report. Many of the plants in the

Facilities, Hamburg



LEGEND

1. WEDEL-SCHULAU AREA
   - Refinery of DEUTSCHE VACUUM OEL A. G.
   - Refinery of DEUTSCH-AMERIKANISCHE PETROLEUM-GESELLSCHAFT
2. NEUER PETROLEUMHAFEN AREA
   - North side of Petroleumhafen
     - Terminal of DEUTSCHE FANTO-MINERALÖL-INDUSTRIE A. G.
     - Terminal of DEUTSCH-AMERIKANISCHE PETROLEUM-GESELLSCHAFT
     - Terminal of RHENANIA-OSSAG MINERALÖL-WERKE A. G.
     - Terminal of DEUTSCHE-ÜBERSEEISCHE PETROLEUM A. G.
     - Terminal of "OLEX" DEUTSCHE BENZIN und PETROLEUM G. m. b. H.
   - South side of Petroleumhafen
     - Terminal of ÖLAGER A. G.
     - Terminal of JOHANN HALTERMANN BUNKERÖL A. G.
     - Terminal of ERNST SCHLIEMANN'S ÖLWERKE
     - Terminal of "DEBAG" BETRIEBSSTOFF A. G.
     - Refinery and Terminal of EUROPAISCHE TANKLAGER und TRANSPORT A. G. (Eurotank)

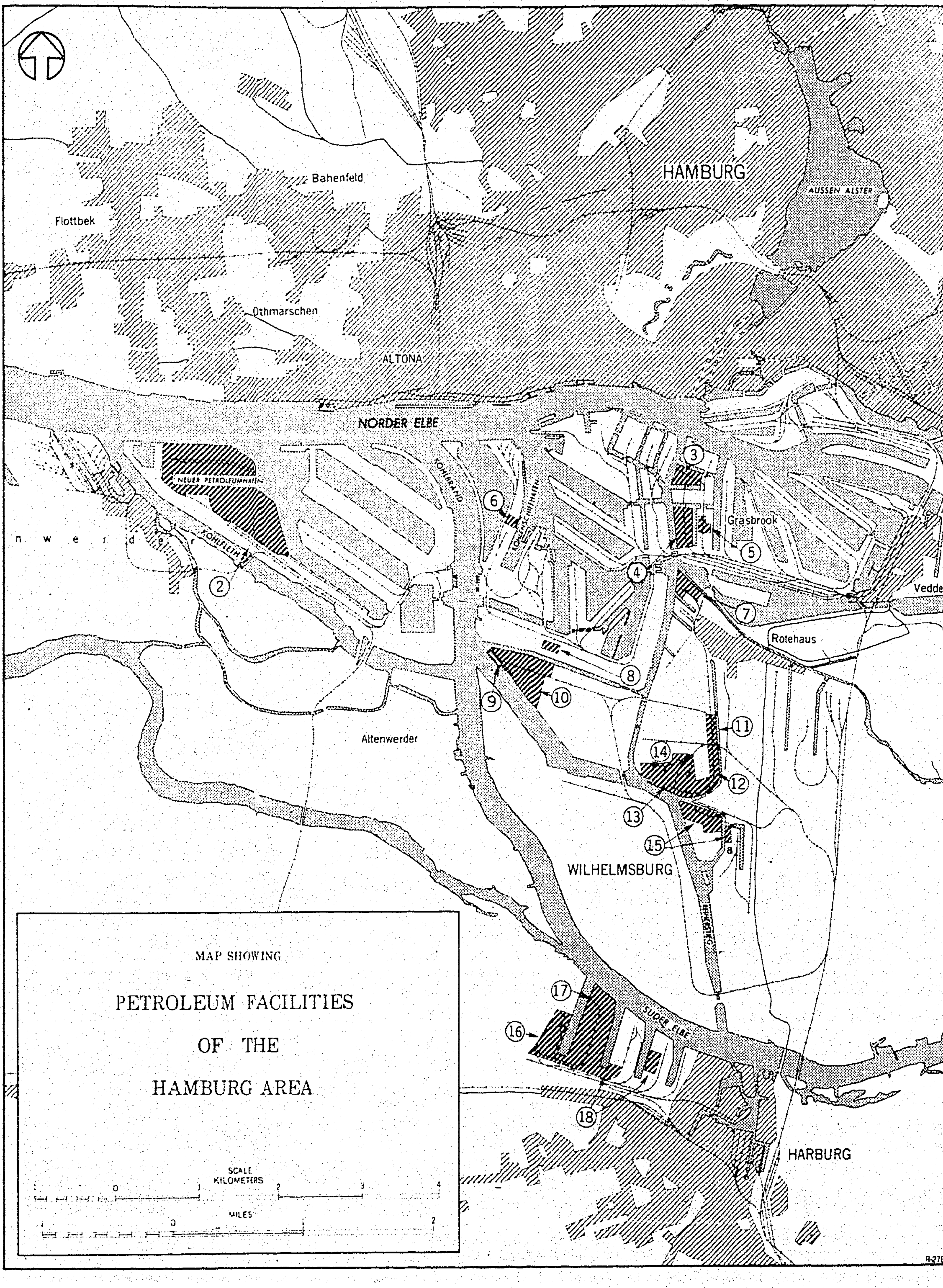
GRASBROOK AREA
3. Refinery of RHENANIA-OSSAG MINERALÖL-WERKE A. G.
4. Refineries of ERNST SCHLIEMANN'S ÖLWERKE and MINERALÖLWERKE ALBRECHT & Co. A. G.
   Terminal of MASCHINENOEL IMPORT G. m. b. H.
5. Terminal of ATLANTIC REFINING Co. G. m. b. H.

KOHLENSCHIFFHAFEN AREA
6. Unidentified Oil Storage Plant

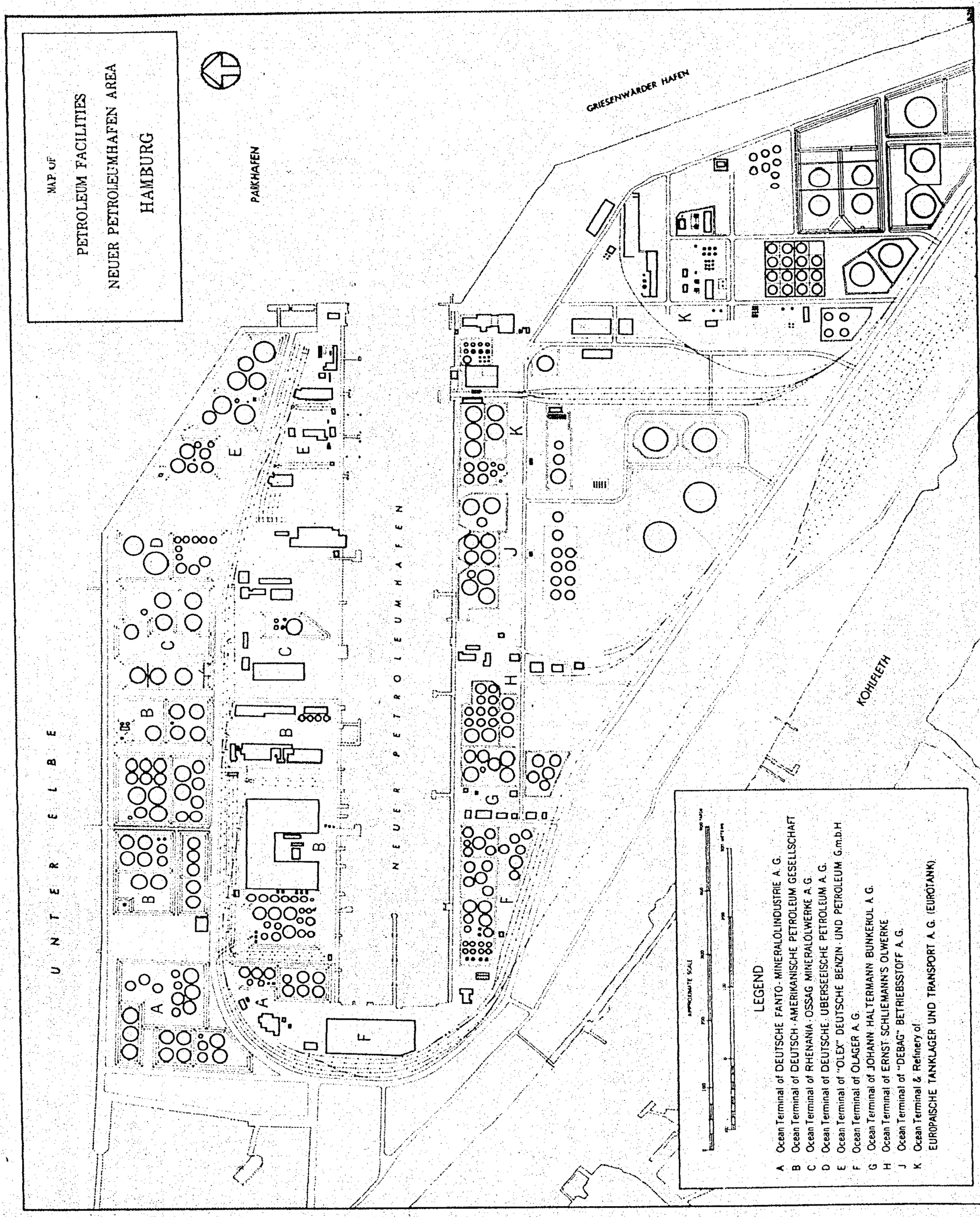
WILHELMSBURG AREA
7. Unidentified Oil Storage Plant
8. Vegetable Oil Plant, HANSA MÖHLE
9. Terminal of DEUTSCHE ERDÖL A. G.
10. Refinery of ÖLWERKE JULIUS SCHINDLER G. m. b. H.
11. Vegetable Oil Plant of NORDISCHE ÖLWERKE?
12. Unidentified Oil Storage Plant
13. Refinery of DEUTSCHE PETROLEUM A. G.
14. Refinery of RHENANIA-OSSAG MINERAL-ÖLWERKE A. G.
15. Refinery of JOHANN HALTERMANN
15a. Unidentified Oil Storage Plant

HARBURG AREA
16. Refinery of EBANO ASPHALT-WERKE A. G.
17. Refinery of RHENANIA-OSSAG MINERAL-ÖLWERKE A. G.
18. Vegetable Oil Plant of NOBLER & THÖRL

R 27A


HAMBURG
AUSSEN ALSTER
Bahenfeld
Flottbek
Othmarschen
ALTONA
NORDER ELBE
NEUER PETROLEUMHAFEN
KOHLFLETH
KÖHLBRAND
Grasbrook
Veddel
Rotehaus
Altenwerder
WILHELMSBURG
SUDER ELBE
HARBURG
MAP SHOWING
PETROLEUM FACILITIES
OF THE
HAMBURG AREA
SCALE
KILOMETERS
MILES
R-278

Neuer Petroleumhafen, Hamburg



Grasbrook and Wilhelmsburg areas are not easily available to deep sea vessels and were customarily served by lighters and barges.

The Hamburg area has been extensively bombed and the installations there have been more or less damaged. Hence, the remaining tankage may actually be considerably less than that estimated above.

Neuer Petroleumhafen.- The greatest concentration of bulk terminal facilities exists at the Neuer Petroleumhafen which was a customs free port area. A general layout plan of the area, showing the relative locations of the various plants based on prewar records of uncertain date, appears on page 248. Tankage lists and capacity statements for most of these installations are not available but rather broad estimates based on prewar reports supplemented by aerial reconnaissance are given below.

	Estimated Capacity	
	M^3	Barrels
Plants on Northside of Harbor		
Deutsche Fanto-Mineralöl Industrie G.m.b.H.	100,000	630,000
Deutsch-Amerikanische Petroleum-Gesellschaft	143,577	904,535
Rhenania-Ossag Mineralölwerke A.G.	63,860	402,318
Deutsch-Überseeische Petroleum A.G.	30,000	189,000
"Olex" Deutsche Benzin- und Petroleum G.m.b.H.	48,800	307,440
Plants on Southside of Harbor		
Ölager A.G.	60,000	378,000
Johann Haltermann	35,000	220,500
Ernst Schliemann's Ölwerke	30,000	189,000
"Debag" Betriebsstoff A.G.	30,000	189,000
Europäische Tanklager- und Transport A.G.	140,000	882,000
T O T A L	681,237	4,291,793

The Europäische Tanklager- und Transport A.G. is both a refinery, (see layout plan on page 108) and an ocean terminal. Its terminal facilities were expanded in 1938 by the purchase of the terminal of the Allegmeine Oel-Handels G.m.b.H. (Oelhag). (see layout plan on page 252). Prewar layout plans of the D.A.P.G. and "Olex" terminals appear on pages 250 and 251. The depth of water at the river berths is approximately 32 ft. and in the harbor itself 30 ft. Shore connections and pumps are numerous for discharging and loading.

Prior to the war the Germans are known to have given serious consideration to constructing underground storage in this area. There are reports of considerable underground tankage at Hamburg at unidentified locations, but it is not known whether or not any actually exists at the Petroleumhafen.

Grasbrook area.- The majority of the installations in this area are lubricating oil refineries or treating plants which lie along the Reiherstieg Canal. Drafts of vessels using this waterway are limited to approximately 16 ft. Hence, only small tankers and barges can dock directly at the plants. Excepting the Rhenania-Ossag refinery, and Atlantic Refining Co. plant on pages 120 and 253, no layout plans are available for the individual plants, but a composite plan, drawn from air cover, appears on page 117.

Neuer Petroleumhafen, Hamburg

LAYOUT PLAN

OCEAN TERMINAL

OF

DEUTSCHE-AMERIKANISCHE

PETROLEUM-GESELLSCHAFT,

NEUER PETROLEUMHAFEN

HAMBURG

SCALE

NORDER ELBE

NEUER PETROLEUMHAFEN

DETAILS OF TANKAGE

TANK NO.	M³	BBLS.	TANK NO.	M³	BBLS.	TANK NO.	M³	BBLS.	TANK NO.	M³	BBLS.	TANK NO.	M³	BBLS.
1	3,286	20,701	15	2,270	14,301	29	100	640	43	1,425	8,978	57	1,093	6886
2	3659	23,050	16	2,270	14,301	30	4,908	30,920	44	2,640	16,632	58	1,426	8984
3	4,908	30,920	17	2,270	14,301	31	4,908	30,920	45	1,425	8,978	59	1,426	8984
4	3,286	20,701	18	4,908	30,920	32	2,630	16,570	46	540	3,402	60	572	3604
5	3,286	20,701	19	4,908	30,920	33	2,010	12,663	47	540	3,402	61	142	895
6	4,908	30,920	20	2,270	14,301	34	2,010	12,663	48	1,126	7,094	62	538	3389
7	1,604	10,105	21	2,270	14,301	35	2,010	12,663	49	540	3,402	63	740	4662
8	1,937	12,203	22	4,682	29,497	36	3,380	21,294	50	2,630	16,570	64	740	4662
9	74	467	23	3,597	22,661	37	78	491	51	2,640	16,632	65	740	4662
10	113	712	24	3,597	22,661	38	3,380	21,294	52	1,093	6,886	66	740	4662
11	75	473	25	2,270	14,301	39	4,676	29,458	53	1,426	8,984			
12	2,270	14,301	26	2,270	14,301	40	3,380	21,380	54	1,129	7113			
13	4,908	30,920	27	2,270	14,301	41	1,425	8,978	55	572	3,604	TOTAL	141,677	904,535
14	2,270	14,301	28	2,640	16,570	42	2,640	16,632	56	1,093	6,886			

LEGEND

- A GASOMETER
- B FOAM EXTINGUISHING STATION
- C R.R. TURNTABLE
- D R.R. TANKCAR FILLING & WEIGHING
- E SLIDING PLATFORM
- F PLATFORM
- G PIPELINES
- H LUBRICATING OIL FILLING ROOM
- J LUBRICATING OIL STORAGE ROOM
- K STORAGE SHED
- L KEROSENE FILLING ROOM
- M KEROSENE STORAGE ROOM
- N NARROW GAUGE R.R.
- O BOILER HOUSE
- P SMOKESTACK
- Q STORAGE ROOM
- R ASPHALT FILLING ROOM
- S PUMPHOUSE
- T WATER PUMPHOUSE
- U STEAM WINCH
- V CLARIFYING TANKS
- W OFFICE AND LABORATORY
- X WORKSHOP
- Y STABLE
- Z ASPHALT TANKS

P 35

BULK PLANT

"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H. NEUER PETROLEUMHAFEN HAMBURG

SCALE
METERS 10 0 20 40 60 80 100
YARDS 10 0 20 40 60 80 100

DETAILS OF TANKAGE			
NO.	PRODUCT	M3	BBLS
1	GASOLINE?	4,100	25,830
2	GASOLINE?	4,100	25,830
3	GASOLINE?	1,500	9,450
4	GASOLINE?	850	5,355
5	GASOLINE?	2,500	15,750
6	GASOLINE?	2,500	15,750
7	GASOLINE?	850	5,355
8	KEROSENE?	3,400	21,420
9	KEROSENE?	4,700	29,610
10	KEROSENE?	6,400	40,320
11	KEROSENE?	4,700	29,610
12	KEROSENE?	3,400	21,420
13	KEROSENE?	3,400	21,420
14	KEROSENE?	6,400	40,320
	TOTAL	48,800	307,440

ELBE RIVER
GASOMETER
FENCE
ROAD
FENCE
1
2
3
4
5
6
7
8
9
10
11
12
13
14
FENCE
MOVING PLATFORM
TUNNEL
ROAD
FENCE
TUNNEL
TRACK SCALES
GASOLINE FILLING ROOM
TURNTABLE
OFFICE AND WORK SHOP
TUNNEL
BOILER HOUSE
GASOLINE PUMPHOUSE
STORAGE SHED
FENCE
KEROSENE PUMPHOUSE
TRACK SCALES
TURNTABLE
MOVING PLATFORM
KEROSENE FILLING ROOM
FENCE
PONTOON
LANDING
PARKHAFEN
FIRE STATION
BOLLARDS

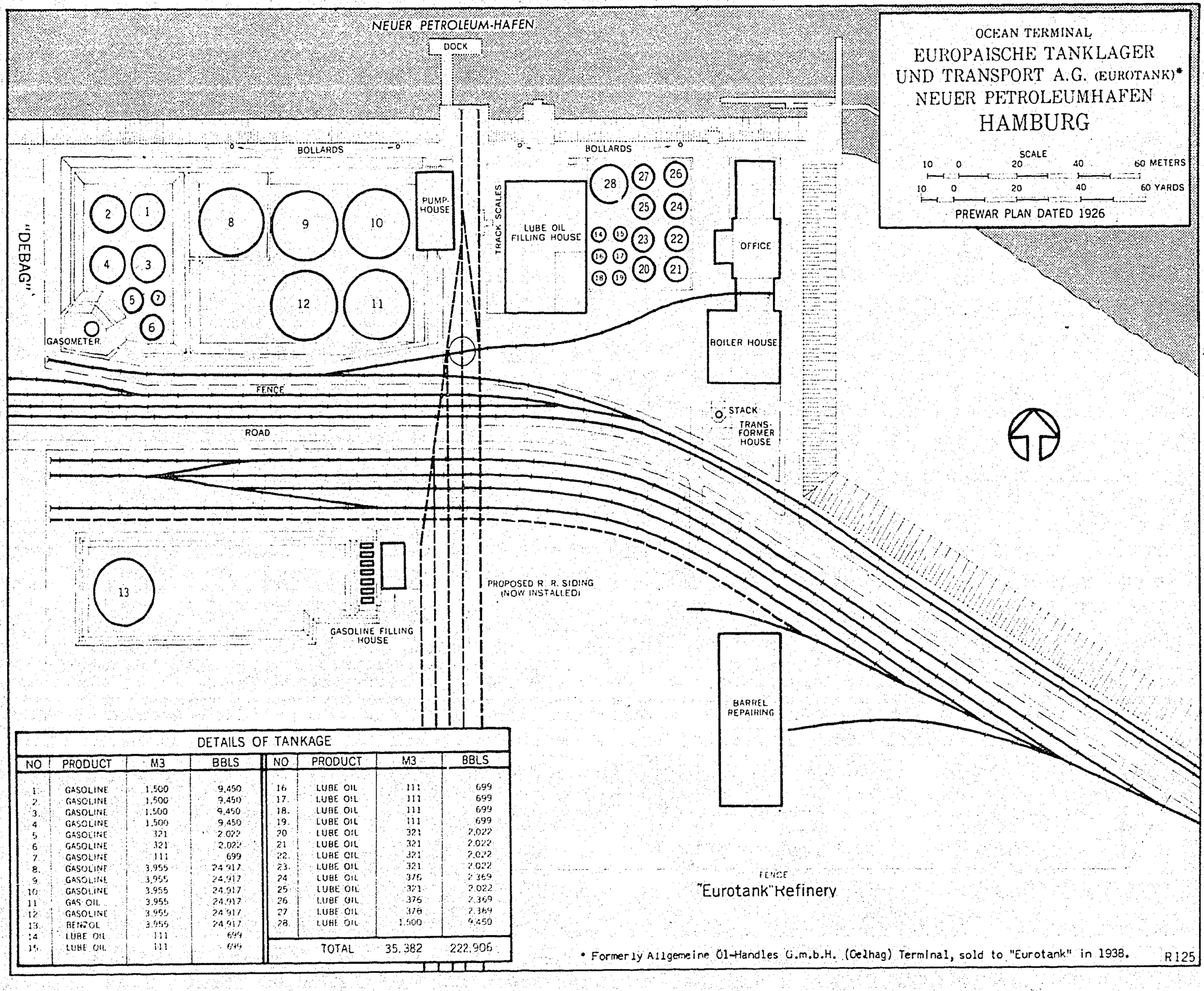
NEUER PETROLEUMHAFEN

R7

NEUER PETROLEUM-HAFEN

OCEAN TERMINAL
EUROPAISCHE TANKLAGER
UND TRANSPORT A.G. (EUROTANK)*
NEUER PETROLEUMHAFEN
HAMBURG

SCALE
10 0 20 40 60 METERS
10 0 20 40 60 YARDS
PREWAR PLAN DATED 1926



"Eurotank" Refinery

DETAILS OF TANKAGE

NO	PRODUCT	M3	BBLS	NO	PRODUCT	M3	BBLS
1.	GASOLINE	1,500	9,450	16.	LUBE OIL	111	699
2.	GASOLINE	1,500	9,450	17.	LUBE OIL	111	699
3.	GASOLINE	1,500	9,450	18.	LUBE OIL	111	699
4.	GASOLINE	1,500	9,450	19.	LUBE OIL	111	699
5.	GASOLINE	321	2,022	20.	LUBE OIL	321	2,022
6.	GASOLINE	321	2,022	21.	LUBE OIL	321	2,022
7.	GASOLINE	111	699	22.	LUBE OIL	321	2,022
8.	GASOLINE	3,955	24,917	23.	LUBE OIL	321	2,022
9.	GASOLINE	3,955	24,917	24.	LUBE OIL	376	2,369
10.	GASOLINE	3,955	24,917	25.	LUBE OIL	321	2,022
11.	GAS OIL	3,955	24,917	26.	LUBE OIL	376	2,369
12.	GASOLINE	3,955	24,917	27.	LUBE OIL	376	2,369
13.	BENZOL	3,955	24,917	28.	LUBE OIL	1,500	9,450
14.	LUBE OIL	111	699				
15.	LUBE OIL	111	699		TOTAL	35,382	222,906

* Formerly Allgemeine Öl-Handles G.m.b.H. (Oelhag) Terminal, sold to "Eurotank" in 1938.

R125

OCEAN TERMINAL

ATLANTIC REFINING CO., G.m.b.H.

HAMBURG-GRASBROOK

BARREL STORAGE

BARREL WASHING

OFFICES

STORAGE TANKS

WORKMENS ROOM

RESIDENCE

WASH ROOM

COOPERAGE

WORTHDAMMSTRASSE

TRACK SCALE

MIXING TANKS

STORAGE TANK

TANK CAR LOADING

152 M³ - 958 Bbls.

169 M³ - 1065 Bbls.

GRENZKANAL

600 M³ 3780 Bbls.

600 M³ 3780 Bbls.

PUMP HOUSE

CRANE

600 M³ 3780 Bbls.

SMITHY

BOILER HOUSE

MACHINE HOUSE

PUMPHOUSE

STACK

242 M³ - 1525 Bbls. Each

256 M³ - 1676 Bbls. Each

HOSE HOUSE

PUMPHOUSE

300 M³ 1890 Bbls.

253 M³ 1595 Bbls

1966 M³ 12,392 Bbls.

1407 M³ 8864 Bbls.

1407 M³ 8864 Bbls.

600 M³ 3780 Bbls.

600 M³ 3780 Bbls

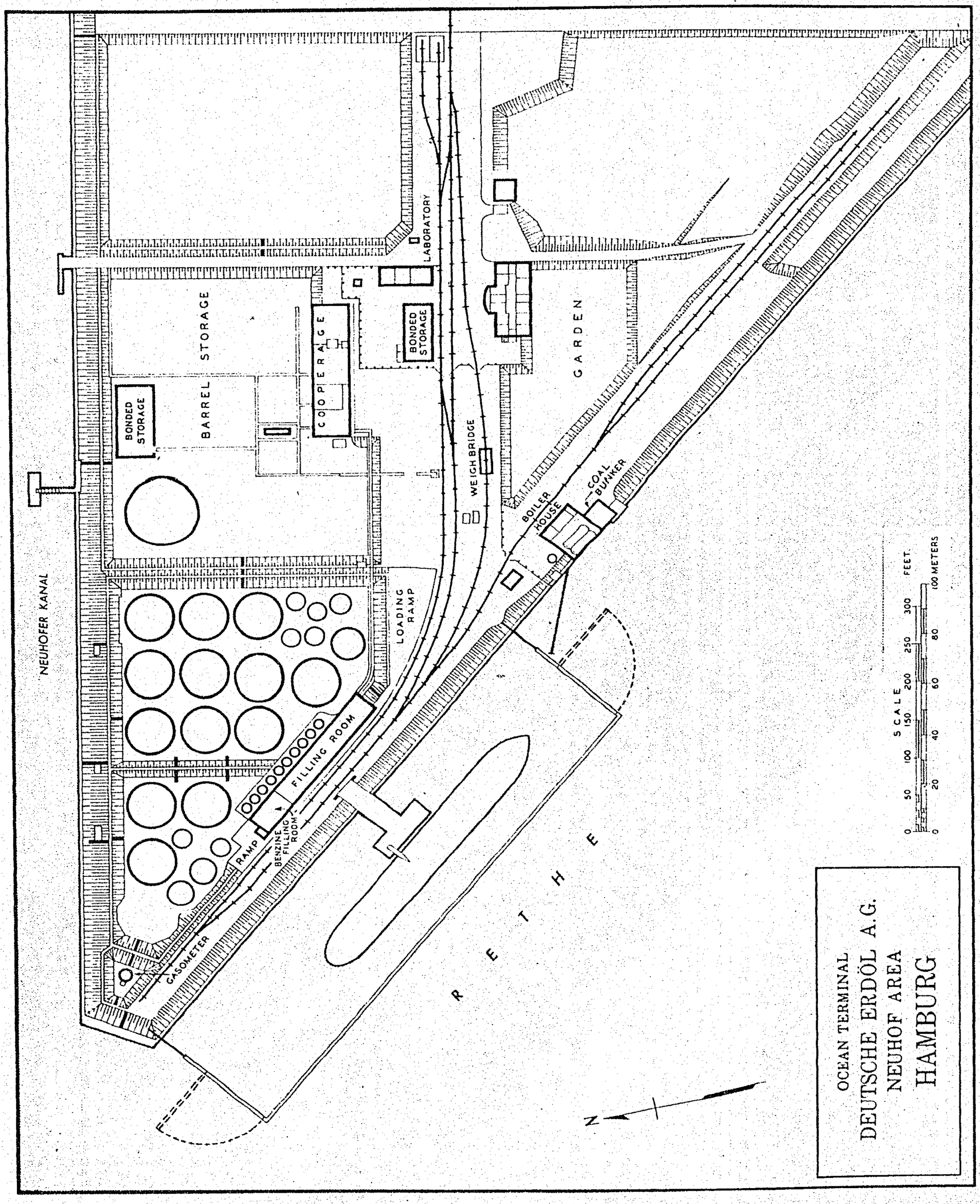
253 M³ 1595 Bbls

265 M³ 1670 Bbls.

R158

DISTRIBUTING
Hamburg-Grasbrook

Neuhof, Hamburg



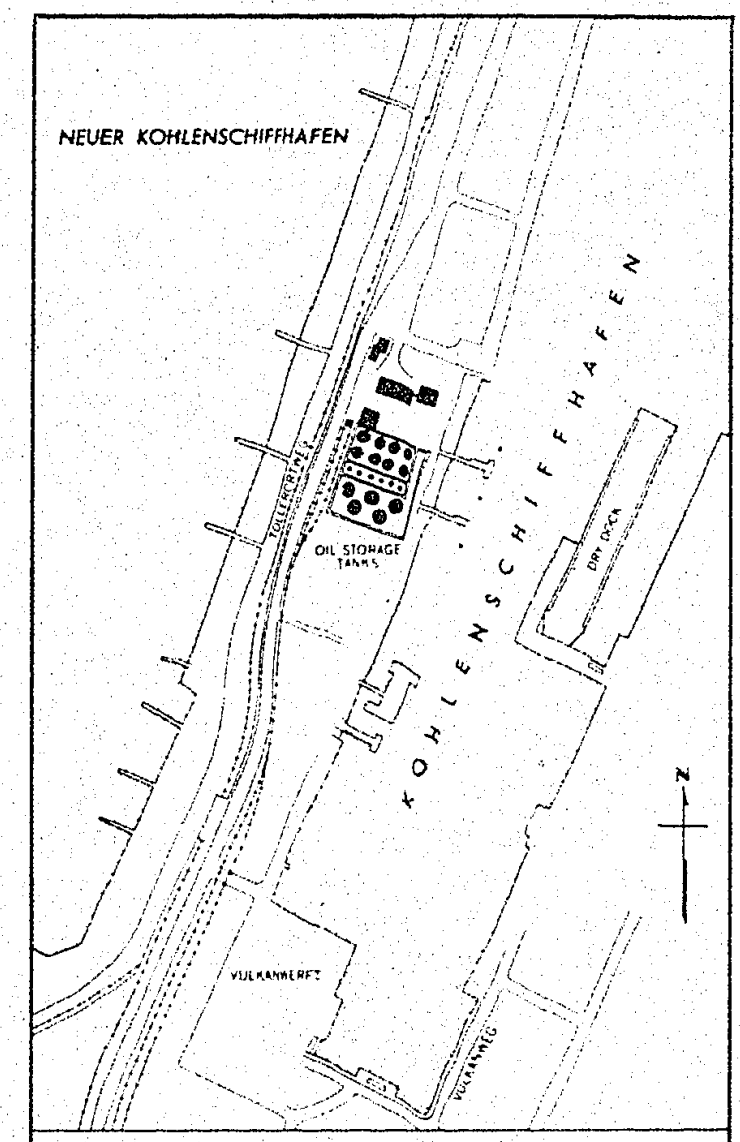
Neuhof area.- The Deutsche Erdöl A.G. terminal is accessible by ocean tankers via the Kohlbrand. This terminal was used for handling bulk gasoline stocks and is sometimes referred to as belonging to "Olex" Deutsche Benzin- und Petroleum Ges., as that company marketed the gasoline refined by the Deutsche Erdöl A.G. interests. A layout plan appears on page 254.

The lube oil refinery Olwerke Julius Schindler, adjacent to the Deutsche Erdöl terminal and the vegetable oil plant of Hansa Mohle on the Neuhofer Canal normally received stocks by smaller tankers or lighters. Both plants are shown on the map on page 116.

The tankage at the Kohlenschiffhafen, which has been included in this area, is believed to be accessible to ocean vessels, though its ownership and use is not definitely known. A layout sketch of the tankage, drawn from air cover, appears on this page.

Estimated tankage capacities for all plants appear on page 245.

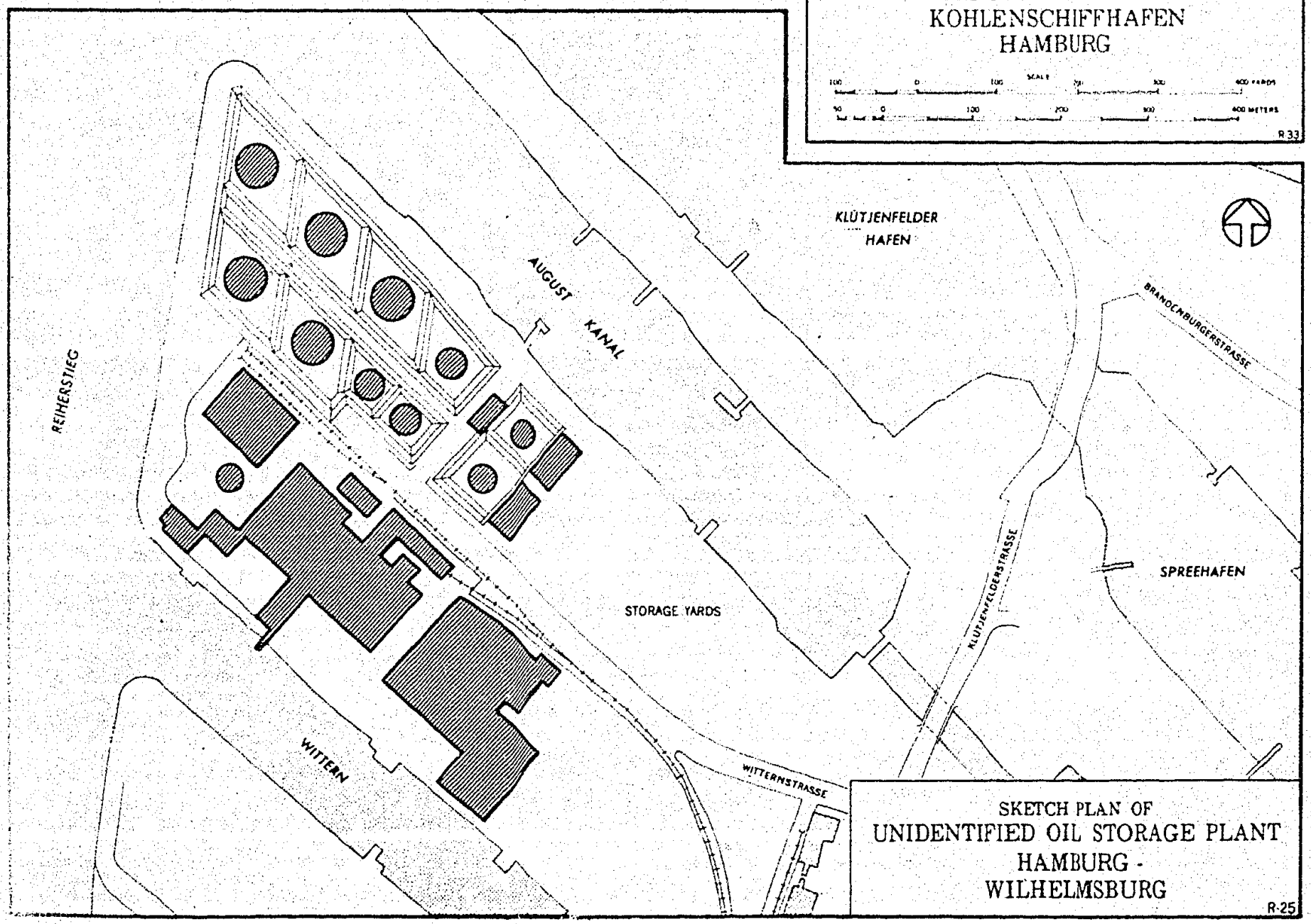
Wilhelmsburg area.- Except for the Rhenania-Ossag refinery, shown on page 123, layout plans and tankage statements are not available and data



SKETCH PLAN OF
OIL STORAGE PLANT
KOHLENSCHIFFHAFEN
HAMBURG

SCALE
100 0 100 300 500 400 YARDS
50 0 100 200 300 400 METERS

R 33



SKETCH PLAN OF
UNIDENTIFIED OIL STORAGE PLANT
HAMBURG -
WILHELMSBURG

R-25

MAP SHOWING OF

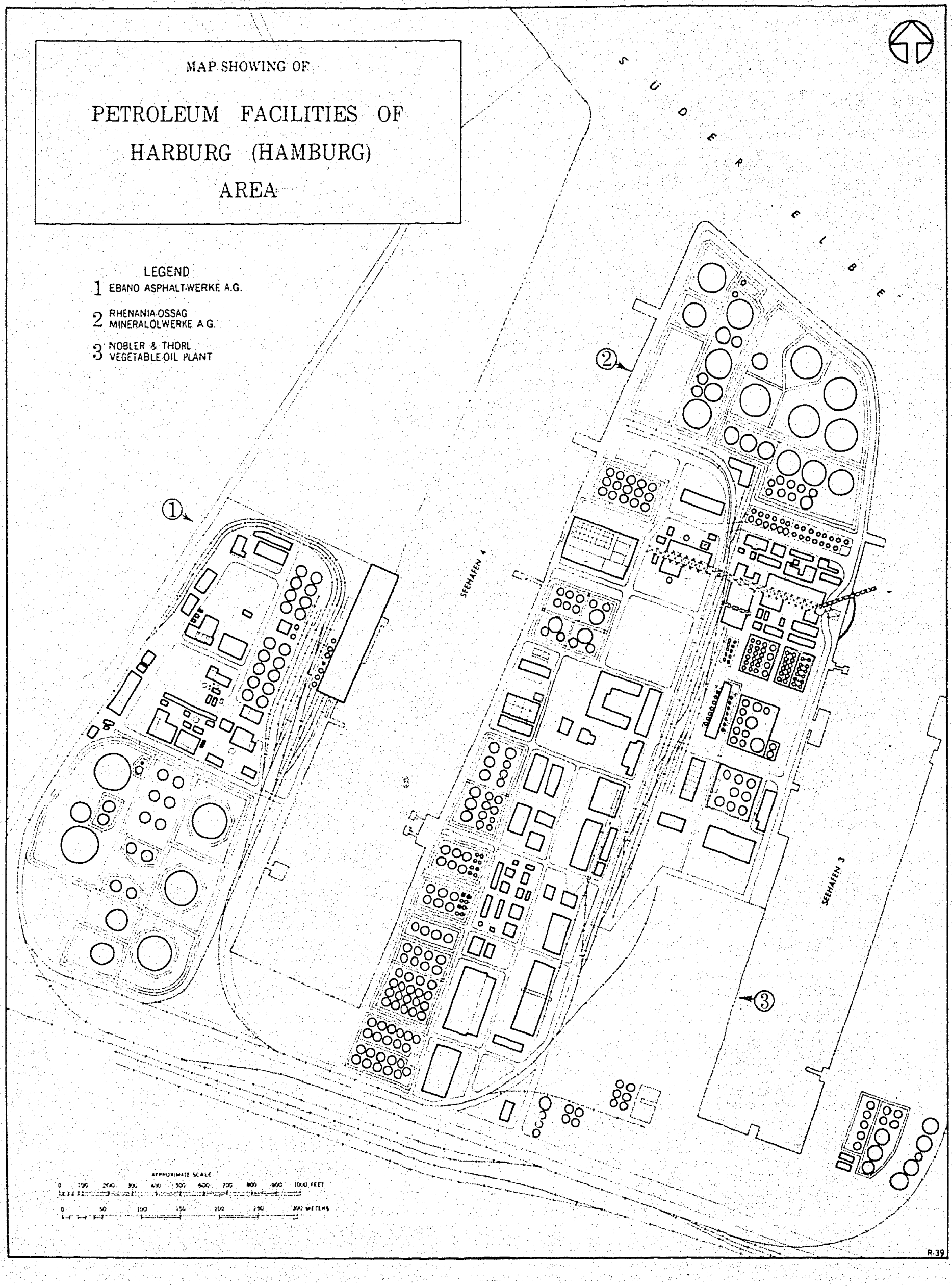
PETROLEUM FACILITIES OF HARBURG (HAMBURG) AREA

LEGEND

1 EBANO ASPHALT-WERKE A.G.

2 RHENANIA-OSSAG MINERALÖLWERKE A.G.

3 NÖBLER & THÖRL VEGETABLE-OIL PLANT



R-39

is very limited concerning the plants in this area. However, the layout plan of the Deutsche Petroleum A.G., also shown on page 123 was drawn from air cover as were the sketches of the other plants shown on the map on page 116. The plants are accessible by lighters and small vessels via the Reiherstieg Canal.

Both the Rhenania-Ossag plant and the adjacent plant of the Deutsche Petroleum A.G. are petroleum refineries. The Johann Haltermann, plant is a tar and benzol distillation plant.

The plant shown as No. 9 on the map on page 116 consists of two medium sized and seven small tanks but it has not been definitely identified as to ownership nor use. It is thought possibly to be a bulk plant built before the war by Ernst Jung.

Plant No. 6 on the map on page 116 is believed to be the small vegetable oil works of the Nordische Olwerke. While not truly an oil terminal, it is included for the sake of completeness, as is plant No. 7 on the map which, though unconfirmed, is said to possibly be a small compounding works belonging to Ernst Schliemann's Oelwerke.

The tankage at the juncture of the Reiherstieg Canal and the August Canal, shown as plant No. 7 on the map on page 247, has not been identified as to ownership nor use. A sketch of the plant, drawn from air cover, appears on page 255.

Harburg area.- Layout plans of the Ebano Asphalt-Werke A.G. and the Rhenania-Ossag Mineralölwerke A.G. appear on pages 105 and 118, in the Refining section of this report. Besides these two refineries, the large vegetable oil plant of Nobler & Thorl, with extensive bulk tankage, is located at the Harburg docks. See page 256.

There are numerous berths at the Harburg docks available to deep sea-tankers drawing up to 29 feet at low water. Prewar pipe line connections for crude oil and products at the berths are 4 inches, 6 inches, 10 inches and 12 inches.

Schulau

The terminal facilities at Schulau were located at the lubricating oil refinery of the Deutsche Vacuum Oil A.G., in conjunction with which the Deutsche-Amerikanische Petroleum-Gesellschaft operated a small gasoline plant. A layout plan appears on page 101 in the Refining section. Tankers berth at the docks on the river front but detailed data are lacking. Tankage is estimated at 50,700 M^3 (319,400 barrels).

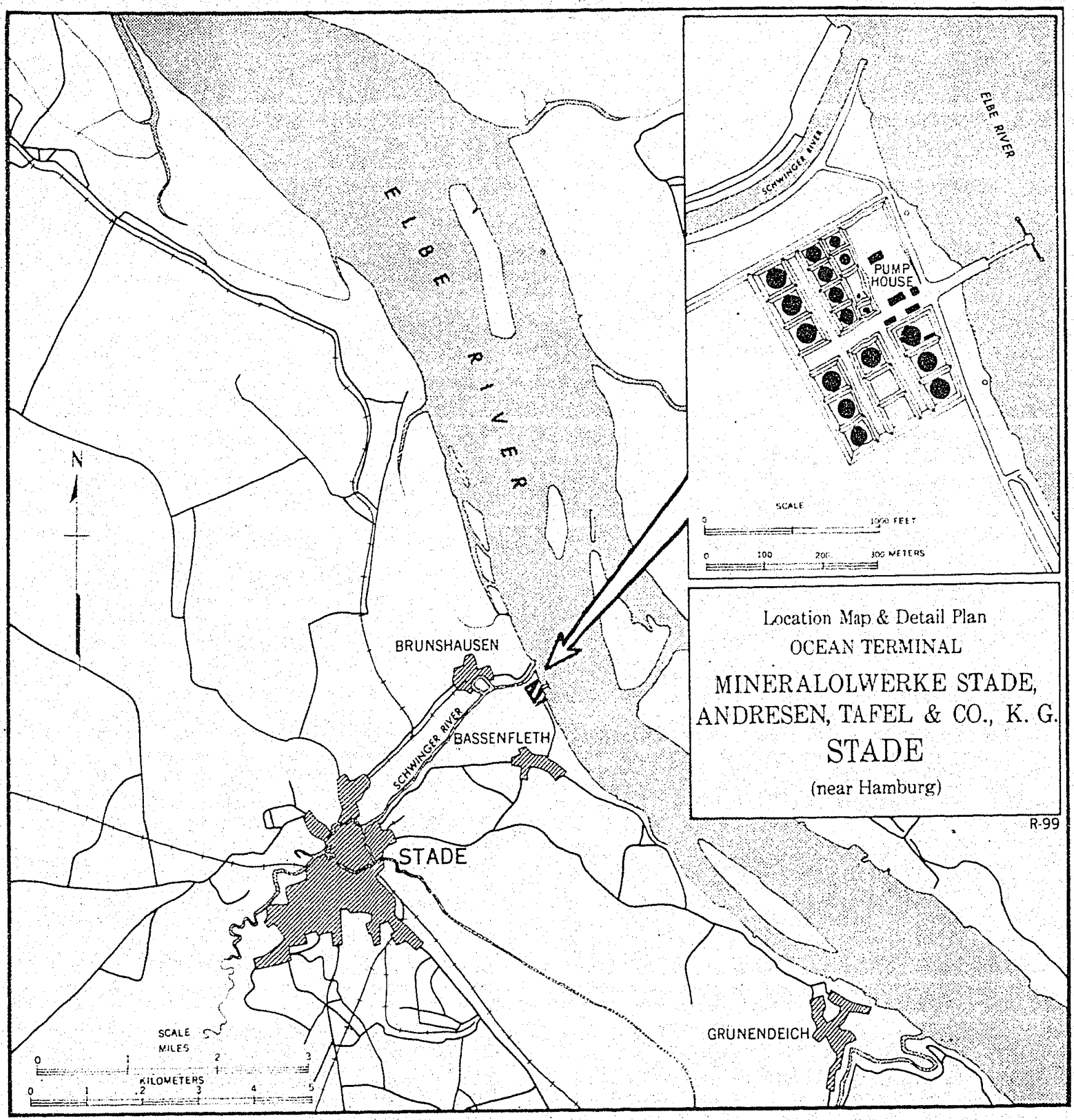
Stade

The terminal facilities at Stade are located on the east bank of the Elbe, about twenty miles below Hamburg. This plant belongs to Mineralölwerke Stade, Andresen Tafel & Co. K.G. and is shown by air cover to consist of the following tankage:

Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
10	110	10,000	63,000	100,000	630,000
4	75	4,000	25,200	16,000	100,800
2	50	2,000	12,600	4,000	25,200
2	46	1,000	6,300	2,000	12,600
18	T o t a l			122,000	768,600

No other details concerning this installation are available. See map, page 258.



5.7.5 Kaiser Wilhelm (Kiel) Canal

Brünsbuttel, Flemhude, Kiel, Ostermoor, Rendsburg, Schafstadt

The Kaiser Wilhelm Canal, often referred to as the Kiel Canal or the Nordsee Canal, runs from the North Sea to the Baltic, and is some 53 miles long. There are two double sets of locks at each end. The new locks are 1,082 feet long, 147 feet wide. The canal width is 338 feet at water level and 114 feet at bottom. All bridges over the canal are at high levels except one swinging bridge. Vessels up to 1,033 feet long, 131 feet wide, 31 feet draft and masts not exceeding 131 feet can pass through the canal. In normal times the canal has electric marker and signal lights on both sides throughout its entire length.

Terminal and bunkering facilities are located at the following points along the canal, proceeding from the North Sea to the Baltic.

Brünsbuttel.- At the North Sea entrance to the canal a bunkering terminal of 14,275 M3 (89,933 barrels) capacity is reported. Ownership and other details are unknown.

The Deutsch-Amerikanische Petroleum-Gesellschaft is also reported to have a small diesel oil bunkering station here consisting of 17 tanks but with a total capacity of only about 1,875 M3 (11,813 barrels).

Ostermoor.- On the southeast bank of the canal, about three miles in from Brünsbuttelkoog, lies the refinery of the Mineralöl- und Asphaltwerke A.G. (Mawag). This is an asphalt and black oil refinery and tankage is reported as follows:

Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
		M3	Barrels	M3	Barrels
4	120	11,000	69,300	44,000	277,200
1	85	5,000	31,500	5,000	31,500
13	80	4,000	25,200	52,000	327,600
4	35	800	5,040	3,200	20,160
T o t a l				104,200	656,460

This refinery has been heavily bombed and is reported to have been inactive for a considerable time.

Deutsche Gasolin A.G. is reported to have storage at Ostermoor, presumably on the canal, consisting of four large tanks, total capacity 76,200 M3 (480,060 barrels).

There are also unconfirmed rumors of a national reserve storage installation consisting of some sixty 10,000 M3 tanks but its existence appears doubtful.

Schafstedt.- The village of Schafstedt, latitude 54° 4' N., longitude 9° 19' E., lies on the northwest bank of the canal, about twelve miles from Brünsbuttel. The storage plant lies about a mile southwest of the village and consists of four large buried tanks, of approximately the following dimensions.

No. of Tanks	Diameter Feet	Height Feet	Individual Capacity		Total Capacity	
			M3	Barrels	M3	Barrels
4	160	25	12,000	75,600	48,000	302,400

Supplies normally are received by pipe line from the Heide-Hemmingstedt refinery. From the tanks a buried pipe line, thought to be equipped with heating elements, leads to the bunkering pier in an indentation of the canal bank, about 350 yards to the south. As seen in air cover, this pipe line appears to include a large U-shaped bend, the purpose of which is not clear.

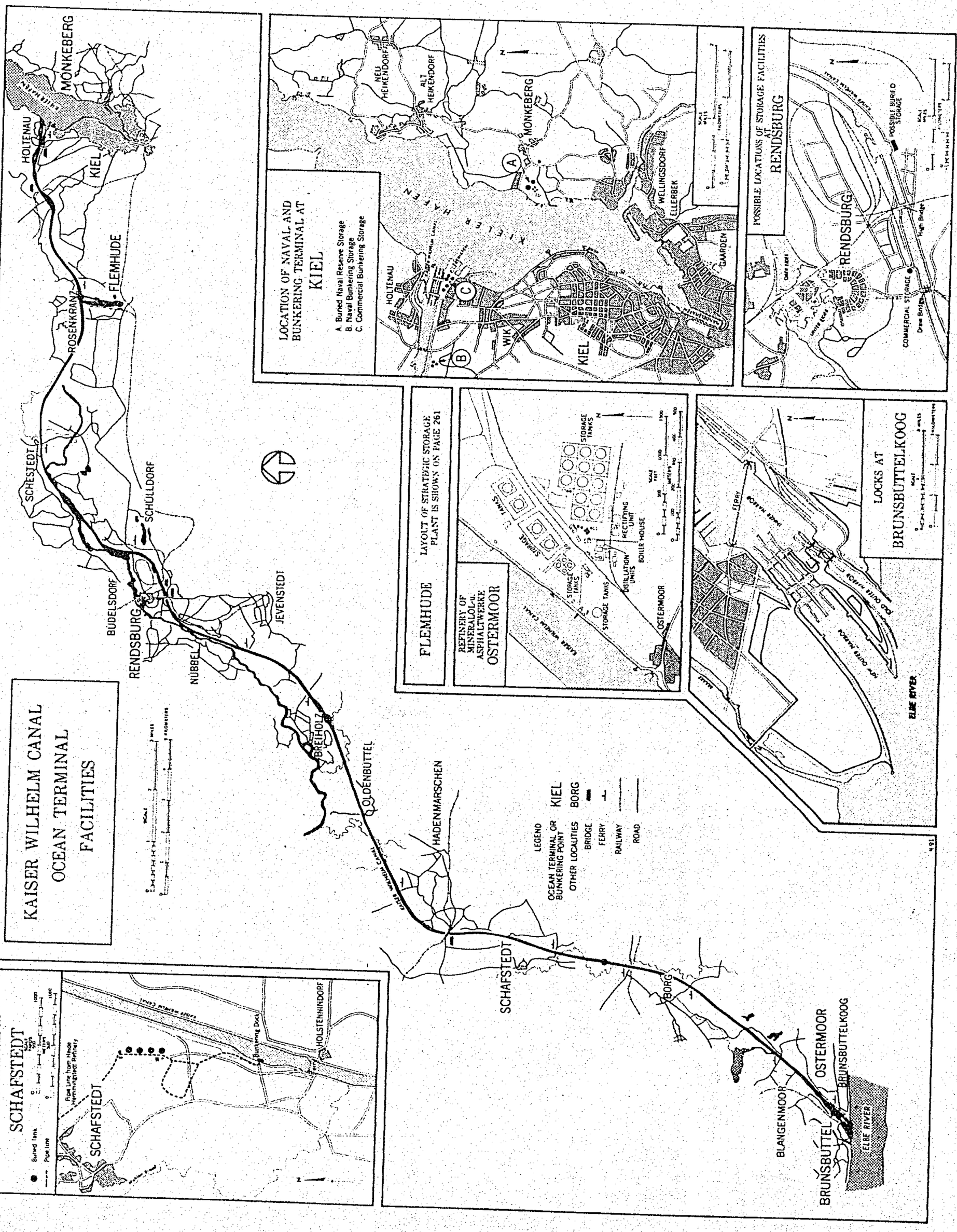
Rendsburg.- The town of Rendsburg lies on the canal about two-thirds of the way from Brünsbuttel to Kiel, latitude 54° 18' N., longitude 9° 42' E.

The following partially buried tankage is reported to exist on the north side of the canal.

Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
		M3	Barrels	M3	Barrels
2	140	15,000	94,500	30,000	189,000
2	120	11,000	69,300	22,000	138,600
2	90	6,000	37,800	12,000	75,600
T o t a l				64,000	403,200

Kaiser Wilhelm Canal



Another unidentified storage plant, said to consist of 14 tanks with a total capacity of 78,000 M^3 (491,400 barrels) is reported at Rendsburg. Prior to the war, the Deutsch-Amerikanische Petroleum-Gesellschaft and Hans Staak both owned bunkering installations here, but details are lacking and it has not been possible to positively identify them with this plant.

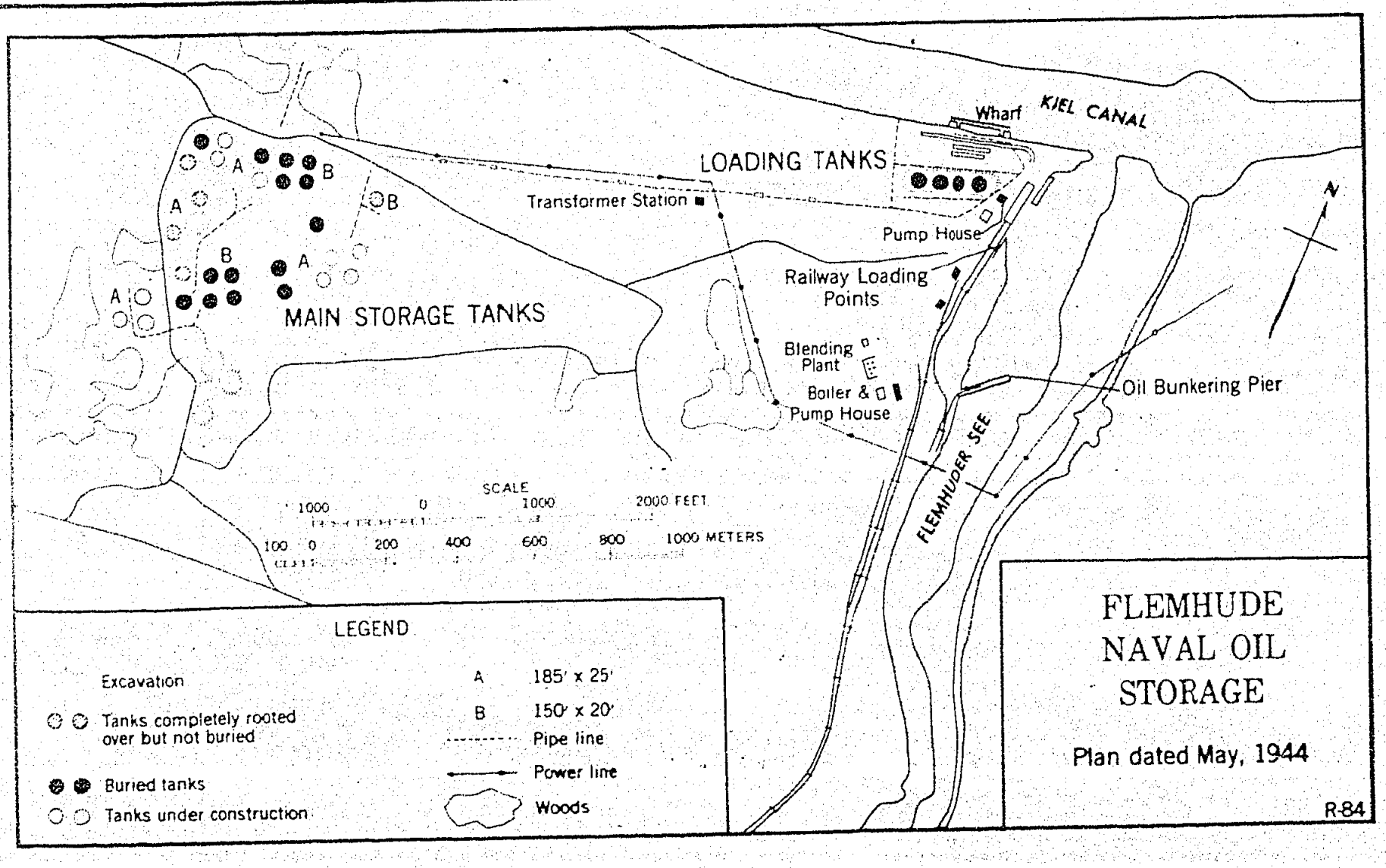
Additional buried storage is reported to possibly exist opposite Rendsburg, on the south bank of the canal, and just north of Osterromfeld. There is an indentation about 520 feet long in the canal bank, and some underground construction has taken place there but it has not been definitely identified as oil storage.

Flemhude.- Latitude 54° 20' N., longitude 9° 58' E. This installation is situated on the south bank of the canal on the west side of the partly filled Flemhudersee and some 8-1/2 miles west of Kiel. It is a major Naval fuel storage center and consists of buried storage tankage, loading and transfer tanks, blending plant, boiler and pumphouse, water and rail loading facilities, etc. Additional tankage and facilities were planned, but never completed. A layout plan drawn from air cover appears below.

Tankage completed and under construction as of May, 1944, is as follows:

Details of Tankage

	No.of Tanks	Diameter Feet	Height Feet	Individual Capacity M^3	Individual Capacity Barrels	Total Capacity M^3	Total Capacity Barrels
Loading tanks on canal	4	150	20	8,600	54,180	34,400	216,720
Main storage tanks	11	150	20	8,600	54,180	34,400	216,720
Main storage tanks	18	185	25	16,000	100,800	288,000	1,814,400
T o t a l						417,000	2,627,100



Kiel

At the time of the last available report, May 1944, ten of the larger tanks representing 160,000 M^3 (1,008,000 barrels) capacity were still incompleted. Therefore, if these tanks remained in an incompleted state the total storage capacity would amount to only 257,000 M^3 (1,619,100 barrels).

Pipe lines are buried, some of them apparently as much as 30 feet deep.

Besides the facilities for receiving tankers and bunkering vessels, the installation is served by a branch of the Rendsburg-Kiel railroad which leaves the main line a mile west of Ackterwehr.

Electric power is supplied to the plant by a power line coming from Kiel.

A small blending plant is located near the rail line in the southeast section of the plant area. There are five round surface tanks, of about 400 M^3 capacity each, seven horizontal cylinders 30 feet long by 8 feet in diameter, twelve tanks of ten feet diameter arranged in three rows of four each and also, an additional four 10-foot tanks. These units are connected with a boiler and pumphouse situated just east of them.

Kiel.- Located at the Baltic end of the canal, Kiel is primarily a Naval base. Though commercial oil terminals are small, considerable stratigically important Naval oil storage is situated here. The North Harbor is inside the locks of the canal. The depths in the Old Harbor vary from 23 to 25 feet. Kiel Bay has no tide and is ice free. The major Naval fuel bunkering and strategic storage installation is located on the top of the cliff at Monkeburg on the east side of the Kiel harbor. Locations are shown on page 260.

Tanks are both of the circular and the cylindrical type and are buried.

Details of Tankage

Type	No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
			M^3	Barrels	M^3	Barrels
Round	6	110	8,000	50,400	48,000	302,400
Cylinders	4 groups				100,000	630,000
Round	2	190	17,300	108,990	34,600	217,980
Round	2	165	12,000	75,600	24,000	151,200
T o t a l					206,600	1,301,580

The last two tanks listed above were under construction since 1940, and were not completed at the end of 1942, hence, may not represent effective storage capacity.

Four small tanks of about 150 M^3 (945 barrels) each are located on the quay side.

The pipe lines connecting the fueling jetty are all underground.

Another Naval bunkering station is located 150 yards south of the Kaiser Wilhelm Canal and 400 yards west of the Prince Hendriche bridge. This consists of three 165-foot tanks of approximately 20,000 M^3 each, a total of 60,000 M^3 (378,000 barrels). These tanks were begun in 1940, and were still under construction in 1942, and it is not definitely known if they were ever completed.

The commercial petroleum terminal is located at the Friehafen in the Wik area, and is referred to as belonging partly to Deutsche Gasoline A.G.

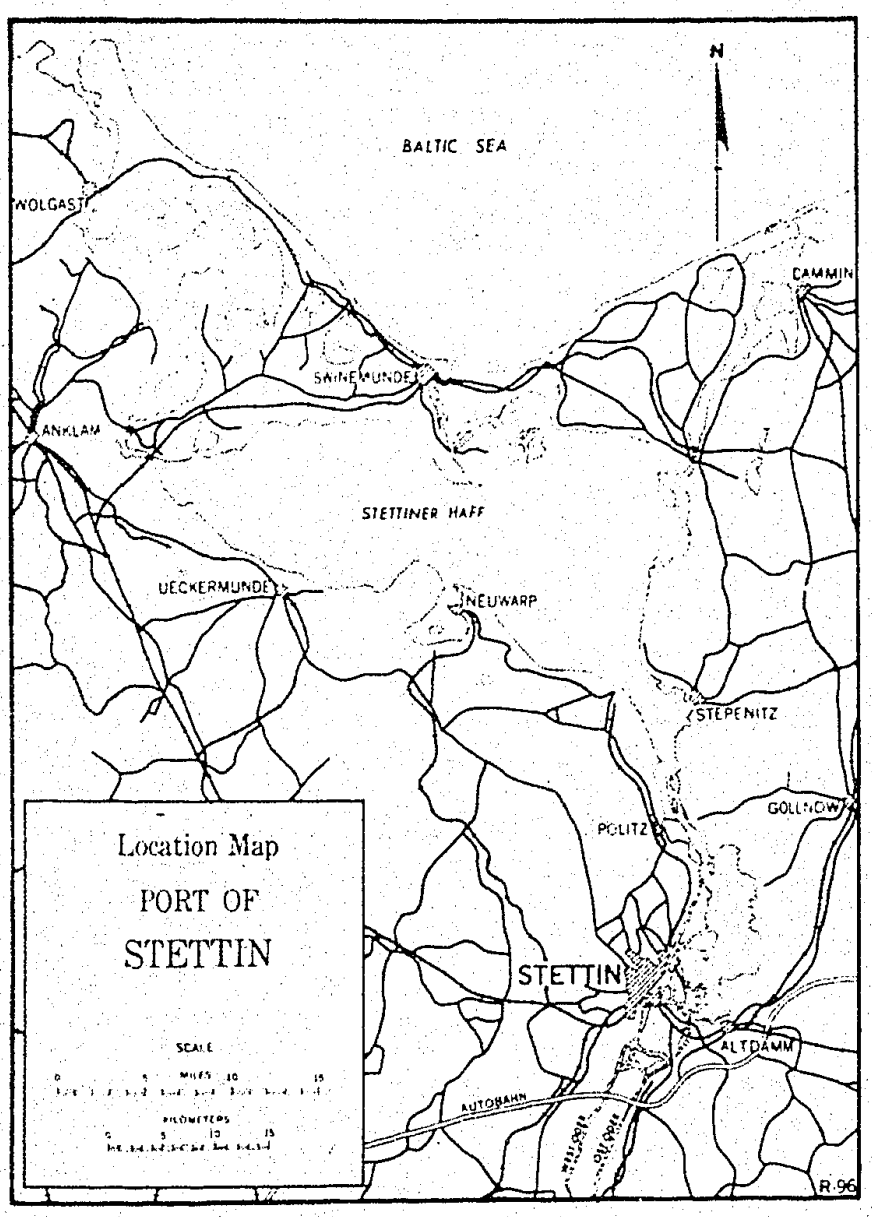
Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
2	120	11,000	69,300	22,000	138,600
3	100	8,000	50,400	24,000	151,200
1	30	500	3,150	500	3,150
T o t a l				46,500	292,950

Although other miscellaneous small tankage may exist around the port, the major terminals may be summarized as follows:

	No. of Tanks	Total Capacity M^3	Total Capacity Barrels
Naval - 4 groups of cylinders &	10 tanks	206,600	1,301,580 (a)
Naval	3	60,000	378,000 (a)
Commercial (Deutsche Gasolin ?)	6	46,500	292,950
T o t a l		313,100	1,972,530

5.7.6 Stettin



The port of Stettin, latitude 53° 25' N., longitude 14° 34' E., is the only German port on the Baltic, other than Kiel, where deep sea tankers called. Depth at the entrance to the port varies from 28-1/2 to 32 feet depending on wind and currents, and depth in the basin is 27 feet. In the winter ice breakers are employed to keep the port open.

A large Naval reserve storage and bunkering plant is reported to exist at Swinemünde at the Baltic Sea entrance to Stettin. Tankage reported to total 171,600 M^3 or (1,081,080 barrels).

Only two small commercial terminals are reported here as follows:

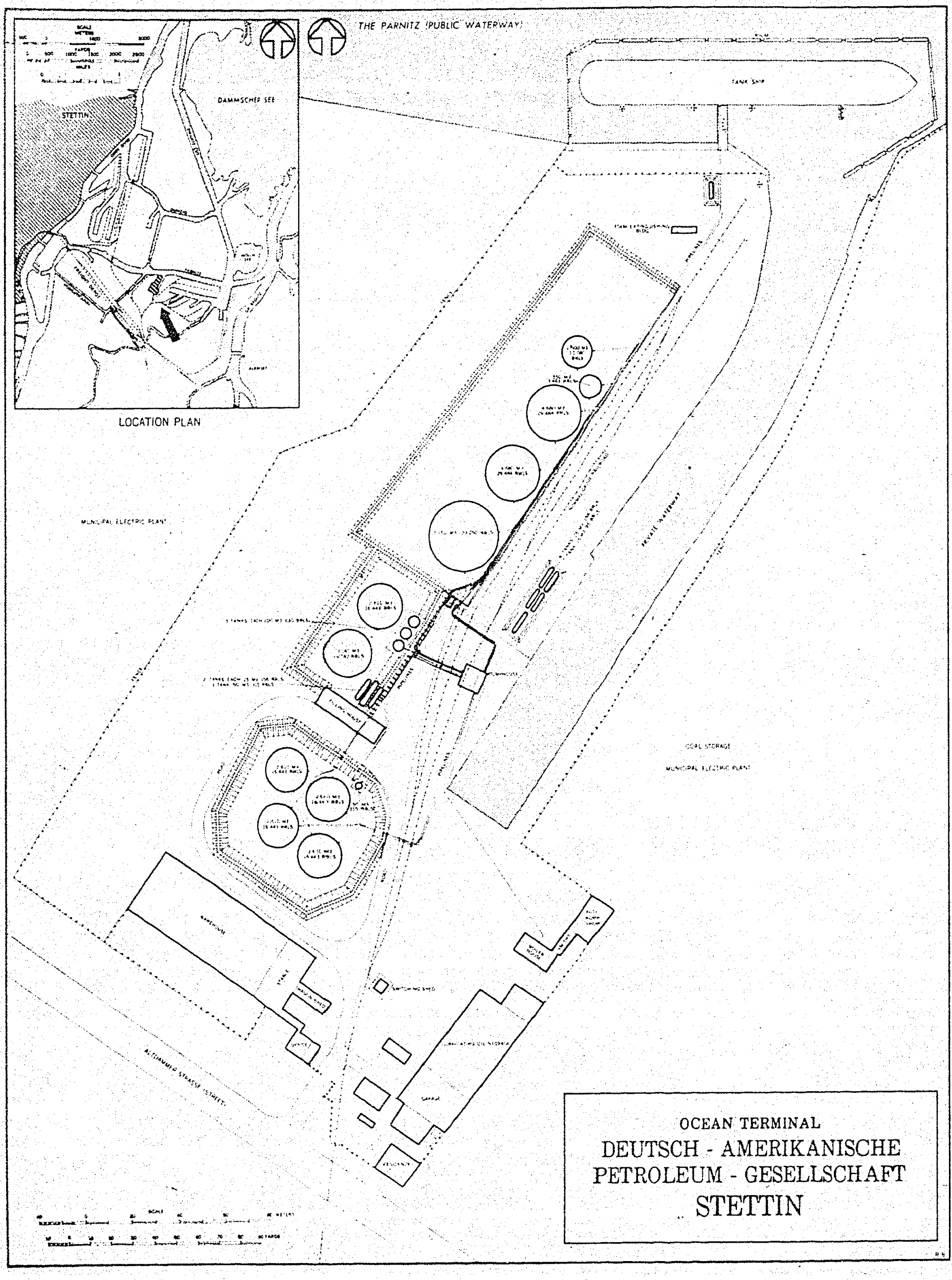
	No.of Tanks	Total Capacity M^3	Total Capacity Barrels
D.A.P.G.	16	35,565	224,063
Rhenania-Ossag	18	4,433	27,928
Total		39,998	251,991

The Deutsch - Amerikanische Petroleum-Ges. terminal is located between the Altdammer Strasse and the Parnitz Canal. A prewar layout plan with location sketch appears on page 264.

D.A.P.G. Terminal Tankage

No. of Tanks	Individual Capacity M^3	Individual Capacity Barrels	Total Capacity M^3	Total Capacity Barrels
1	7,750	48,825	7,750	48,825
2	4,680	29,484	9,360	58,968
1	3,140	19,782	3,140	19,782
5	2,610	16,443	13,050	82,215
1	1,600	10,080	1,600	10,080
1	550	3,463	550	3,463
4	25	158	100	632
1	15	98	15	98
16	T o t a l		35,565	224,063

(a) Total capacity perhaps less if construction not completed.


THE PARNITZ (PUBLIC WATERWAY)
STETTIN
DAMMSCHER SEE
LOCATION PLAN
TANK SHIP
COAL STORAGE
MUNICIPAL ELECTRIC PLANT
PRIVATE WATERWAY
WAREHOUSE
OCEAN TERMINAL
DEUTSCH - AMERIKANISCHE
PETROLEUM - GESELLSCHAFT
STETTIN

The Rhenania-Ossag terminal is located at Steinbruckhafen and the berth is approved for vessels drawing up to 23-1/2 feet.

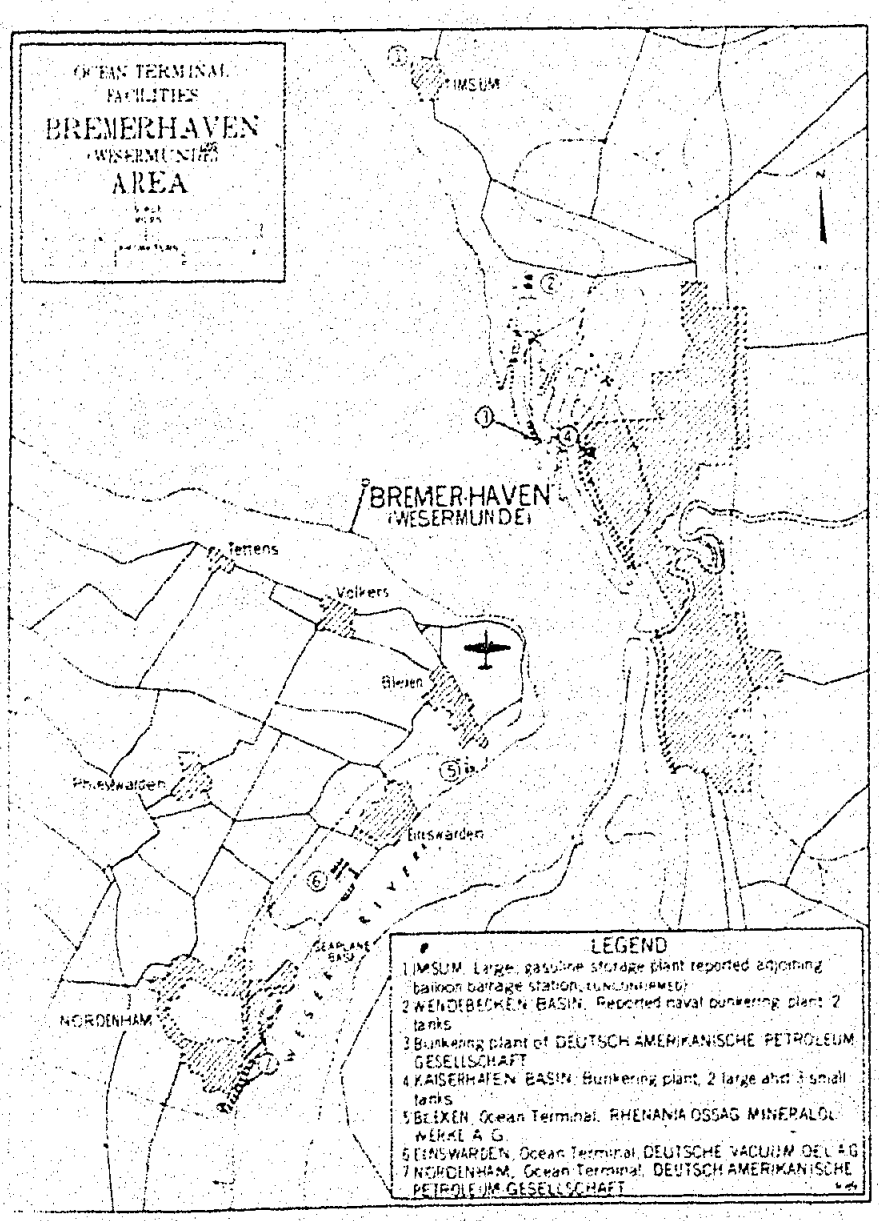
Tankage was largely devoted to gasoline storage and the tankage, according to the parent company's prewar tankage statement, is listed below. No layout plan is available.

Rhenania-Ossag Terminal Tankage

Tank Number	Capacity	
	M^3	Barrels
I	2,069	13,035
II	554	3,490
III	204	1,285
IV	204	1,285
V	204	1,285
VI	551	3,471
VII	204	1,285
VIII	204	1,285
10 filling tanks	239	1,506
Total	4,433	27,927

Pipe lines and shore connections are 6 inches and 8 inches. Discharge rate is 120 tons per hour at allowable pressure of 60 pounds.

5.7.7 Weser River Terminals - Blexen, Brake, Bremen, Bremerhaven, Einswarden, Farge and Nordenham



The Weser River is navigable by ocean going vessels as far as Bremen, some 34 nautical miles from its mouth. A number of petroleum terminals and oil storage installations are located at points along the river between Bremerhaven and Bremen. These plants are described below in the order of their location, proceeding up-river from Bremerhaven.

Bremerhaven.- The port of Bremerhaven, latitude 58° 32' N., longitude 8° 36' E., lies near the mouth of the Weser River and can be entered by vessels of over 40 feet draft.

The largest ships can tie up at the Columbus Kaje on the Weser River. The quay is over 3,000 yards long and has a depth of 45 feet at low water. The tidal rise is 12 feet 1 inch spring and 10 feet 10 inches neap.

There are six wet docks:

	Depth
Verbindungshafen	38 ft.
Kaiserhafen III	38 ft.
Kaiserhafen II	38 ft.
Kaiserhafen I	32 ft.
Neuer Hafen	29 ft.
After Hafen	23 ft.

The only commercial terminal at Bremerhaven is the bunkering terminal of the Deutsch-Amerikanische Petroleum-Gesellschaft, located on Columbus Kaje, but there are two and possibly four small groups of Naval tankage there. Commercial terminal facilities also exist at Blexen, Einswarden and Nordenham, on the west bank of the Weser River opposite Bremerhaven. Few details concerning any of these plants are available, but locations of known plants are shown on the map on page 265 and estimated capacities of plants reported at Bremerhaven are given below.

Estimated Tankage, Bremerhaven

Plant	Location	No. of Tanks	Capacities		Remarks
			M^3	Barrels	
D.A.P.G.	Columbus Kaje	8	31,200	196,560	Bunkering terminal
Navy (?)	North of Wendebecken Basin	2	21,000	132,300	Tanks buried
Navy (?)	South of Kaiserhafen Basin	5	23,200	146,160	Tanks buried
Unidentified	Alterhaven	x	x	x	Unconfirmed
Unidentified	Vorhaven	x	x	x	Unconfirmed
Total			75,400	475,020	

Blexen.- The Rhenania-Ossag Mineralölwerke A.G. owns a small gasoline terminal at Blexen, on the west bank of the Weser River, directly opposite Bremerhaven. The berth at this terminal is approved for vessels with overall length of 545 feet, beam 73 feet, draft 30 feet at low water and 40 feet at high water. The water level may rise as much as 5 feet during westerly gales and lower a similar amount during easterly gales.

This was a gasoline terminal and prewar tankage was as follows:

Details of Tankage

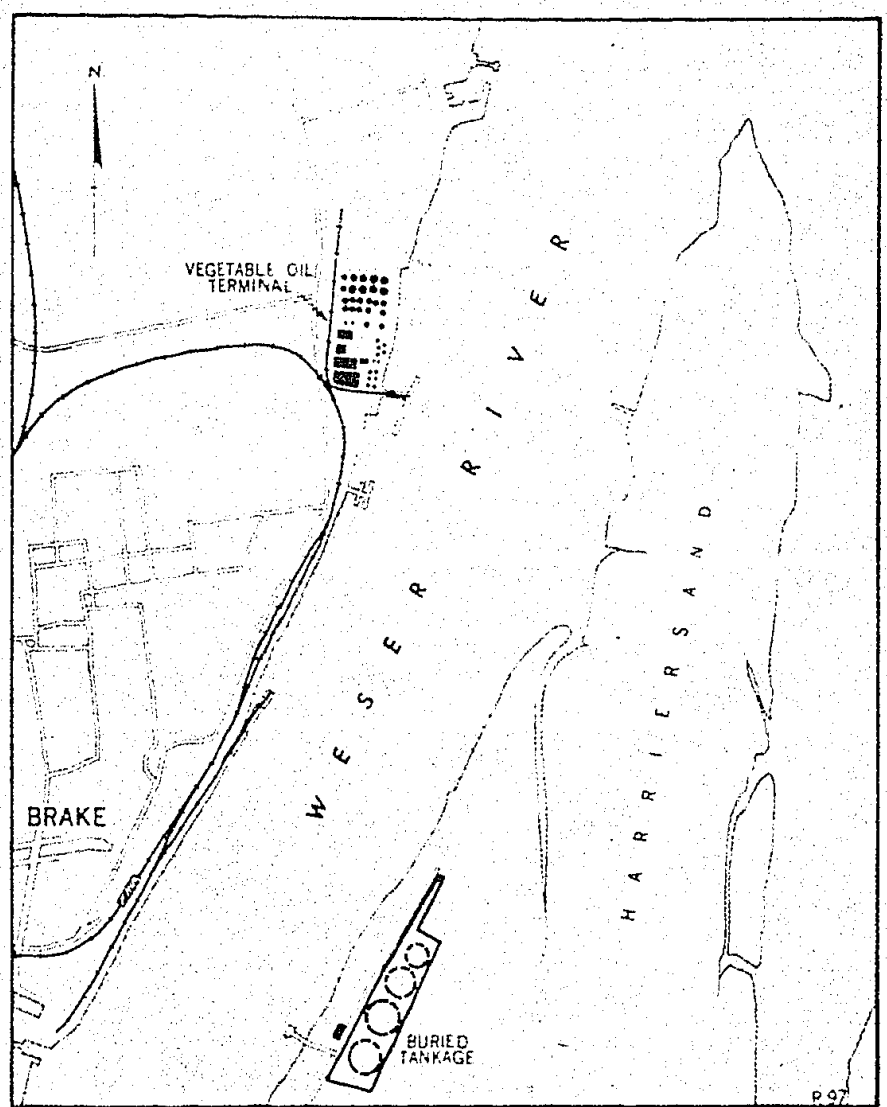
No. of Tanks	Capacity	
	M^3	Barrels
1	4,670	29,421
1	4,652	29,308
1	4,698	31,298
1	4,670	29,421
1	371	2,337
	19,061	121,785

Pipeline connections at the terminal were 8 inches, allowable pressure 45 lbs. and pumping rate 200 tons per hour.

Einswarden.- Einswarden lies on the west bank of the Weser River between Blexen and Nordenham. Air cover reveals an ocean terminal there consisting of 10-140 foot tanks, with an estimated total capacity of 150,000 M^3 (945,000 barrels). Ownership is unknown and no other details are available.

Nordenham.- Nordenham, latitude 53° 30' N., longitude 8° 30' E., lies on the west bank of the Weser River, approximately six miles south or upstream from Bremerhaven. There is one pier, 3,300 feet long, and the depth of water alongside is 30 feet at low water. Tidal conditions are similar to those at Bremerhaven.

The Deutsch-Amerikanische Petroleum-Ges. has a terminal here but details are lacking. Prewar capacity is reported to have been approximately 41,700 M^3 (262,710 barrels). However, aerial reconnaissance has reported 21 tanks with an estimated total capacity of 78,000 M^3 (491,400 barrels) in this locality. Tankage may therefore have been increased or some may belong to other companies. -



LOCATION MAP, OCEAN TERMINAL FACILITIES, BRAKE

Brake.- Latitude 53° 17' N., longitude 10° 44' E., is on the west bank of the Weser River, approximately halfway between Bremen and Bremerhaven. Vessels drawing up to 28 feet can proceed to Brake on ordinary tides. There is a dock, 800 feet long, 350 feet wide, with locks and there are also other basins. Depth of dock at low water is 32 feet.

Two groups of storage tanks exist at Brake, but their ownership is unknown. The group of underground tanks located on the west side of the Harrier Sand appear to be Naval bunkering tanks while the group of unprotected tanks on the west bank north of the town are believed to be a commercial vegetable oil installation. Locations are shown on the map on this page, and estimated capacities are given below.

Details of Tankage

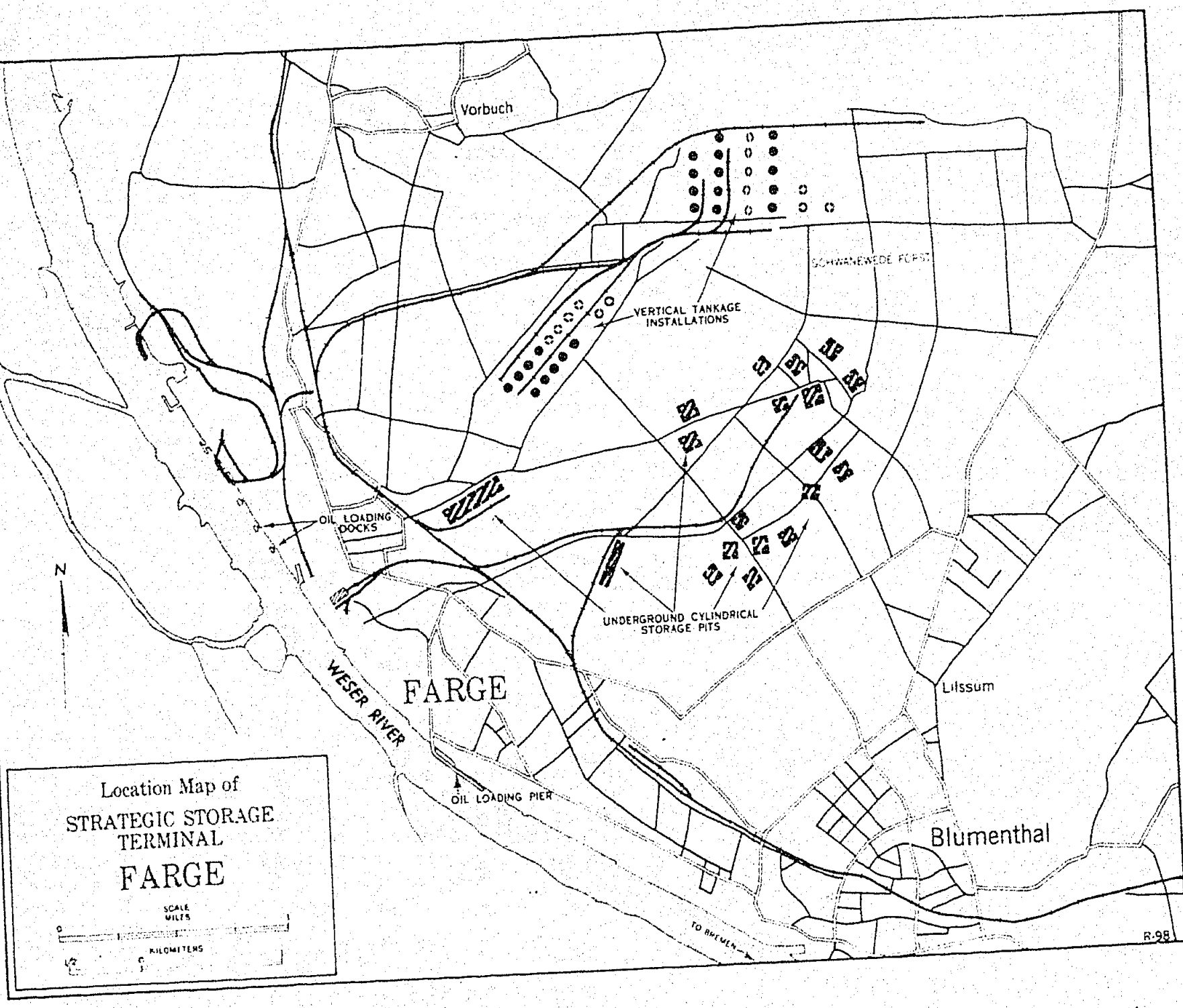
Plant	Location	No. of Tanks	Total Capacity	
			M^3	Barrels
Bunkering	Harrier Sand	4	20,000	126,000
Vegetable oil	North of Brake	41	119,500	752,850
T o t a l			139,500	878,850

Farge.- Farge, latitude 53° 14' N., longitude 8° 33' E., is located on the east bank of the Weser River, some 14 miles northwest of Bremen. This strategic storage installation covers an area of 2-1/4 square miles in the Schwanewede Forest and was planned by the Government to be the largest buried oil reserve in Germany. However, as of January 1943, the plant was only partly completed and construction appears to have been retarded. A layout sketch from air cover appears on page 268.

The northwestern group of tanks consist of from 15 to 18 vertical tanks of which 11 were incomplete as of January 1943. These tanks are 165 feet in diameter with a capacity of approximately 20,000 M^3 each. Hence, total capacity, if completed would equal approximately 360,000 M^3.

The northern group of tanks consist of 18 tanks of which 10 were incomplete as of January 1943. These tanks are 195 feet in diameter with a capacity of 28,000 M^3 each. Hence, the total capacity, if completed, would equal approximately 504,000 M^3.

Between the northern tank group and Farge village are four groups of cylindrical storage containers in a total of 19 pits. The cylinders are 165 feet long, 27 feet in diameter and have a capacity of approximately 2,600 M^3 each. They are under



stood to be buried 10 cylinders to a pit (though in some cases it may be five). Hence, it is estimated that there are 190 cylinders having a total capacity of 494,000 M^3.

Total Tankage Capacity, Farge

	Probable Minimum As of January 1943		Probable Maximum If All Construction Completed	
	M^3	Barrels	M^3	Barrels
Vertical tanks, northwest	140,000	882,000	360,000	2,268,000
Vertical tanks, north	224,000	1,411,200	504,000	3,175,200
Horizontal tanks	247,000	1,556,100(a)	494,000	3,112,200(b)
T o t a l	611,000	3,849,300	1,358,000	8,555,400

There is also room for the addition of many more tanks, but the actual effective storage capacity probably lies somewhere between the above figures.

(a) If five to a pit.
(b) If ten to a pit.

All tanks are shielded with concrete and completely buried except for ventilators, or passages leading into the pits. Tanks are connected by an elaborate system of pipe lines buried in conduits and which lead both to the railway sidings and the piers. There are at least three pumphouses.

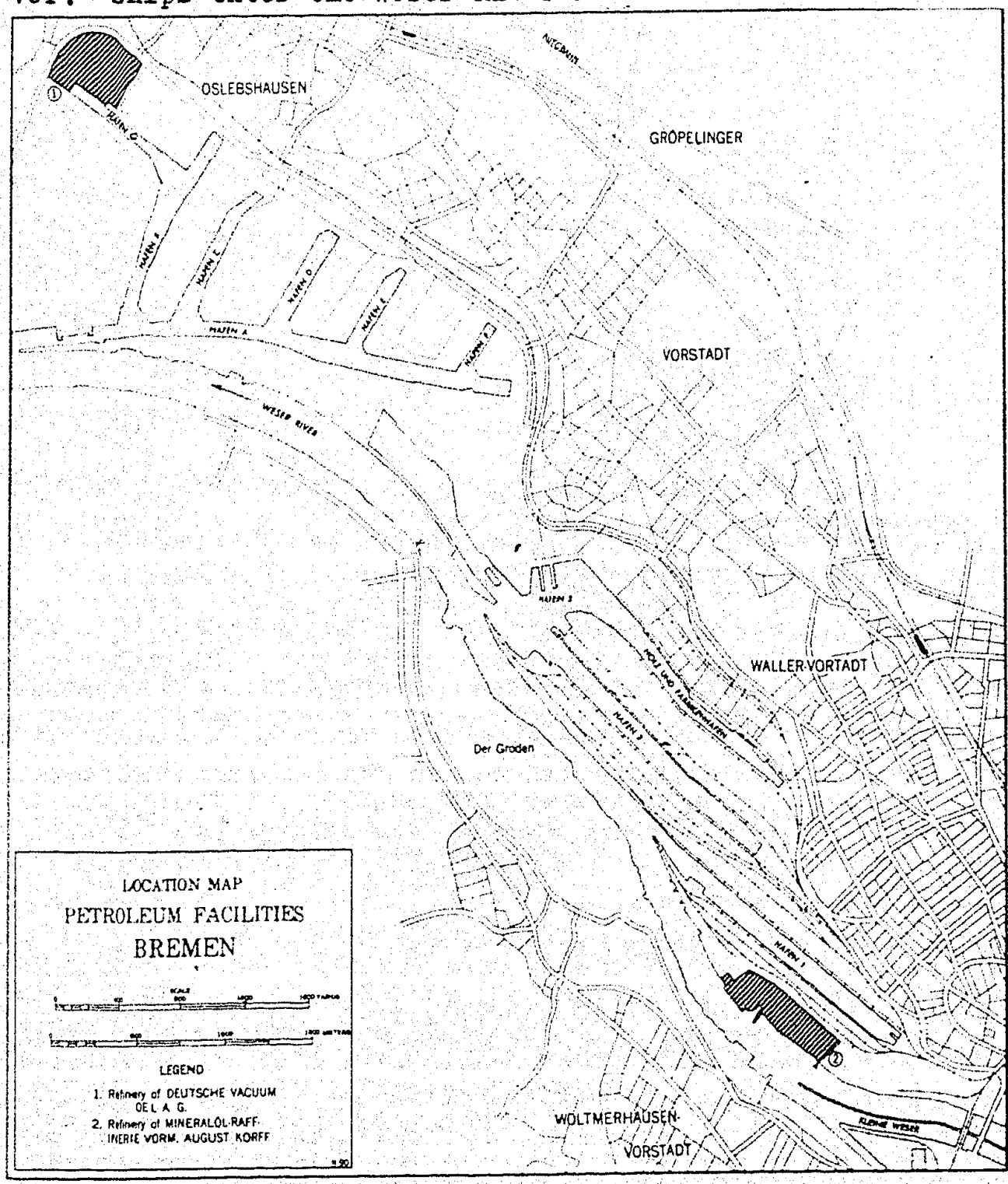
There are three piers at the river side which appear to be available to ships drawing up to 24-1/2 feet.

The upstream pier is built parallel to the shore and appears to be for white products. It is connected to a pumphouse at the northern end of the cylindrical storage group by a pipe line that is buried except for the last 1,250 feet, which crosses the tidal flats to the pier and is supported on piles.

Down river are two small bunkering piers about 650 feet apart. They extend 250 feet into the river and each has a 40 x 20 foot platform at the outer end. The piers are built on piles which carry a catwalk and the pipe line which connects with the pumphouse at the northern end of the vertical storage tank farm.

The plant is also provided with elaborate railway loading facilities. Three separate sets of sidings branch off from the main Bremerhaven-Bremen railway line and another branch line leads around the north side of the large fuel oil tanks. A number of buildings are associated with the sidings.

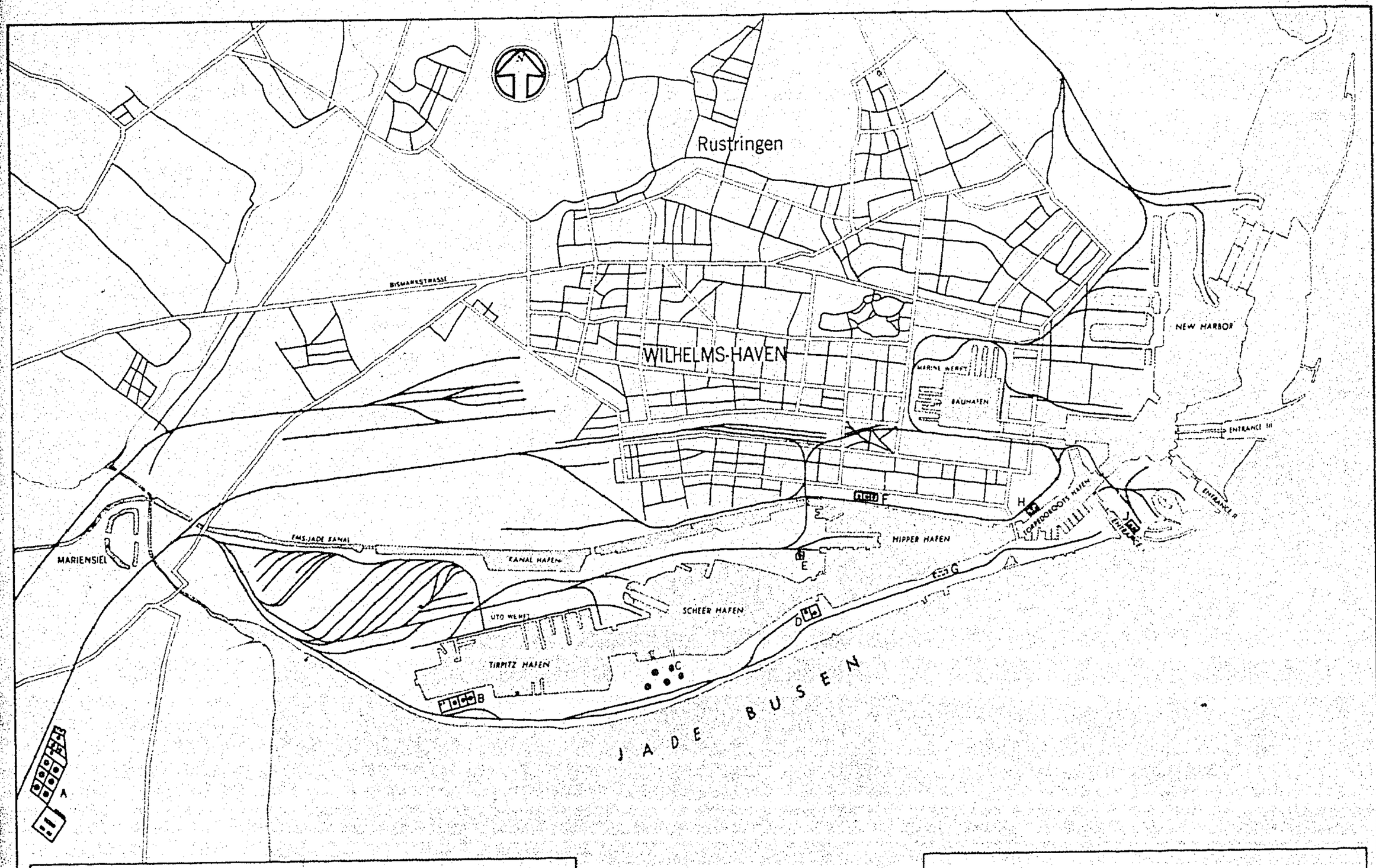
Bremen.- The port of Bremen is located some 34 nautical miles up the Weser River. Ships enter the Weser River from the North Sea at Bremerhaven. The River is tidal and sailings depend upon the tide, the depth of the channel being: 23 feet at mean low water springtide, 34 feet at mean high water spring tide



The rise of the tide is 11 feet at mean high water spring tide and 9 feet. 9 inches at mean high water neap tide.

There are numerous basins in the port and their depths vary between 18 and 28 ft. at low water, but the most important is the Industrie und Handleshafen which is entered through locks, and hence is not tidal. The lock chamber is 560 feet long, 82 inches wide and 28 feet deep.

The only ocean terminal at Bremen is that in connection with the refinery of the Deutsche Vacuum Oel A.G. The lube oil treating plant of the Mineralöl Raffinerie vom August Korff did not have important



L E G E N D

A. SANDE OIL DEPOT:

No. of Tanks	Approx. M3	Total Cap'y. Barrels
4	43,200	272,160
2	20,000	126,000
1	1,000	6,300
3	2,400	15,120
1	400	2,520
11	67,000	422,100

B RECEIVING TANKS FOR SANDE OIL DEPOT:

No. of Tanks	Approx. M3	Total Cap'y. Barrels
3	24,000	151,200
1	1,000	6,300
1	500	3,150
5	25,500	160,650

C. 5 BURIED TANKS, APPROX. TOTAL CAP'Y. 85,000 M3, 535,500 BBLS.

D. 2 TANKS, APPROX. TOTAL CAP'Y. 12,000 M3, 75,600 BBLS.

E. 1 TANK, APPROX. CAP'Y. 4,000 M3, 25,200 BBLS

F. 3 TANKS, APPROX. TOTAL CAP'Y. 13,000 M3, 81,900 BBLS

G. REPORT LOCATION OF 2 SMALL BURIED TANKS.

H. 4 TANKS, APPROX. TOTAL CAP'Y. 4,700 M3, 29,610 BBLS.

J. 2 TANKS, APPROX. TOTAL CAP'Y. 3,000 M3, 18,900 BBLS.

MAP SHOWING

OCEAN TERMINAL FACILITIES

WILHELMSHAVEN

SCALE

YARDS 500 0 1000 2000

METERS 500 0 1000 2000

tankage. The other limited bulk storage plants at Bremen are listed in the table on page 312.

The Deutsche Vacuum Oel A.G. plant is a lubricating oil refinery with terminal facilities for ocean tankers. It is located at the end of Hafen G in Oslebshausen, a suburb lying on the northwest of Bremen. A layout plan appears on page 91 in the Refining section of this report.

Total tankage capacities are approximately 165,000 M^3 (1,039,500 barrels).

The berth is 656 feet long, 213 feet wide and 28 feet deep. Two tugs are required for docking and undocking. The terminal pipeline shore connections were 4 in., 5 in., and 6 in. and three grades of oil could be discharged simultaneously; pressure allowed, 49 lbs., discharging rate, 100 to 120 tons per hour.

5.7.8 Wilhelmshaven

Wilhelmshaven is primarily a Naval harbor. The basins are entered through locks. Depth at the entrance at high tide is 36 feet, the rise on spring tide being 12 feet and on neap tide 9 feet. Depths at the quays in the harbor vary from 21-1/2 feet to 32-1/2 feet. There is considerable tankage here, largely devoted to Naval purposes. Locations are shown on the map on page 270.

Oil Storage Installations

Location	No. of Tanks	Capacity	
		M^3	Barrels
Sande	11	67,000	422,100
Tirpitzhaven	5	25,500	160,650
Tirpitzhaven Uto	2	1,000	6,300
Scheerhaven (SW)	5	85,000	535,500
Scheerhaven (SE)	2	12,000	75,600
Scheerhaven (NE)	1	4,000	25,200
Hipperhaven (NW)	2	1,400	8,820
Hipperhaven (N)	3	13,000	81,900
Torpedobootshaven (NW)	4	4,700	29,610
No. 1 Entrance	2	3,000	18,900
Total		216,600	1,364,580

Sande.- The installation at Sande lies about 3,000 yards west-by-south of the Tirpitzhaven and in prewar reports is referred to as belonging to Naphta Industrie and Tankanlagen A.G. (Nitag). This plant was formerly used for storage of tar oil, gas oil and motor gasoline but considerable removal and replacement of original tankage is reported to have taken place. Present tankage and estimated capacities are as follows:

Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
4	125	10,800	68,040	43,200	272,160
2	110	10,000	63,000	20,000	126,000
1	40	1,000	6,300	1,000	6,300
3	35	800	5,040	2,400	15,120
1	25	400	2,520	400	2,520
11	Total			67,000	422,100

This installation is connected by pipe lines, said to be three lines laid in a treated concrete tunnel, to three receiving tanks at the southwest corner of the Tirpitzhaven. Each of the Sande tanks is said to be equipped with its own electrically driven pump.

Tirpitzhaven.- The large tanks at the southwest corner of the Tirpitzhaven are the receiving tanks for the Sande installation. Approximate capacities are as follows:

Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
3	100	8,000	50,400	24,000	151,200
1	40	1,000	6,300	1,000	6,300
1	30	500	3,150	500	3,150
Total				25,500	160,650

Discharging pipe lines are reported as follows:

For kerosene: One 10-inch line with 6-inch shore connection
For gasoline: One 10-inch line with 8-inch shore connection
For fuel oil: Two 10-inch lines with 8 inch shore connection
For crude oil: One 14-inch line with two 6-inch shore connection

The discharging rate for the crude oil line is 254 tons per hour using shore steam.

Maximum draft for vessels at this berth is 24 feet.

Tirpitzhaven Uto.- In the Uto repair yards on the north side of the basin there are two small tanks of about 30 feet in diameter and total capacity of 1,000 M^3 (6,300 barrels).

Scheerhafen.- In the southwest corner of the Scheerhafen are five large buried tanks of about 160 feet diameter each. Total capacity is estimated to be 85,000 M^3 (552,500 barrels).

In the southeast corner of the Scheerhafen are two tanks of approximately 90 feet in diameter and a total estimated capacity of 12,000 M^3 (75,600 barrels).

In the northeast corner of this harbor is a single 80 foot tank with a capacity of approximately 4,000 M^3 (25,200 barrels).

Hipperhafen.- On the north side of the Hipperhafen are three tanks estimated capacities as follows:

Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
1	90	6,000	37,800	6,000	37,800
2	70	3,500	22,050	7,000	44,100
3	Total			13,000	81,900

Two small tanks with a total capacity of approximately 1,400 M^3 (8,820 barrels) are reported to be located in the northwest corner of this harbor. These tanks are described as being all that remain of a much larger installation, most of which has

been removed, but this location has not been positively identified.

There is also an unconfirmed report that two buried tanks are situated on the south side of the Hipperhafen at about the locality indicated on the map on page 270.

Torpedobootshafen.- Four tanks are located next to the south generating station at the northwest end of the Torpedobootshafen.

Details of Tankage

No. of Tanks	Diameter Feet	Individual Capacity M3	Individual Capacity Barrels	Total Capacity M3	Total Capacity Barrels
1	70	3,500	22,050	3,500	22,050
3	25	400	2,520	1,200	7,560
4	T o t a l			4,700	29,610

The three smaller tanks are believed to hold diesel oil for the generating station.

No. 1 Entrance.- On the east side of No. 1 Entrance at the head of Fluthafen are located two tanks, total estimated capacity 3,000 M3 (18,900 barrels).

5.8 STRATEGIC STORAGE

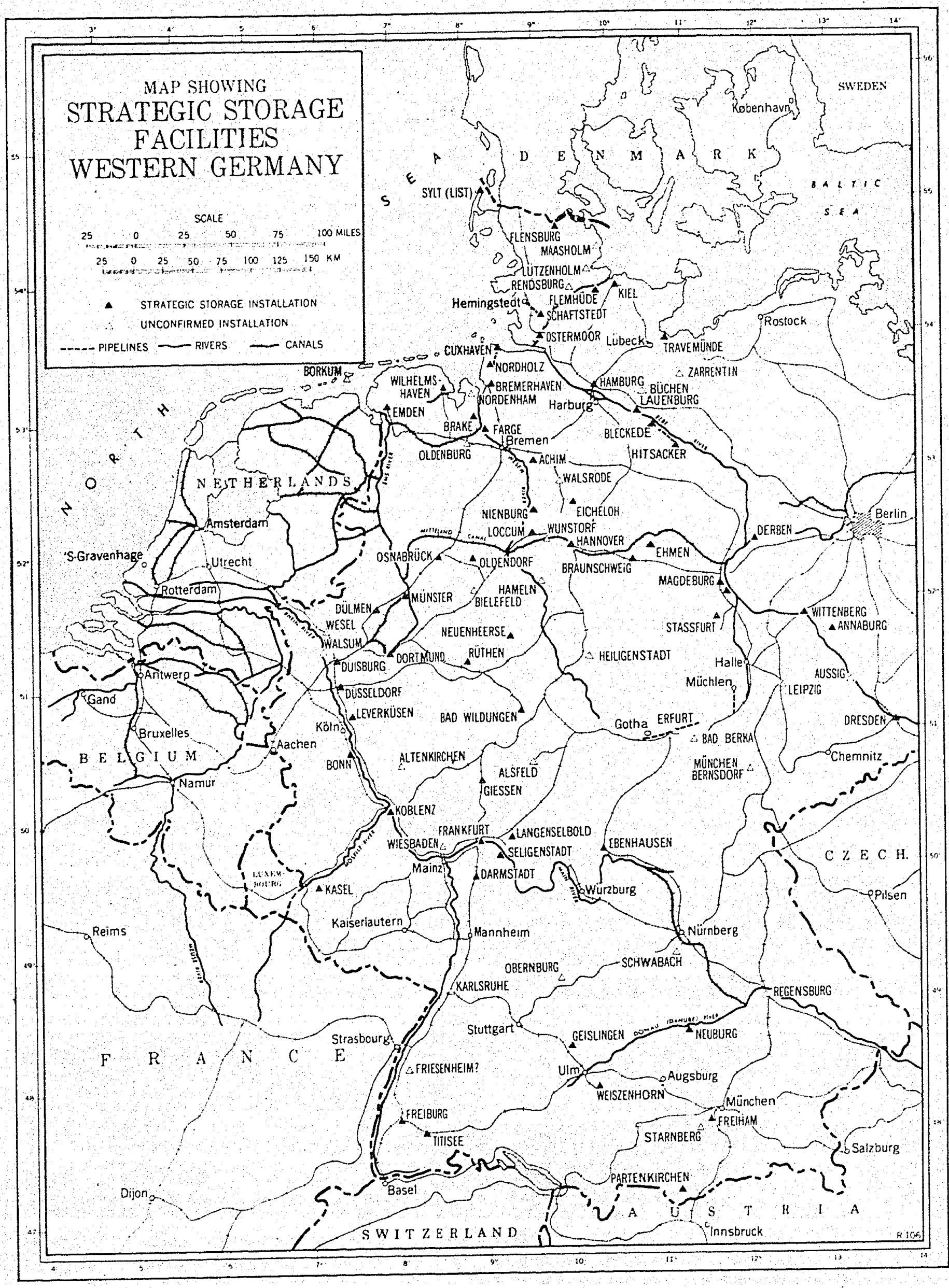
5.8.1 General

Strategic oil stocks are held in a system of Government-owned storage centers, mostly underground, that were built as a part of Germany's war plans. These centers, the majority of which have been built since 1935, were intended to contain strategic reserve stocks for the armed forces entirely independent of commercial stocks. The strategic storage installations are entirely distinct, both in situation and design, from the commercial storage of Germany. They have been designed and located to serve military purposes and to secure the maximum immunity to attack. This, of course, does not preclude the requisition and use of commercial installations for strategic purposes when necessary or convenient.

The Naval reserve and bunkering plants appear to have always been directly under the control of the Navy. The construction and operation of other strategic storage plants is under the direction and control of the Wirtschaftliche Forschungs G.m.b.H. (a), commonly referred to as W.I.F.O. The W.I.F.O. is a closely controlled Government corporation and its functions include the storage, transportation and distribution of liquid fuel and lubricants, commonly referred to as P.O.L. (petrol, oil and lubricants), to the Army and Air Force. In this, the W.I.F.O. works in close liason with the Zentral Bureau für Mineralöl and the Reichsstelle für Mineralöl, but their relative positions in the central Government hierarchy is not known. It is believed that the ultimate control in the release of stocks by the W.I.F.O. is exercised by a central Government authority in which Army officials are strongly represented but do not predominate. In this way the central (Nazi) Government seem to have ensured and maintained its direct control of the strategic aviation and motor fuel reserves, rather than allowing the Army and Air Force unlimited power over these necessary resources (b). This control is accentuated by the procedure usually followed, by which supplies are routed from the producing plant first to a

(a) Literal translation "Economic Research Co.".
(b) It is significant that the main reserve plants are guarded by SS troops rather than by regular army forces.

Strategic storage, Western Germany



STATISTICAL SUMMARY OF STRATEGIC BULK STORAGE FACILITIES (a)

Werk-reise(b)	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates(c) Lat. N.	Long. E.	Plant Used By	Estimated Plant Capacity M^3	Barrels	SUPPLIED BY Water	Rail	Remarks
X	Achim	47	53° 00'	9° 04'	Navy	290,500	1,830,150	Yes	Yes	Major underground reserves center on the Weser 20 km. SE of Bremen. Mainly black oils but some white oil also. Description on page 281.
IX	Alsfeld	96	50° 46'	9° 16'	?	?	?	No	?	60 miles NE of Frankfurt, an unconfirmed underground locality.
XII	Altenkirchen	108	50° 41'	7° 39'	?	?	?	No	-	20 miles N of Koblenz or 20 miles NE of Saarbrucken, an unconfirmed underground locality (also mentioned as Hochtenbach).
IV	Annaburg	88	51° 44'	13° 02'	GAF (d)	6,000	37,000	No	Yes	A GAF L.T.Lager, just east of the Elbe. 12 tanks above ground in forest.
IV	Aussig	88	51° 24'	13° 12'	?	?	?	Yes	Yes	Reported underground locality either on the Elbe south of Torgau or on the Elbe 30 miles SE of Dresden.
IX	Bad Berka	98	50° 54'	11° 17'	GAF	6,500	40,950	-	-	GAF L.T.Lager above ground in forest.
IX	Bad Wildungen	96	51° 08'	9° 07'	Army (?)	?	?	No	Yes	SW of Kassel. Doubtful confirmation in air cover of underground storage in tunnels in the hillside, between Wega and Ehrolf.
VI	Bielefeld	72	52° 02'	8° 32'	Army	20,000?	126,000	No	Yes	A reported underground divisional center. Unconfirmed. See also Oldendorg and Neuen Heerse.
X	Bleckede	34	53° 18'	10° 46'	Navy	370,000	2,331,000	Yes	Yes	Major underground black oil storage center on the Elbe SE of Hamburg. Description on page 282
VI	Bonn	107B	50° 44'	7° 04'	WIFO	-	-	-	-	WIFO Hauptlager reported but unconfirmed.
X	Borkum	31A	53° 36'	6° 40'	Navy	19,000	119,700	Yes	-	Underground on south end of Borkum Island in North Sea.
X	Brake	32	53° 20'	8° 29'	Navy	20,000	126,000	Yes	Yes	On the Weser, north of Bremen. Underground tankage probably for bunkering. Located on Harrier Sand. Description on page 267.
XI	Braunschweig (Brunswick)	62	52° 15	10° 30'	Army	6,000?	37,800	No	Yes	Underground tanks possibly situated in a mound alongside sidings south of Or. Gleidingen. Probably a divisional center.
X	Bremerhaven	32	53° 33'	8° 35'	Navy	44,200	278,460	Yes	-	Two groups of buried tanks in the Harbor area. Description on page 265.
X	Büchen	35	53° 29'	10° 39'	GAF	20,000	126,000	-	-	Underground GAF depot. Specializes in jet fuel.
X	Cuxhaven	17	53° 53'	8° 42'	Navy	80,000	504,000	Yes	-	Naval operational underground tanks connected by pipe line with main reserve near Nordholz and Ludingworth. Description on page 283.
XII	Darmstadt	121	49° 52'	8° 49'	Army	900+	5,670+	No	Yes	Two horizontal buried cylinders in the woods immediately south of parade grounds. Possibly also a center holding up to 30,000 M^3. Not confirmed.
XI	Derben-Ferchland	63	52° 25'	12° 01'	WIFO	159,900	1,007,370	Yes	Yes	On the Elbe NE of Magdeburg. Major underground reserve storage. Description on page 283.
VI	Dortmund	83	51° 31'	7° 27'	Army	20,000	126,000	?	?	A likely reported underground center as yet unidentified.
IV	Dresden	101	51° 03'	13° 45'	Army	50,000	315,000	Yes ?	Yes ?	A reported important underground plant on the Elbe not yet identified.
I	Drugehnen	14	54° 49'	20° 16'	WIFO	Large	-	-	-	WIFO Aussenstelle NW of Konigsberg, East Prussia.
VI	Duisberg	82B	51° 26'	6° 45'	Army	38,500	242,550	Yes	Yes	At Ruhrort. Surface tanks only visible in air cover, though underground tankage is reported. Possibly refers to requisitioned commercial plants.
VI	Dülmen	70	51° 50'	7° 16'	GAF	20,000?	126,000?	No	Yes	An important Air Force L.T. Lager.
VI	Düsseldorf	94B	51° 13	6° 47'	Army (?)	20,000?	126,000?	Yes ?	Yes ?	Location of reported underground storage unidentified. Possibly refers to commercial tankage near Reisholz.
XIII	Ebenhausen ▲	122	50° 7'	10° 08'	GAF	13,000	81,900	No	Yes	A GAF L.T. Lager north of Schweinfurt, two plants each 6,550 M^3 (one is possibly a dummy) above ground in forests.
XI	Ehmen ▲	62	52° 24'	10° 43'	GAF	5,900	37,170	No	Yes	Well concealed in a wood. Tanks above ground.
XI	Eicheloh ▲	61	52° 45'	9° 36'	WIFO	6,000	37,800	?	Yes	12 tanks above ground concealed in a forest.
X	Emden	31A	53° 21'	7° 13'	Navy	40,000	252,000	Yes	Yes ?	At entrance of Dortmund-Ems Canal. Two round tanks, probably black oils.
IX	Erfurt	98	50° 58'	11° 02'	?	?	?	No	Yes ?	Unidentified plant, probably a divisional center, may be tied in to the truck pipe line seen in this area, or may be confused with commercial plant used here by Air Force.
X	Farge	47	53° 12'	8° 32'	WIFO & Navy	611,000 or more	3,849,300	Yes	Yes	Major underground reserve center on the Weser below Bremen. If all tanks under construction in 1942 are completed total capacity may be twice this amount. Description on page 285.
X	Flemhude	8	54° 20'	9° 58'	Navy	257,000 or more	1,619,100	Yes	Yes	A major underground reserve storage center for heavy oils on the Kiel Canal. Excludes 160,000 tons of partially built tankage, blending plant suggests some light oil storage. Description on page 285.

(a) Excluding commercial plants requisitioned for military purposes. However, duplication due to incomplete identification in some cases is probable.
(b) Army district. See map on page 329 for Werkreise boundaries.
(c) Latitudes and longitudes taken from Index-Gazetteer to "The Times" Survey Atlas of the World, London, 1922; edited by John Bartholomew, The Edinburgh Geographical Institute, except those marked ▲ which were taken from maps furnished by Army Map Service.
(d) GAF is abbreviation for German Air Force.

STATISTICAL SUMMARY OF STRATEGIC BULK STORAGE FACILITIES (Continued) (a)

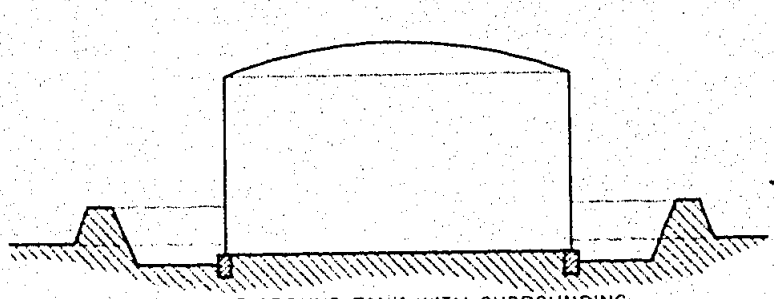
Werkreise(b)	Place	Map. Ref. O.S.G.S. 4081 Sheet No.	Coordinates(c) Lat. N.	Coordinates(c) Long. E.	Plant Used By	Estimated Plant Capacity M³	Estimated Plant Capacity Barrels	SUPPLIED BY Water	SUPPLIED BY Rail	Remarks
X	Flensburg	3	54° 48'	9° 27'	Navy	14,000	88,200	Yes	No	In Schleswig, probably naval black oil storage. Four buried round tanks.
V	Freiburg (Im Breisgau)	151A	48° 00'	7° 52'	WIFO	?	?	No	?	A reported important underground plant. Unconfirmed.
VII	Freiham ▲ (Unter Pfaffenhofen)	155	48° 07'	11° 22'	WIFO	131,000	825,300	No	Yes	Near Munich, an important underground base for supplies to Italy and the west.
XII	Friesenheim (1) (2) (3)	144	48° 23'	7° 53'	Army	?	?	No	?	A reported underground plant which could be in any of 3 places of this name. (1) 12 miles south of Mainz. (2) A suburb of Ludwigshaven. (3) 14 miles SSE of Strasbourg (Werkreisse).
V	Geislingen ▲	146	48° 36'	9° 54'	WIFO	6,000	37,800	No	Yes	12 tanks above ground. Well concealed in forest. Also known as Amstetten.
IX	Giessen	109	50° 36'	8° 41'	Army ?	20,000	126,000	No	Yes ?	A reported underground plant. Unconfirmed, probably a divisional center.
X	Hamburg	33	53° 33'	10° 00'	WIFO	?	?	?	?	Large underground storage is reported, at Feugraben (unidentified). No confirmation.
		33	" "	" "		25,000	157,500	-	-	At Blaufries (unidentified). No confirmation.
		33	" "	" "		?	?	-	-	In the Bakkenhafen Basin (unidentified). Extensive commercial storage exists at Hamburg. See page 243.
XI	Hameln	73	52° 07'	9° 22'	WIFO ?	?	?	No	Yes	Important stocks reported. Location unknown.
XI	Hannover	61	52° 23'	9° 44'	Army	20,000?	126,000?	-	Yes ?	A reported underground center not yet identified.
IX	Heiligenstadt	85	51° 23'	10° 08'	WIFO	6,000?	37,800?	-	-	WIFO Aussenstelle and depot unlocated.
X	Hitzacker	49	52° 08'	11° 00'	WIFO	300,000?	1,890,000?	Yes	Yes	Major underground reserve storage center on the Elbe. Description on page 287.
V	Karlsruhe	130	49° 01'	8° 23'	Army	?	?	?	Yes	Reported as a starting point of POL trains, a likely divisional center. Possibly a requisitioned commercial plant.
XII	Kasel	119	49° 46'	6° 44'	Army ?	20,000?	126,000?	No	Yes	An underground plant reported near Trier. Unconfirmed, but a likely divisional center and reserve for the Western Front.
X	Kiel Klausdorf	8	54° 23'	10° 9'	?	6,000	37,800	?	Yes	Important underground storage of oil, motor and aviation gasoline reported in a wood at Vossbrook. Questionable identification from air cover.
	Mönkeberg	8	54° 21'	10° 11'	Navy	182,600	1,150,380	Yes	-	The main underground naval reserve storage at Kiel. See page 282.
	Projendorf	8	54° 22	10° 07'	Navy	60,000	37,800	Yes	-	3 tanks 400 yards west of Prince Hendriche Bridge. Under construction in 1943.
XII	Koblenz	108	50° 21'	7° 36'	Army	20,000	126,000	?	Yes	A reported underground center. Unidentified.
IX	Langenselbold	121	50° 11'	9° 03'	GAF	20,000	126,000	No	Yes	18 miles ENE of Frankfurt. Underground fuel storage reported in a wood 6 kilometers north of Neuenhasslau. Used by GAF and possibly Army also.
X?	Lauenburg	34	53° 23'	10° 33'	Army ?	7,000	44,100	Yes ?	?	6 underground tanks reported between Lausenberg and Boizenberg. Exact location unidentified.
IV	Leipzig	68	51° 20'	12° 23'	Army ?	?	?	?	Yes	Reported as a starting point of POL trains, likely Werkreise center.
VI	Leverkusen ▲	94B	51° 02'	7° 00'	Army ?	14,000	88,200	-	-	13 above ground tanks reported.
VI	Loccum ▲	60	52° 27'	9° 7'	GAF	13,500	85,050	No	Yes	26 vertical cylindrical tanks buried in six groups.
X	Lutzenholm	8	54° 29'	9° 52'	Navy ?	?	?	?	?	Underground storage reported near Eckernforde (Schleswig). No confirmation. Also see Maasholm.
X	Maasholm ▲	8	54° 42'	10° 00'	Navy	?	?	Yes ?	No	A reported underground locality, possibly naval bunkering. Unconfirmed.
XI	Magdeburg	75	52° 08'	11° 38'	?	60,000 20,000	378,000 126,000	?	Yes	Two underground centers (one GAF) have been reported but not identified. Air cover shows only surface tankage in the Rothensee and dock areas. An important distributional center and a synthetic plant also located here.
IX	München Bernsdorf	99	50° 49'	11° 57'	WIFO	6,000	37,800	-	-	Exact location not identified.
VI	Münster	71	51° 56'	7° 38'	?	9,000	56,700	-	-	Probably air field storage. Also, an unconfirmed army center reported to hold 20,000 M³. See also Ruthen.
VII	Neuberg a. Donau (Unterhausen)	147	48° 43'	11° 06'	WIFO	100,000	630,000	?	Yes	A major underground center, well dispersed in a forest. Office of WIFO general headquarters transportation branch.
VI	Neuenheerse	84	51° 40'	8° 57'	WIFO	6,000	37,800	No	Yes	12 or more vertical cylindrical tanks above ground in Assler Forest.
XI	Nienburg (Schaferhof)	60	52° 38'	9° 13'	WIFO	150,000	945,000	Yes	Yes	Important major reserve underground center for light oils. 60 buried tanks. Description on page 289.
X	Nordenham	22	53° 30'	8° 30'	Navy	10,000	63,000	Yes	Yes	On the lower Weser. Reported underground storage for naval bunkering has not been identified in air cover, but possibly refers to commercial plants here and at Blexen.
X	Nordholz	17	53° 49'	8° 40'	Navy	864,000	5,443,200	No	No	The main underground reserve naval fuel storage for Cuxhaven with which it is connected by pipe line. Possibly aviation gasoline for adjoining air field also. Description on page 241.

STATISTICAL SUMMARY OF STRATEGIC BULK STORAGE FACILITIES (Continued) (a)

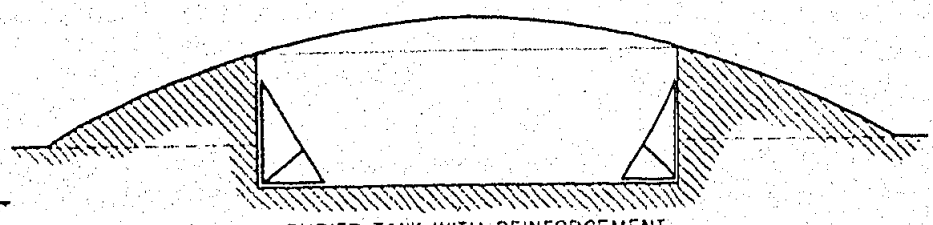
Werk-reise(b)	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates(c) Lat. N.	Coordinates(c) Long. E.	Plant Used By	Estimated Plant Capacity M³	Estimated Plant Capacity Barrels	SUPPLIED BY Water	SUPPLIED BY Rail	Remarks
IX	Obernburg	121	49° 51'	9° 08'	GAF(d)	-	-	-	-	An Air Force depot not yet definitely located.
X	Oldenburg	46	53° 09'	8° 13'	WIFO	-	-	-	-	A reported WIFO depot. Unconfirmed.
VI	Oldendorf	60	52° 18'	8° 28'	GAF	45,000	283,500	Yes	Yes	18 miles north of Bielefeld. Three groups containing a total of 60 buried cylinders connected by pipe line to the Ems-Weser Canal. Description on page 290.
VI	Osnabrück	59	52° 17'	8° 03'	WIFO	?	?			Important WIFO depot reported but confirmation lacking.
X	Ostermoor ▲	17	53° 55'	9° 11'	Navy	-	-	-	-	At North Sea end of Kiel Canal. Unconfirmed report states large underground storage NE of Ostermoor is part of National Reserve. For black oils and some for gasoline in 60 to 70 tanks of 10,000 M³ each. Existence considered doubtful, air cover shows commercial surface tankage associated with refinery. See page 259.
VII	Partenkirchen	159	47° 30'	11° 07'	Army	1,200 ?	7,560 ?	No	?	Underground plant reported in a wood between Partenkirchen and Walchensee, possibly the Garmisch divisional center.
I	Pillau	14	54° 39'	19° 53'	Navy	28,000	163,800	-	-	Bunkering point in East Prussia on Baltic.
XIII	Regensburg	141	49° 01'	12° 07'	WIFO	?	?	Yes	Yes	Transshipment point. There is substantial commercial storage here. Strategic storage also seems probable but has not been located.
X	Rendsburg	8	54° 18'	9° 41'	Navy ?	-	-	Yes	No	Possible location of an underground gas oil bunkering plant. A reported location between Audorf and Rade, is not visible in air cover. See page 259.
VI	Rüthen	84	51° 28'	8° 31'	WIFO	6,000	37,800	No	Yes	12 vertical cylindrical above ground tanks in a wood.
X	Schafstedt	17	54° 04'	9° 19'	Navy?	48,000	302,400	Yes	No	Four tanks buried (1941). Canal loading facilities for black oil for bunkering on the Kiel Canal. Connected by pipe line with refinery at Hemmingstedt. See page 259.
XIII	Schwabach	133	49° 20'	11° 03'	?	?	?	No	?	Underground storage reported north of village of Unter Riechenbach near Schwabach, but definite confirmation lacking. Air cover shows widely scattered groups of circular clearings including 6 main ones, 156 circles in all. If these are tank sites the area would form a major reserve. No rail connections or pipe line system are visible.
XIII	Seligenstadt	122	50° 02'	8° 58'	?	30,000	189,000	No	Yes	ENE of Wurtzburg. 38 buried tanks reported near the railway station. Probably the Wurtzburg divisional center.
VII	Starnberg	154 155	48° 00'	11° 20'	?	?	?	?	?	25 km. SW of Munich. Very large stocks reported in the woods. See also Freiham in this area. Exact locality unidentified.
XI	Stassfurt	75	51° 51'	11° 34'	WIFO	500,000	3,150,000	No	Yes ?	Major underground reserve storage located in salt mines. Branch of WIFO General Headquarters.
II	Stettin	38	53° 25'	14° 34'	WIFO	-	-	-	-	Probably WIFO depot at Stettin as yet unidentified.
II	Swinemunde	22	53° 54'	14° 16'	Navy	171,600	1,081,080	Yes	?	Naval bunkering reserve storage on Baltic Sea north of Stettin.
X	Sylt ▲	2	55° 02'	8° 25'	GAF	12,000	75,600	?	?	Main storage for air fields on the island.
V	Titisee	151A	47° 54'	8° 09'	Army	?	?	No	?	An underground Army depot SE of Freiburg, probably of limited significance.
X	Travemünde	19	53° 58	10° 52'	?	6,000	37,800	Yes	?	Four large underground tanks reported between the seaplane base and the race-course on Priwall. An above ground plant is seen in air cover.
XI	Walsrode	48	52° 52'	9° 35'	Army?	?	?	No	Yes	Reported 1) between Walsrode and Honerdingen. " 2) sw of Falling Bostel. Capacity reported to be 100,000 M³ but any such size extremely doubtful.
VI	Walsum ▲	82B	51° 32'	6° 42'	Army	12,000	75,600	Yes	?	Underground storage reported. May refer to requisitioned commercial plants.
V or VIII	Weissenhorn	146	48° 18'	10° 08'	GAF	10,400	65,520	No	Yes	Air Force L.T.Lager. SE of Ulm. 13 vertical cylindrical tanks, above ground in a wood.
X	Wesel	82B	51° 39'	6° 37'	?	?	?	No	?	Five interconnected reservoirs reported four km. west of Wesel. No confirmation.
XII	Wiesbaden	120	50° 04'	8° 14'	WIFO?	?	?	?	?	Possibly an army storage depot.
X	Wilhelmshaven	31B	53° 32'	8° 06'	Navy	85,000	535,500	Yes	-	Five buried tanks south of the Scheerhaven.
						136,000	856,800	Yes	-	Surface storage at Sande and elsewhere in harbor. See description on page 271.
X or III	Wittenberg	76	51° 52'	12° 35'	?	120,000	756,000	?	Yes ?	Unconfirmed report of 100 underground tanks in the area between Wittenberg, Juterborg and Treuenbreitzen, east of the Elbe.
XI	Wunstorf	61	52° 27'	9° 25'	?	?	?	?	?	A reported underground locality. No confirmation.
II	Zarrentin	34	53° 33'	10° 57'	WIFO	?	?	?	?	WIFO Aussenstelle reported but depot not definitely located.
				TOTAL		5,423,700	34,169,310			

(a) Excluding commercial plants requisitioned for military purposes. However, duplication due to incomplete identification in some cases is probable.
(b) Army district. See map on page 329 for Werkreise boundaries.
(c) Latitudes and longitudes taken from Index-Gazetteer to "The Times" Survey Atlas of the World, London, 1922; edited by John Bartholomew, The Edinburgh Geographical Institute, except those marked ▲ which were taken from maps furnished by Army Map Service.
(d) GAF is abbreviation for German Air Force.

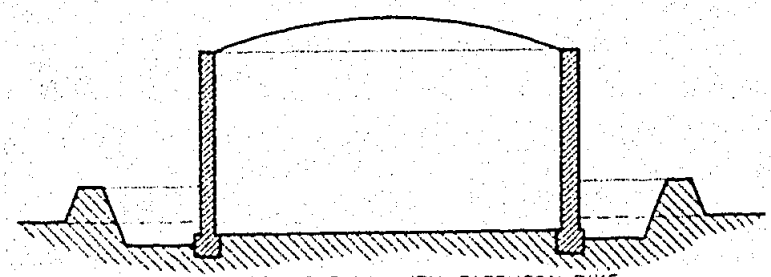
TYPES OF GERMAN STORAGE TANKS



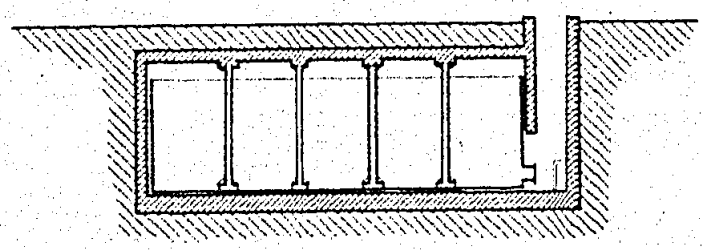
ABOVE GROUND TANK WITH SURROUNDING EARTHERN DIKE



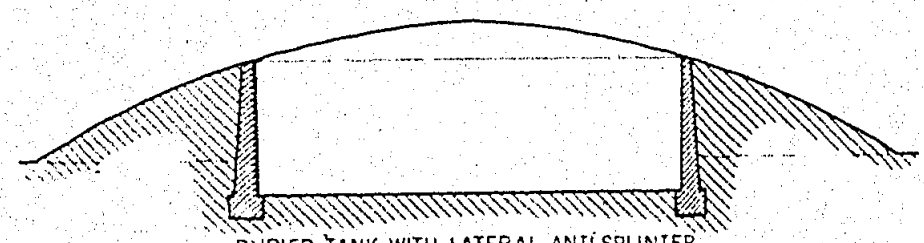
BURIED TANK WITH REINFORCEMENT ON THE INSIDE



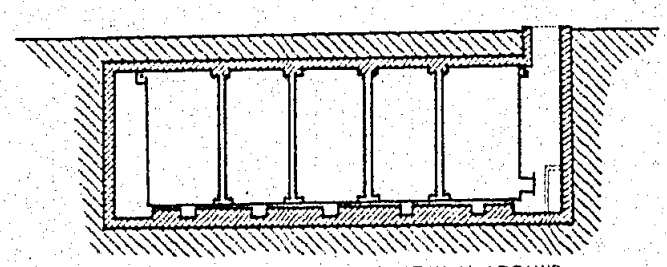
ABOVE GROUND TANK WITH EARTHERN DIKE AND REINFORCED CONCRETE OUTER SHELL



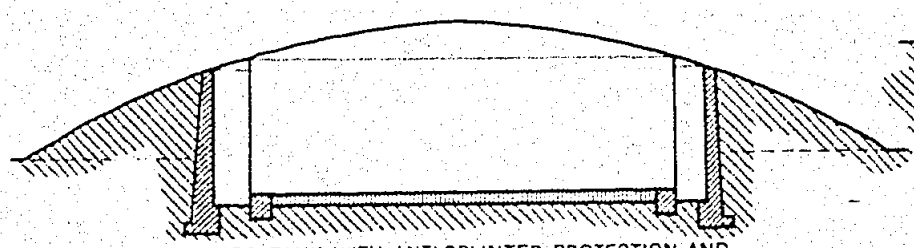
BURIED TANK WITH ROOF SUPPORTS



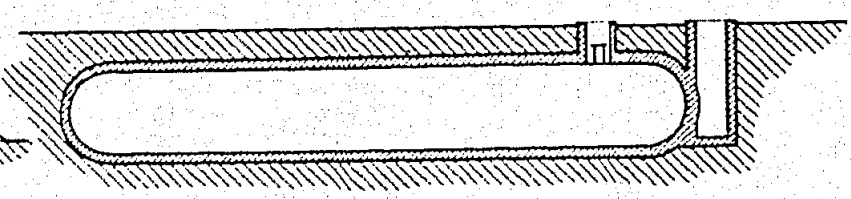
BURIED TANK WITH LATERAL ANTI-SPLINTER PROTECTION AND EARTH EMBANKMENT



BURIED TANK WITH PASSAGE-WAY AROUND THE SHELL AND UNDER THE BOTTOM



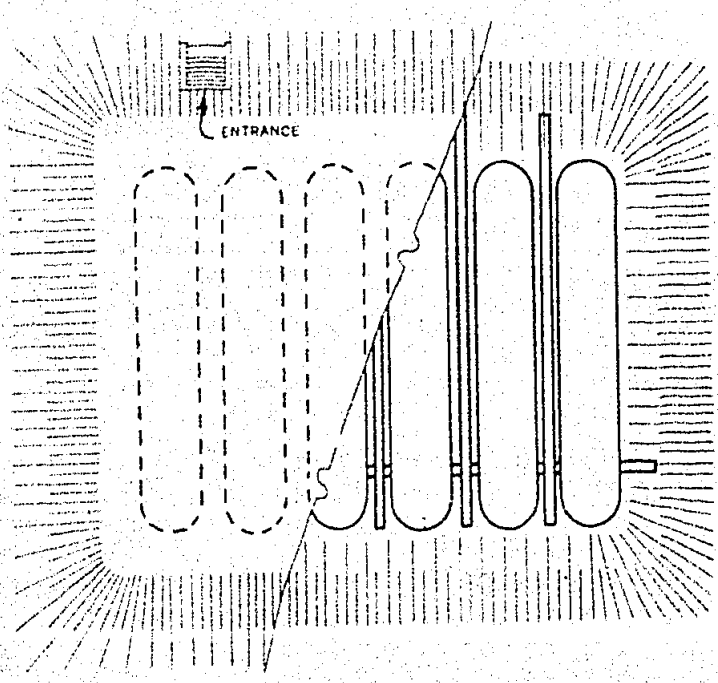
BURIED TANK WITH ANTI-SPLINTER PROTECTION AND WITH AN ALL-AROUND PASSAGE-WAY



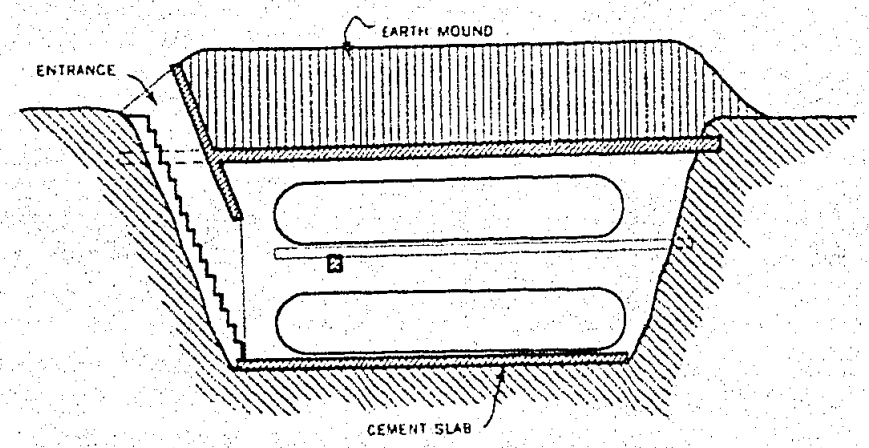
BURIED CYLINDRICAL TANK

DETAILS OF BURIED CYLINDRICAL STORAGE INSTALLATION*

SKETCH PLAN OF INSTALLATION



SECTIONAL ELEVATION OF INSTALLATION



* SIMILAR TO INSTALLATION AT FARGE

R-103

strategic reserve center and then alloted from there to depots controlled by the Army and the Air Force and staffed by military personnel. All of the reserve storage centers and also the larger army storage plants are operated by W.I.F.O. civilian personnel.

The head office of the W.I.F.O. is, or was, located in Berlin and branch offices, or Aussenstellen, are located in the vicinity of the main storage plants in Germany and occupied territories. Additonal details concerning the W.I.F.O. organization and a list of known Aussenstellen appears in Appendices 9 and 10.

The official classifications of strategic storage plants, or depots in military parlance, are as follows:

Main Depots: (large plants usually serving more than one arm of the services)

Zentral Hauptlager: Central main plant with long term storage of strategic reserves. Operated by W.I.F.O.

Zentral Umschlaglager: Main transit storage plant, usually, but not always, connected with transshipment from water to rail. Often combined with a Hauptlager. Operated by W.I.F.O.

Army Depots:

Ober Komando Heers Nachschublager (OKH N/Lager): Usually the principal storage plant of an Aussenstelle (W.I.F.O. district headquarters) which has not a Hauptlager. Operated by W.I.F.O. under Army High Command direction.

Heeresnachschublager (H N/Lager): A subsidiary plant of an Aussenstelle under W.I.F.O. management and personnel with Army High Command direction.

Wehrmachts-Betriebstofflager (W BL): Plant operated entirely by army personnel.

Naval Depots: (mainly for black oils)

Grossmarineöllager: Large storage plant for Naval reserves, operated by Naval personnel.

Kleinmarineöllager: Bunkering plant operated by Naval personnel.

Air Force Depots:

Lufttanklager: (LTL): A major Luftgau storage plant. Operated by GAF personnel.

Feld Lufttanklager: (F LTL): Similar to a Lufttanklager: but mostly located in occupied territories. Operated by GAF personnel.

Hilf Lufttanklager: (H LTL): Commercial aviation gasoline depots requisitioned by Air Force. Operated by GAF personnel.

The term "Auslieferungslager" is applied to the dispatching or shipping off portion of any type of depot.

For protection, the strategic installations have usually been constructed in less frequent areas, often in woodlands, some distance from built-up centers, and camouflaged in various ways. In some of the secondary centers tankage remains above ground, but in all major installations the tanks are entirely underground or partially buried and mounded over with earth and sod, and are difficult targets to damage.

Tanks are of two general types:

(1) Vertical cylindrical tanks, most often used for fuel oils. Commonly used sizes are:

Diameter Feet	Capacity	
	M^3	Barrels
95	6,600	41,580
110	10,000	63,000
140	15,000	94,500
165	20,000	126,000

(2) Horizontal cylinders, most often used for gasoline. Commonly used size:

Dimensions in Feet	Capacity	
	M^3	Barrels
165 x 27	2,600	16,380

The horizontal cylinders are usually laid groups of from two to ten in a pit, and surrounded with cement about one foot thick, reinforced with metal mesh, and covered over with a layer of earth or sand, from three to twelve feet thick. Illustrations of the usual types of tanks and their protection appear in the sketches on page 278. Where passageways exist around underground tanks, ventilators are usually provided. Gasoline fumes, being heavier than air, constitute a hazard if allowed to collect in the enclosed areas. Pipe lines are usually buried at depths ranging between three and six feet.

While in a limited number of cases these storage plants might, after the war, be converted to meet a civil need, the majority of them, due to their location, construction and size, may be definitely considered as military installations to be disposed of as such.

Though more than 100 strategic and military storage installations have been reported and their probable total capacity has been estimated to exceed 5,000,000 M^3 (31,500,000 barrels), it is more or less certain that some of those reported are actually commercial installations and bunkering terminals (a) that have been requisitioned by the W.I.F.O. or the armed forces for use as wartime military distribution centers. However, some 40 installations of various sizes and definitely of strategic, Naval and military character have been positively identified, most of them by air cover. Most of the locations so identified lie west of the Elbe River or in Schleswig-Holstein. Of these, fourteen are major strategic reserve storage centers with an estimated combined capacity totaling 4,540,200 M^3(28,603,260 barrels).

Identified Major Strategic Reserve Storage Installations

	Estimated Capacity	
	M^3	Barrels
Naval (mainly black oils)		
Achim (Weser River)	290,500	1,830,150
Bleckede (Lower Elbe River)	370,000	2,331,000
Cuxhaven (Nordholz)(North Sea)	944,000	5,947,200
Farge (Lower Weser River)(b)	304,000	1,915,200
Flemhude (Kiel Canal)	257,000	1,619,100
Kiel (Monkeburg)(Baltic Sea)	182,600	1,150,380
Swinemünde (Baltic Sea)	171,600	1,081,080
Wilhelmshaven (North Sea)	216,600	1,364,580

(a) See Ocean Terminals on page 239.
(b) Only an approximation of the black oil tankage at Farge is included here.

Identified Major Strategic Reserve Storage Installations (Continued)

	Estimated Capacity	
	M^3	Barrels
W.I.F.O. Hauptlager (mainly white oils)		
Derben (Elbe River)	159,900	1,007,370
Farge (Lower Weser River)(a)	494,000	3,112,200
Freiham (Near Munich)	100,000	630,000
Hitsacker (Elbe River)	300,000	1,890,000
Neuburg a. Donau (Near Ingolstedt)	100,000	630,000
Nienburg (Weser River)	150,000	945,000
Stassfurt (near Magdeburg)	500,000	3,150,000
T O T A L	4,540,200	28,603,260

While the above list is not necessarily exclusive and the existance of other important installations, as yet unidentified, is possible, though not considered highly probable (b).

Much of the information on these installations has been obtained from the study of aerial photographs or by other indirect methods of varying reliability. Hence, the capacity figures are of necessity estimates and, while in many cases are thought to be fairly accurate, should be used with caution. The above listed major plants are described individually below. Also, because of its fairly large size and the excellent information available concerning it, a description of the Air Force Luftanklager at Oldendorf is included. Data concerning all plants, both known and doubtful, are summarized in the tables on pages 275 to 277, and their locations except for a few reported in eastern Germany, are shown on the map on page 274.

5.8.2 Achim

Location.- Achim, latitude 50° 0' N., and longitude 9° 0' E., is located on the north bank of the Weser River, some twelve miles southeast of Bremen. The plant is located between the river and the Hannover-Bremen railway line.

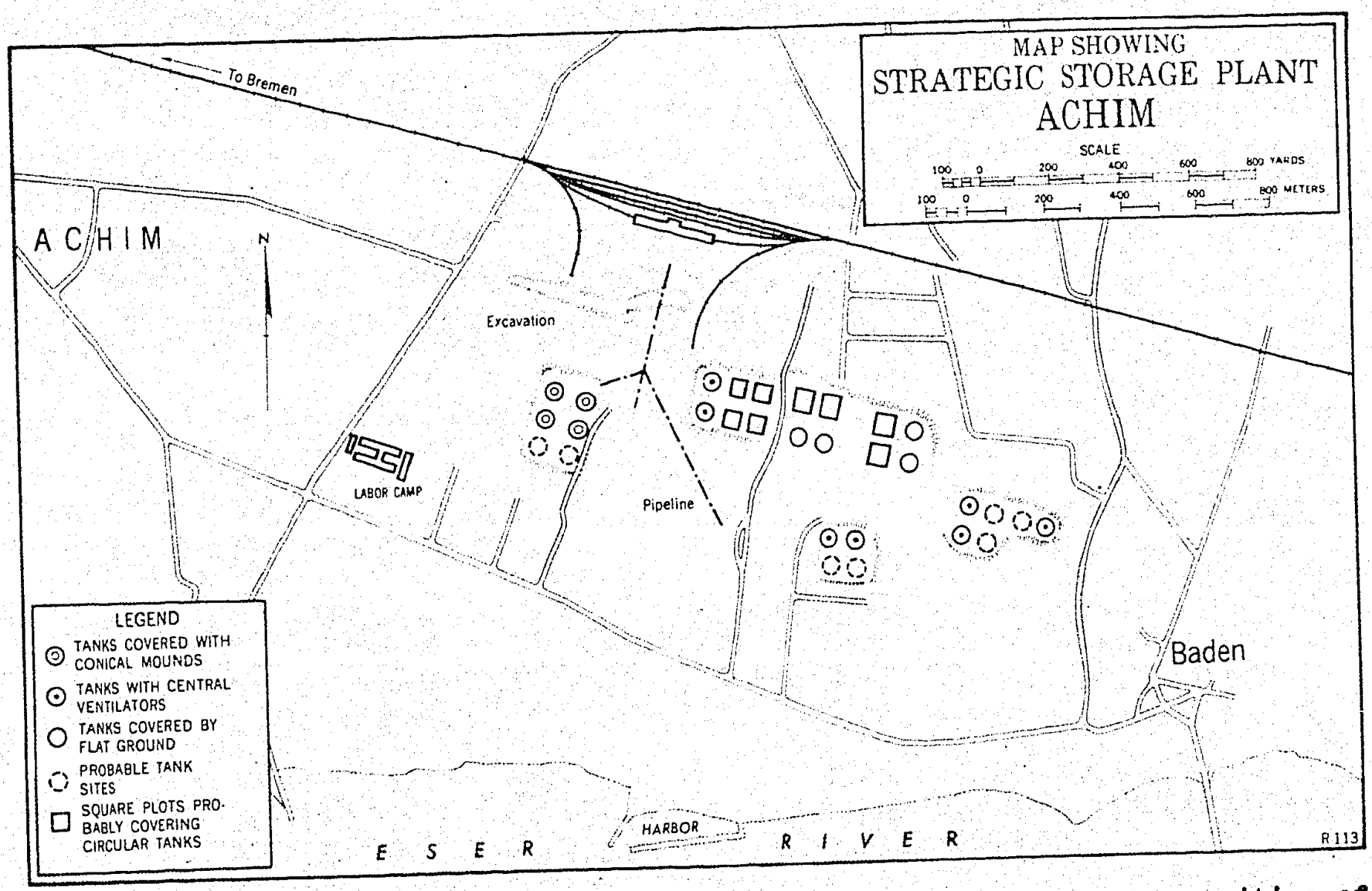
User.- Navy.

Description.- This is a major inland reserve storage point for Naval fuel oil and is served by railway and by river tank barge. It is the oldest of the strategic plants, original construction having taken place in 1928. The tanks are in three main groups.

(1) Twelve buried rectangular reinforced concrete tanks, constructed in 1928. These tanks measure 164 x 164 x 30 feet deep, and have a capacity of 10,000 M^3 (63,000 barrels) each. Access is provided to the inner chambers which are lined with either tiles or metal. The roofs are supported on pillars and are covered with about 20 inches of dirt.

(2) Six buried vertical cylindrical tanks, each 115 feet in diameter and of 10,000 M^3 (63,000 barrels) capacity.

(a) Only an approximation of the white oil tankage at Farge is included here.
(b) Persistent reports of a W.I.F.O. Hauptlager at or near Hamburg may possibly refer to commercial terminals or refineries now used for military supply purposes.



(3) Thirteen or more buried cylindrical tanks having estimated capacities of 8,500 M^3 (53,550 barrels) each.

Summary of Storage Tankage

Type of Tank	No. of Tanks	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
Rectangular tank	12	10,000	63,000	120,000	756,000
Large vertical,cylindrical	6	10,000	63,000	60,000	378,000
Small vertical,cylindrical	13	8,500	53,550	110,500	696,150
Total	31			290,500	1,830,150

5.8.3 Bleckede

Location.- The Bleckede plant, latitude 50° 17' N., longitude 10° 44' E., is located one mile southwest of the Elbe River, approximately forty miles above Hamburg. The tanks are located in wooded country in the estate of von Estouffsche Aker.

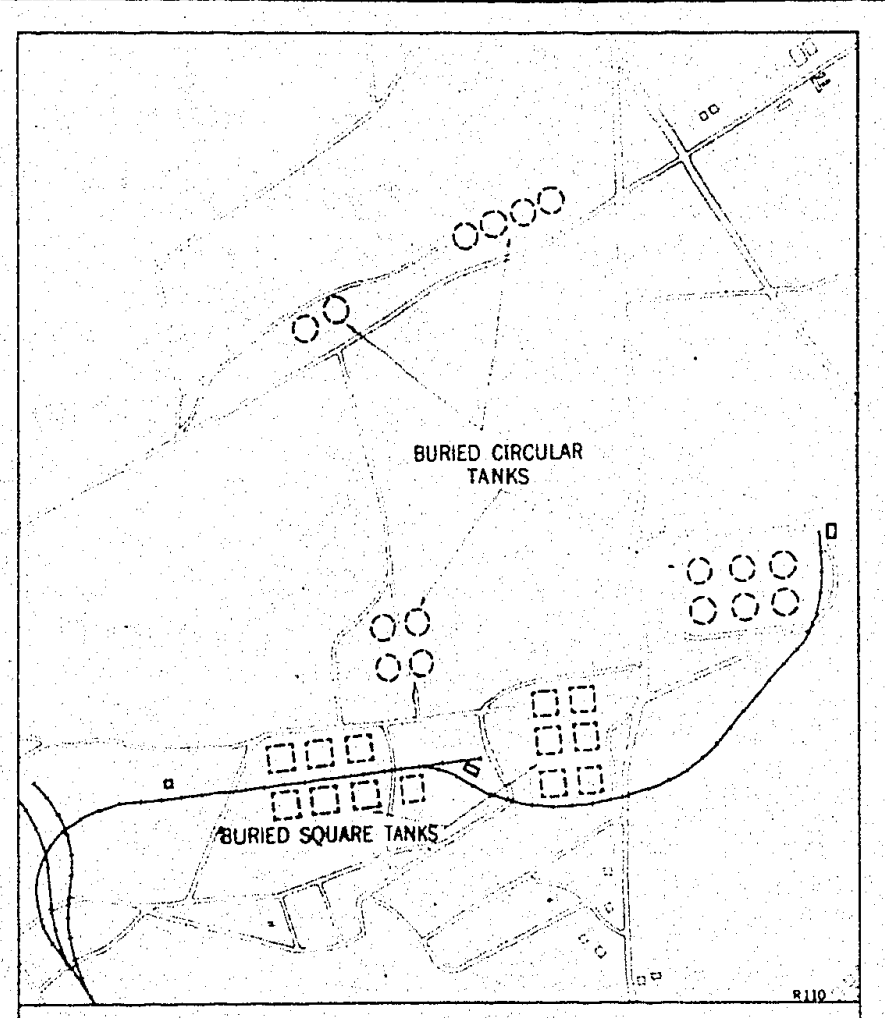
User.- Navy.

Description.- Storage may have been designed, in part, for storing crude oil or more probably as central reserve for distribution by tank barges on the Elbe River.

There are both circular and rectangular tanks, all of which are buried. The circular tanks are divided into four groups of two tanks, four tanks, four tanks, and six tanks respectively.

Summary of Tankage

Type	No. of Tanks	Diameter Feet	Individual Capacity		Total Capacity	
			M^3	Barrels	M^3	Barrels
Circular tanks	16	140	15,000	94,500	240,000	1,512,000
Rectangular tanks	13		10,000	63,000	130,000	819,000
Total	29				370,000	2,331,000



Sketch Plan of Strategic Storage Plant, Bleckede

The rectangular tanks are placed in two groups of six and seven tanks, respectively. They are believed to be concrete reservoirs of the same design as those at Achim.

There is a barge basin 600 feet long in an artificial inlet off the river about a mile from the storage plant, with which there is a pipe line connection. There are also rail sidings in the plant.

5.8.4 Cuxhaven - Nordholz

Location.- On the North Sea to the west of the mouth of the Elbe River, latitude 53° 52' N., longitude 8° 30' E.

User.- Navy.

Description.- Total storage capacity at Nordholz is estimated to be 864,000 M^3 (5,443,200 barrels) with an additional 80,000 M^3 (504,000 barrels) at the harbor side at Cuxhaven. A more complete description of the plants and the port of Cuxhaven is given under "Ocean Terminals" on page **241**, and a layout plans appear on page **242**.

5.8.5 Derben

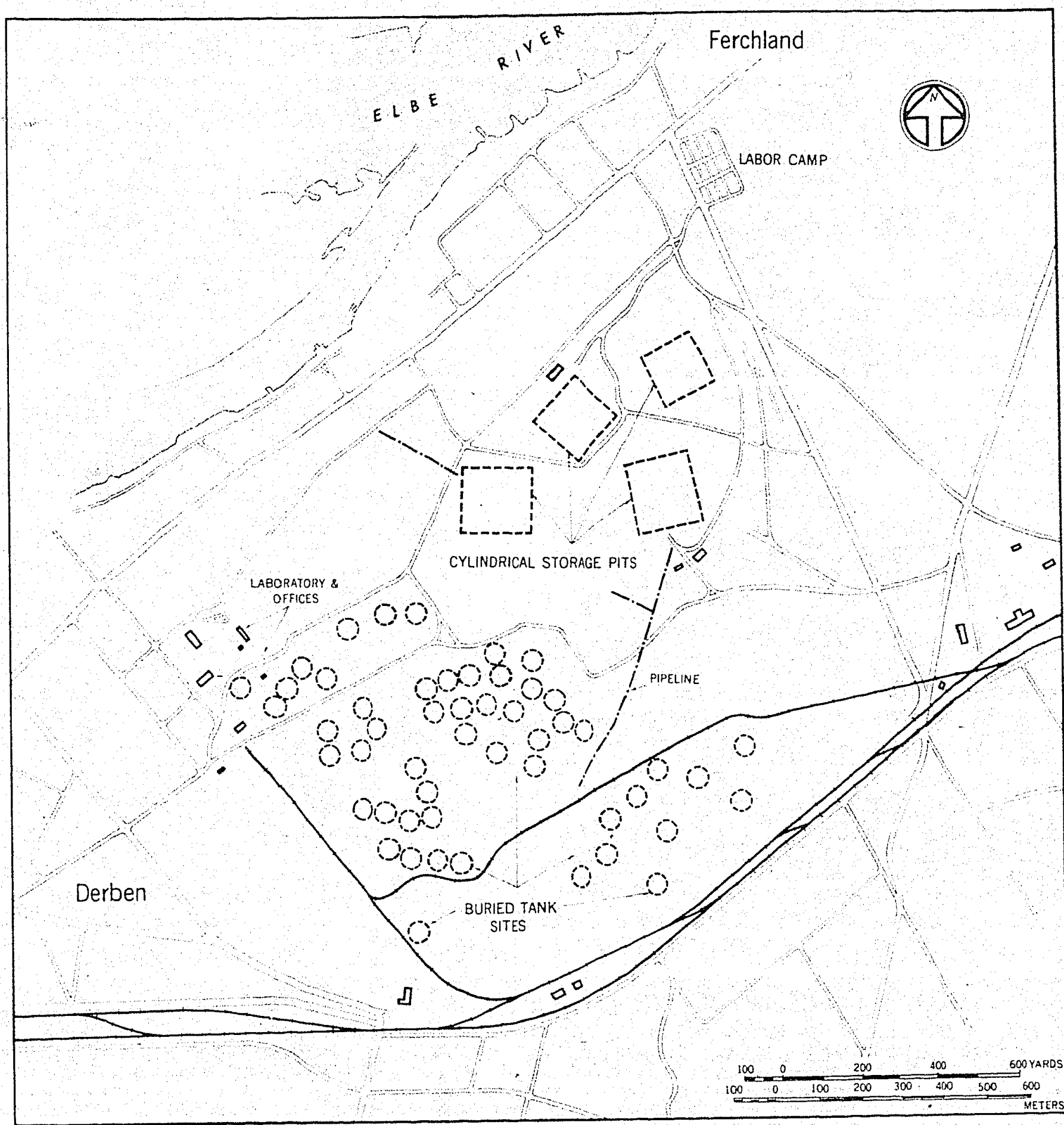
Location.- Derben, latitude 50° 25' N., longitude 12° 0' E., is located on the east bank of the Elbe River, about 25 miles northeast of Magdeburg.

User.- W.I.F.O. for suppling Army and sometimes Air Force.

Description.- This hauptlager is a well equipped underground storage plant for gasoline, diesel oil, lubricating oils, and possibly fuel oil. It was the main source of supplies to the German army in France.

The tankage is reported to have originally consisted of 24 large cylinders for gasoline and 35 smaller cylinders for diesel oil. Each cylinder was buried separetly, enclosed in reinforced concrete and covered with approximately eight feet of sand and dirt. Each is equipped with a pump-shaft and electric pump. During the war four new storage units have been added. In these units the cylinders measure about 170 x 27 feet and instead of being buried individually, are laid side by side in pits, five or possibly ten to a pit.

Four concrete passageways serve as entrances to these pits which are thought to have protective overburdens of about 27 feet of sand above the cylinders.



SKETCH PLAN OF STRATEGIC STORAGE PLANT AT DERBEN

R 115

Summary of Estimated Tankage

Type	No. of Tanks	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
Large cylinders	24	2,600	16,380	62,400	393,120
Smaller cylinders	25	1,300	8,190	45,500	286,650
New cylinders	20	2,600	16,380	52,000	327,600
Total	69			159,900	1,007,370

Pipe lines for gasoline leading to the older cylinders are buried, without additional protection, about three feet deep.

The trenches for lubricating oil and possibly fuel oil lines are between three and six feet deep and contain rollers set in cement upon which the oil lines and a hot water pipe runs. These are protected by a semi-circular cement housing and covered over with dirt. Inspection pits and expansion joints are provided every 300 to 400 yards.

The main pump station for transferring oil from tank barges to the tanks is located on the side of the hill on the river bank and a small heating plant providing steam for heating the oil lines is situated nearby. A smaller pumping station for withdrawing fuels and lubricants from the tanks is situated alongside a narrow gauge railway. A gasoline blending unit has been built underground near the smaller pumping station.

There are three underground transformer chambers in the tank farm and laboratories and offices are situated at the southwest end of the installation alongside Derben village.

There are two barge wharves in the Elbe River and three sets of railway sidings connect with the main railway lines.

5.8.6 Farge

Location.- Farge, latitude 53° 14' N., longitude 8° 33' E., is located on the east bank of the Weser River about 14 miles below Bremen.

User.- W.I.F.O and Navy.

Description.- A large plant for all products. The white products section is understood to be a W.I.F.O hauptlager, while the black products section is a major Naval fuel oil reserve. Total tankage is estimated to be between 611,000 M^3 (3,849,300 barrels) and 1,358,000 M^3 (8,555,400 barrels). A more detailed description and location sketch will be found under "Ocean Terminals" on pages 267 to 269.

5.8.7 Flemhude

Location.- On the Kaiser Wilhelm Canal about 8-1/2 miles west of Kiel, latitude 54° 20' N., longitude 9° 58' E.

User.- Navy.

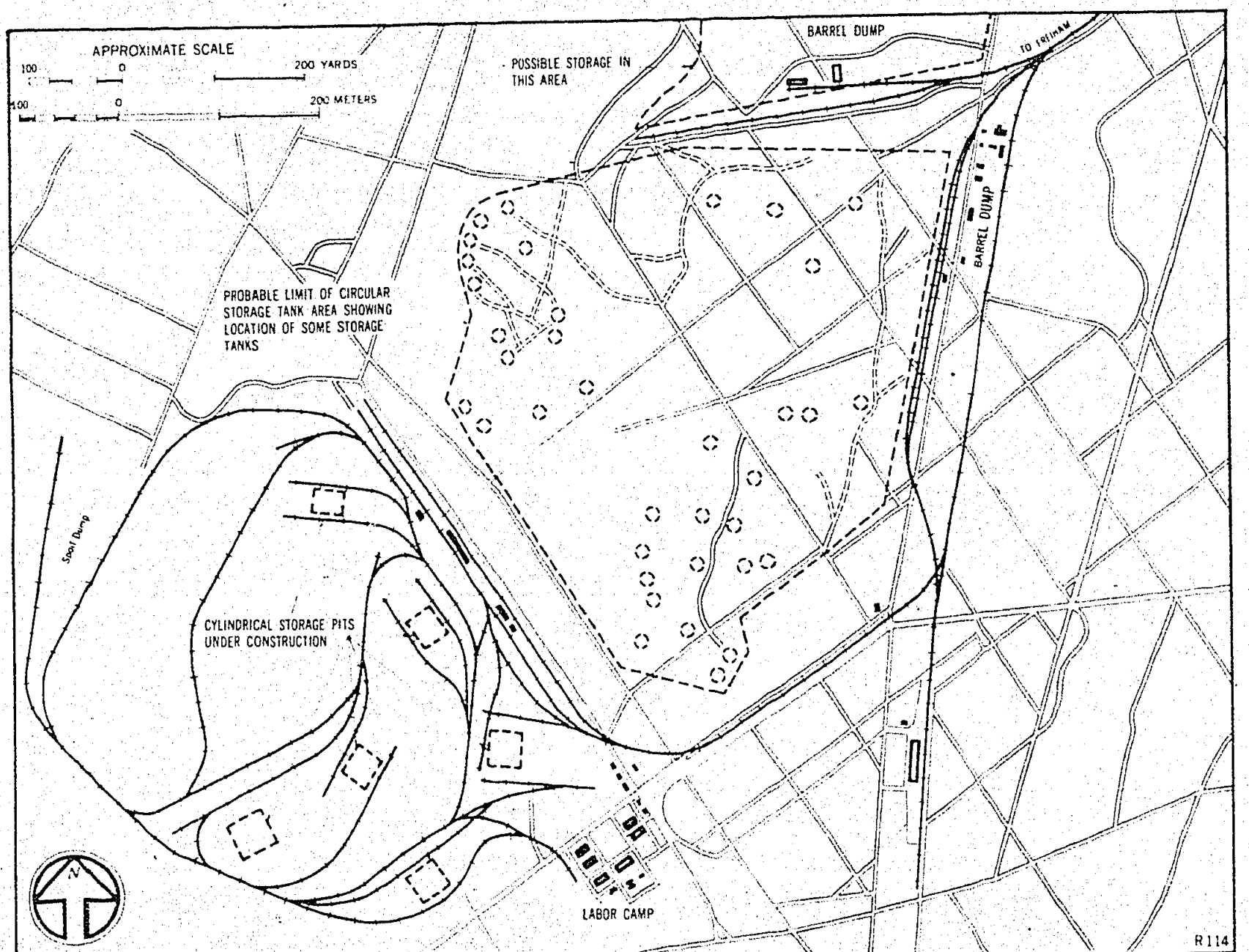
Description.- A major Naval fuel oil reserve storage installation with buried tankage. Tankage as of May 1944 totalled approximately 417,000 M (2,627,100 barrels) of which 10 large tanks representing 160,000 (1,008,000 barrels) were still in incomplete stages of construction. A more detailed description and layout plan appears under "Ocean Terminals" on pages 261 and 262.

5.8.8 Freiham

Location.- The storage installation Freiham, latitude 46 6' N., and longitude 11 22' E., ten miles west-southwest of Munich, is situated in the Kreuzlinger Forest between the villages of Freiham, Unter Pfaffenhofen, Planegg and Gauting.

User.- W.I.F.O. for Air Force supplies.

Description.- This buried storage installation is one of the most important in southern Germany. It is classed as a hauptlager. The main gasoline storage lies in a pentagonal area bounded on four of its sides by roads and railways. Within this area are at least 36 tanks and possibly as many as fifty. At least five of these tanks in the northeastern portion of the area appear to be of the vertical cylindri-



Sketch Plan of Strategic Storage Plant at Freiham (Unter Pfaffenhofen)

cal type. There have been indications that the remainder are horizontal cylinders buried individually, but this has not been definitely established. The total gasoline storage capacity is believed to be approximate at least 80,000 M^3 (504,000 barrels).

North of the northern rail siding there is a storage area for other oils, probably lubricants. There are said to be 24 buried containers in this area, but details are not abailable. The storage capacity has been rather arbitrarily estimated at 20,000 M^3 (126,000 barrels).

Summary of Estimated Storage Tankage

Product	No. of Tanks	Total Capacity	
		M^3	Barrels
Gasoline	36 to 50	80,000	504,000
Other oils	24	20,000	126,000
Total		100,000	630,000

Aerial reconnaissance in 1942 revealed the excavation of six pits southwest of the pentagonal area. Work progressed very slowly and in May 1944 was observed as follows:

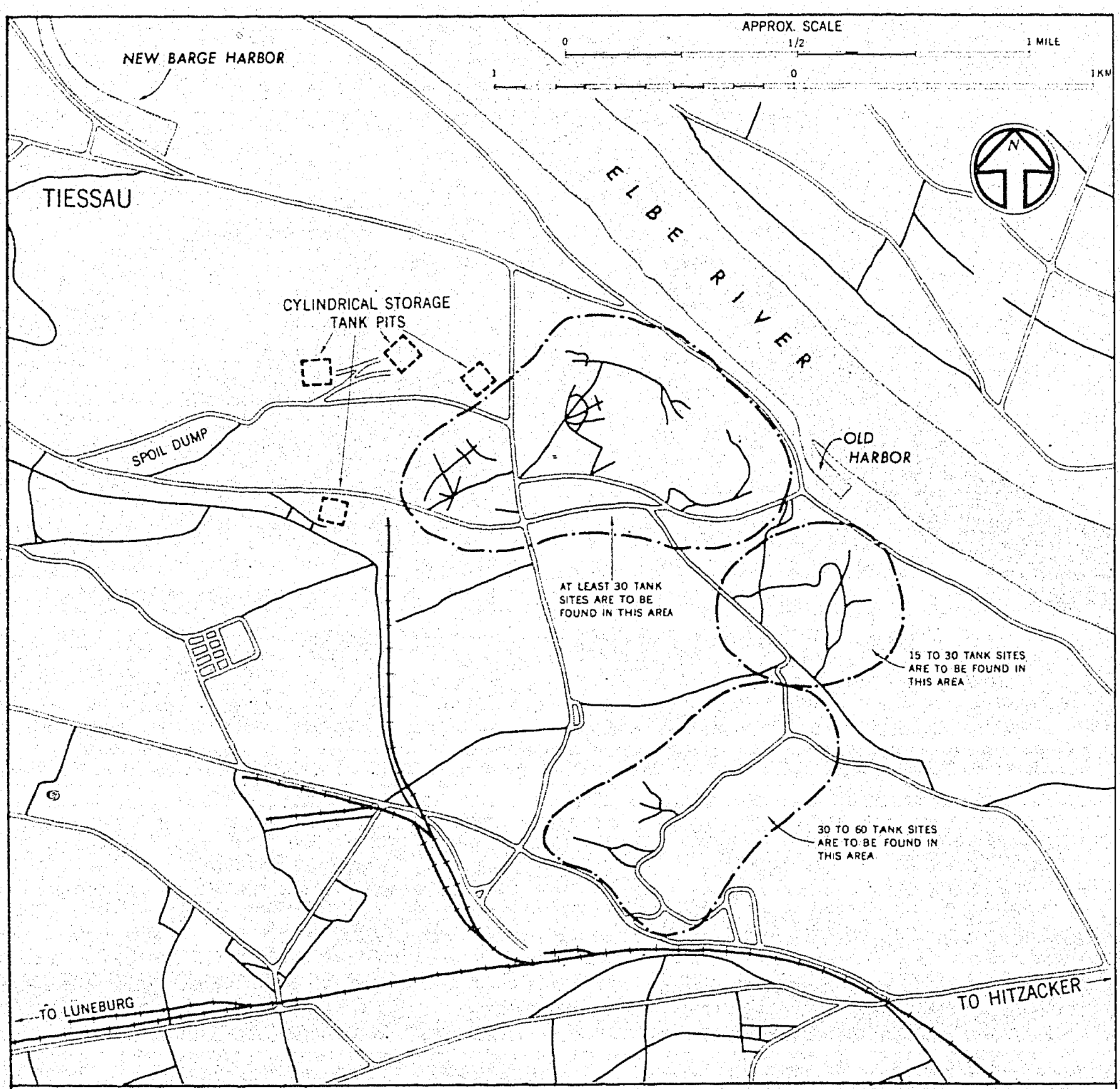
One pit filled in, and possibly containing cylinders.
One pit contained five unburied cylinders.
One pit contained a possible pumphouse under construction
Three pits still empty.

Also, 35 circular clearings, each 80 feet in diameter, are visible in the forest, east of the pentagon area. It is uncertain whether these mark buried tanks or whether they have some other purpose such as charcoal burning.

A branch rail line leaves the Lindau-Munich line just west of Freiham, and enters the northeast corner of the plant where there are several branch sidings with a number of buildings alongside.

5.8.9 Hitzacker

Location.- This plant is located in the low hills northwest of Hitzacker, latitude 53° 0' N., and longitude 11° 0' E. It is on the west bank of the Elbe River about 55 miles above Hamburg and 16 miles above the Bleckede strategic storage plant.



Sketch Map of Strategic Storage Plant at Hitzacker

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User.- W.I.F.O..for Army and possibly Air Force supplies.

Description.- Few details concerning this important hauptlager installation are available. It is believed to be primarily for gasoline, but the storage of diesel and fuel oil is not precluded. Reports of storage capacities here as high as 2,850,000 M^3 are probably highly exaggerated and a total of 300,000 M^3 (1,890,000 barrels) has been taken as a conservative estimate. Four main storage areas have been identified as follows:

(1) The northern area containing 30 or more probable buried tank sites. The outlines of three circular tanks have been seen here but it could not be determined whether or not all the tanks were of this type.

(2) The eastern area contains three clusters of buried tanks. About 15 pairs of ventilators are visible but it is not known whether each pair represent one or two tanks. There also appear to be two pumphouses in the area.

(3) The southeastern area is in a small valley through which runs a pipe line with three or more pumphouses. There are 30 pairs of ventilators visible which appear to cover from 30 to 60 tanks.

(4) To the west of area "A" are four new pits. At the time of observation, one pit contained five horizontal cylinders 165 x 27 feet and another contained two cylinders still unburied and two pits were empty.

This installation lies alongside the Luneburg-Dannenburg railway and has two or three loading points, each with its own siding. The westernmost of these is provided with five small pits, each containing a 40 x 10 ft. horizontal cylinder. These cylinders probably hold about 65 tons of gasoline each.

There are two barge harbors on the Elbe River. The old harbor is adjacent to the storage areas with which it has pipe line connections. The new harbor lies near Tiessau in an artificial dock with a channel joining the river about two miles downstream from the old harbor. A large building on the quay appears to be a pumphouse and it is believed that a pipe line connects it with the storage tanks.

5.8.10 Kiel

Location.- This strategic underground storage installation is located on the cliff top at Monkeburg, latitude 54° 21' N., longitude 10° 11' E., on the east side of Kiel Harbor on the Baltic.

User.- Navy.

Description.- Total reserve storage tankage is estimated to be 182,600 M^3 (1,150,380 barrels). A detailed description of the plant appears on page 262, under "Ocean Terminals". The location is shown on the map on page 260.

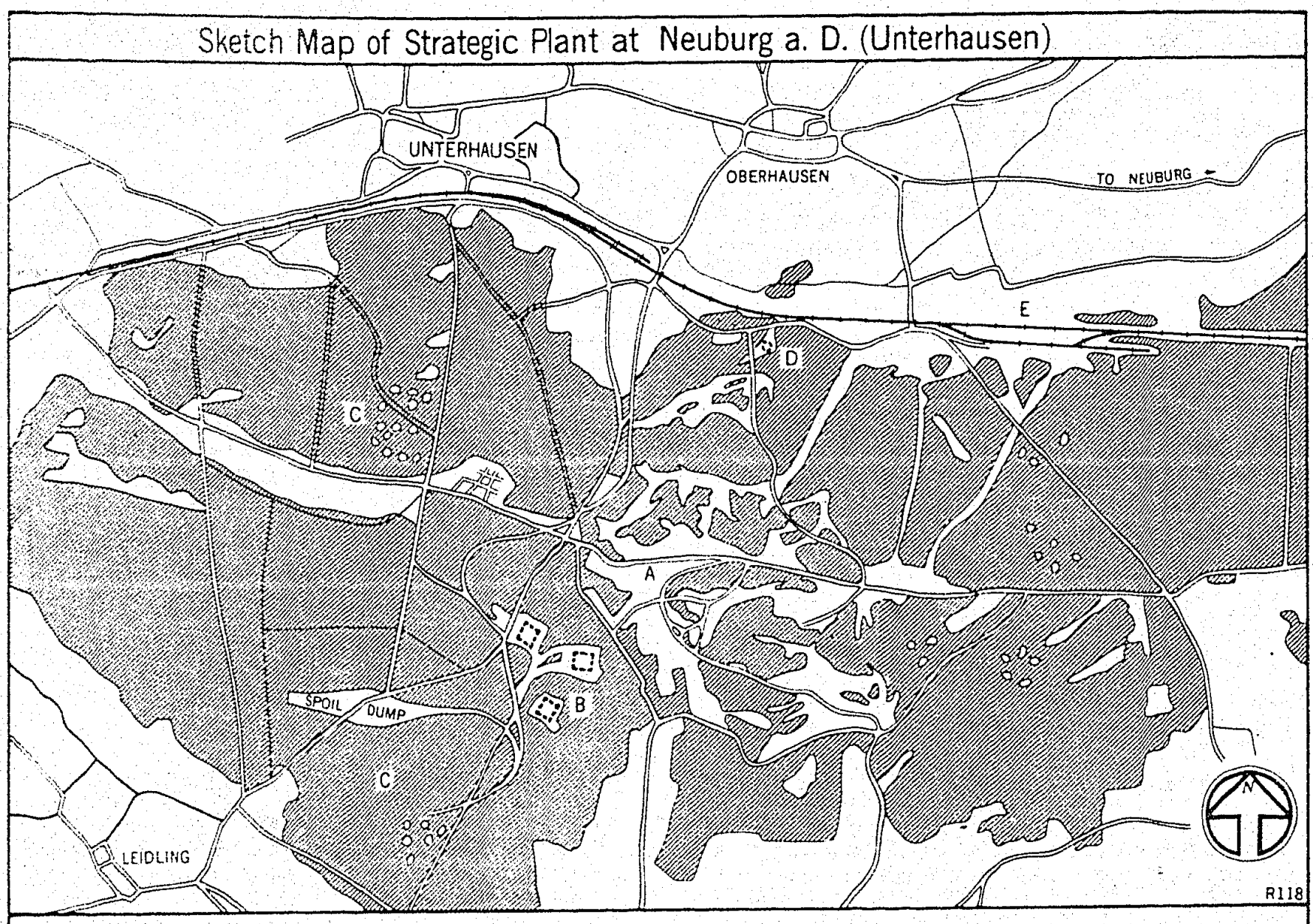
5.8.11 Neuburg

Location.- This plant lies in an area about two miles square, in the Unterhauser Forest, about a mile SSE of Unterhausen, and midway between Nürnberg and Munich. Latitude 48° 42' N., longitude 11° 6' E.

User.- W.I.F.O. for Air Force and possibly army supplies.

Description.- Very little data concerning this hauptlager are available. The area is well covered with overgrowth and storage capacities cannot be accurrately estimated, but are thought to be at least 100,000 M^3 (630,000 barrels).

Nienburg



The plant is served by a spur branching off from the main Borgheim-Neuburg railway line. There are three sidings and seven small buildings.

5.8.12 Nienburg

Location.- On the east bank of the Weser River northwest of Hannover. The installation, latitude 52° 37' N., longitude 9° 11' E., lies approximately two miles southwest of Nienburg.

User.- W.I.F.O. for Air Force supplies.

Description.- This hauptlager is probably the most important storage center of aviation gasoline in northern Germany. The tankage capacity is reported to be 150,000 M^3 (945,000 barrels), divided between 120 tanks. It is not known whether these are cylindrical or vertical in type and the figures cannot be verified.

Air cover, however, shows that the tanks are arranged in six circular groups, three with a radius of 600 feet and three of 325 feet. Each group shows two concentric rings of protuberancies which are probably the ventilators or inspection shafts of the buried tanks. There are about 20 in each of the larger and 18 in each of the smaller. It seems probable that each protuberance marks a tank or cylinder and that those in the larger circles are larger tanks than those in the

smaller. The larger tanks probably have capacities of the order of 2,000 M^3 and the smaller of 500 M^3. There is probably a buried pumphouse in the center of each circle.

The main railway line from Bremen to Hannover skirts the southeastern side of the plant where there are three sidings. There is a small wharf on the Weser River for the use of tank barges.

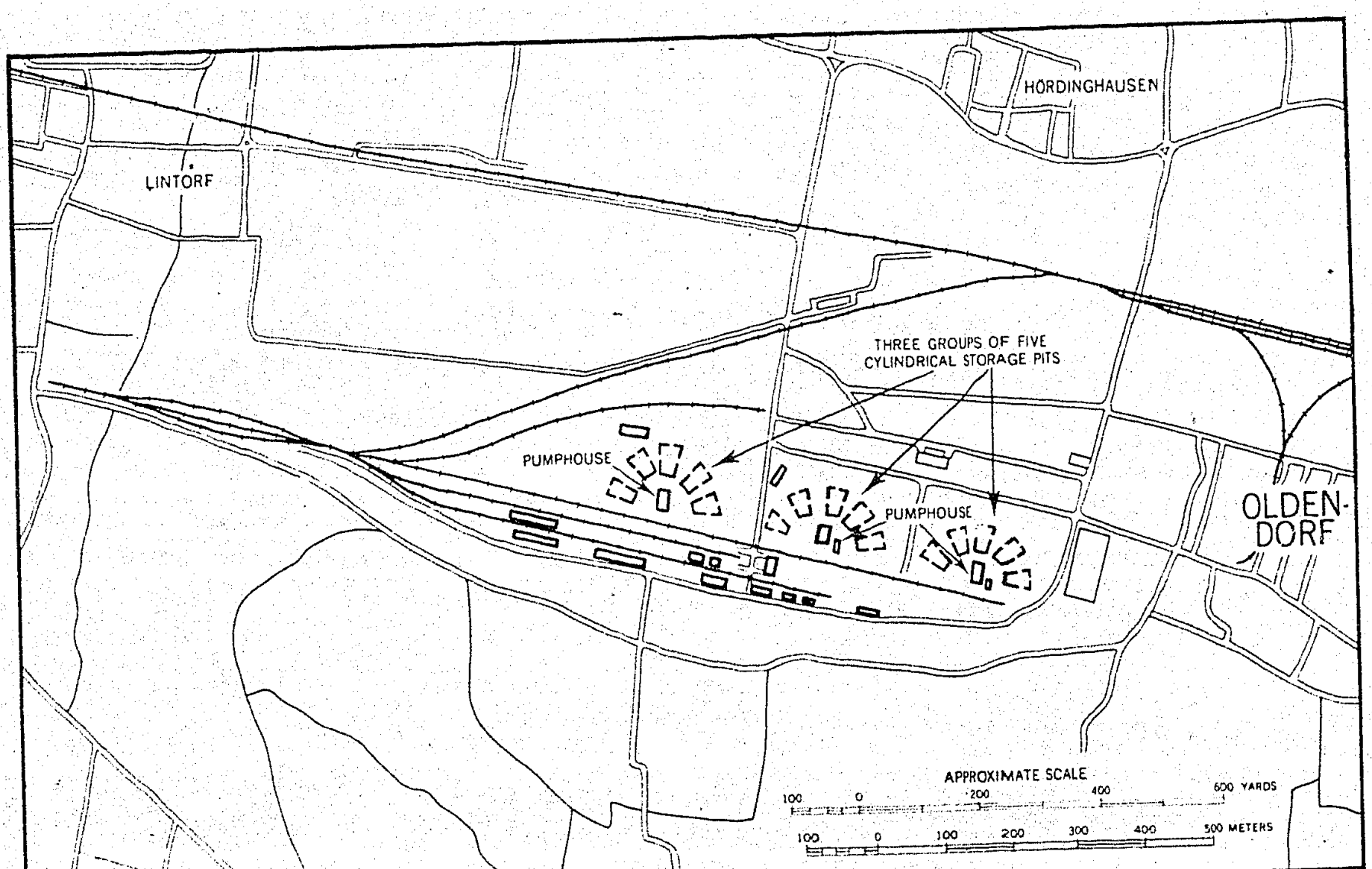
The storage center at Nienburg was the object of a heavy raid on August 6, 1944. In at least seven places the tanks appear to have been penetrated. The damage to pipe lines and less obvious damage to other tanks was probably extensive.

5.8.13 Oldendorf

Location.- About one mile west of Oldendorf and on the northern edge of a wooded hill, south of the Minden-Bad Essen railway line. Latitude 52° 18' N., longitude 8° 28' E. Oldendorf is about 18 miles west of Minden.

User.- Air Force.

Description.- This Air Force lufttanklager for the handling of aviation gasoline encompasses an area of about 800 yards x 150 yards. The tanks are layed out in three crescent-shaped groups, running east and west. Each group consists of five pairs of horizontal cylinders arranged in a semi-circle. The cylinders are about 90 feet long and 25 feet in diameter, and have a capacity of about 1,500 M^3 (9,450 barrels) each.



Sketch Map of Strategic Storage Plant at Oldendorf

R 127

Total Tankage

Type	No. of Tanks	Individual Capacity		Total Capacity	
		M^3	Barrels	M^3	Barrels
Cylinders	30	1,500	9,450	45,000	283,500

Each pair of cylinders connect with a raised structure from which short pipe lines lead to building, 75 x 110 feet, probably pumphouses at the center of each crescent. The cylinders are buried and the raised structures protected on three sides by earth revetments.

The installation lies along the Holzhausen-Bad Essen railway line and is provided with several spars and sidings, and possbily an underground loading shelter.

The Ems-Weser Canal lies 2-1/2 miles north of the installation and it is possible that there is a pipe line to a loading dock on the canal.

5.8.14 Stassfurt

Location.- Stassfurt, latitude 51° 51' N., longitude 11° 34' E., is located approximately 20 miles south of Magdeburg. Storage tanks are located in salt mines near Stassfurt.

User.- W.I.F.O. for Army and possibly Air Force supplies.

Description.- Extensive bulk storage tankage is located far underground in the salt mines. While reports of its existence appear to be reliable, no exact details concerning this plant are available. Total tankage capacity is reported to be among the largest in Germany and is tentatively estimated at about 500,000 M^3 (3,150,000 barrels).

5.8.15 Swinemünde

Location.- At Swinemünde, latitude 53° 54' N., longitude 14° 16' E., on the Baltic Sea at the entrance to the Stetinner Haff and Oder River.

User.- Navy.

Description.- A large Naval storage center is reported here but details concerning the plant are not presently available. Estimated total capacity is reported as 171,600 M^3 (1,081,080 barrels). This plant is listed under Stettin in the "Ocean Terminal" section on page 263.

5.8.16 Wilhelmshaven

Location.- Wilhelmshaven lies on the protected Jade Busen on the North Sea coast. Latitude 53° 32' N., longitude 8° 8' E.

User.- Navy.

Description.- Wilhelmshaven is one of Germany's most important Naval bases and extensive tankage for Naval storage and bunkering exists there. The aggregate bulk storage capacity is estimated at 216,600 M^3 (1,364,580 barrels).

The various installations and the port of Wilhelmshaven are described in more detail under "Ocean Terminals" on page 271 and a location map appears on page 270.

MARKETING STATISTICS OF THE LEADING OIL COMPANIES IN GERMANY - 1938

Product	D.A.P.G.(a)		Rhenania-Ossag(b)		"Olex"(c)		Deutsch Gasolin A.G.		Benzol-Verband G.m.b.H.		Deutsch Vacuum Oel A.G.		I.G.Farben-industrie		Deurag(d)		Others		Total	
	Barrels	%	Barrels	%	Barrels	%	Barrels	%	Barrels	%	Barrels	%	Barrels	%	Barrels	%	Barrels	%	Barrels	%
Motor Fuel	5,390,196	21.63	5,182,852	20.81	2,347,464	9.42	1,622,292	6.51	5,268,088	21.14	-	-	-	-	-	-	5,106,108	20.49	24,920,000	100.00
Industrial Naphtha	174,348	17.40	679,356	67.80	83,166	8.30	-	-	-	-	-	-	-	-	-	-	65,130	6.50	1,002,000	100.00
Butane & Propane	-	-	-	-	-	-	-	-	-	-	-	-	536,256	93.10	37,440	6.50	2,304	0.40	576,000	100.00
Kerosene	545,154	63.06	-	-	210,938	24.40	19,019	2.20	-	-	-	-	-	-	-	-	89,389	10.34	864,500	100.00
Distillate Fuels, Internal	4,042,401	36.07	2,535,046	22.62	1,110,624	9.91	143,451	1.28	1,419,940	12.67	50,431	0.45	-	-	-	-	1,905,207	17.00	11,207,100	100.00
Distillate Fuels, Bunkers	1,337,093	29.31	1,199,780	26.30	63,410	1.39	-	-	-	-	-	-	-	-	-	-	1,961,617	43.00	4,561,900	100.00
Residual Fuels, Internal	37,659	66.89	18,641	33.11	-	-	-	-	-	-	-	-	-	-	-	-	-	-	56,300	100.00
Residual Fuels, Bunkers	2,213,180	45.19	691,037	14.11	71,014	1.45	-	-	-	-	-	-	-	-	-	-	1,922,269	39.25	4,897,500	100.00
Lubricating Oil & Grease	765,039	21.97	1,204,145	34.58	169,563	4.87	-	-	-	-	330,809	9.50	-	-	-	-	1,012,624	29.08	3,482,200	100.00
TOTAL BARRELS	14,505,070	28.13	11,513,857	22.32	4,056,199	7.86	1,784,762	3.46	6,688,028	12.96	381,240	0.07	536,256	1.03	37,440	-	12,064,648	23.39	51,567,500	100.00

	Metric Tons	%	Metric Tons	%	Metric Tons	%	Metric Tons	%	Metric Tons	%	Metric Tons	%	Metric Tons	%	Metric Tons	%	Metric Tons	%	Metric Tons	%
Asphalt	2,093,257	35.90	2,247,190	38.54	-	-	365,010	6.26	-	-	-	-	-	-	-	-	1,125,344	19.30	583,800	100.00

(a) Deutsch-Amerikanische Petroleum-Gesellschaft.
(b) Rhenania-Ossag Mineralölwerke Aktien-Gesellschaft.
(c) "Olex" Deutsche Benzin- und Petroleum G.m.b.H.
(d) Gewerkschaft Deutsche Erdöl-Raffinerie (Deurag).

5.9 INTERIOR BULK PLANTS

Bulk storage facilities are plentiful throughout Germany. The major petroleum distributing companies own extensive systems of commercial bulk plants and numerous plants owned by local jobbers and distributors are to be found in the more important towns and cities. The bulk storage capacities of these plants vary between 30,000 M^3 (189,000 barrels)(or even larger in some of the more important centers), to 30 M^3 (189 barrels) in one underground tank, in the smaller places. Layout plans of several representative plants appear on pages 330 to 345. In view of the importance of inland waterways in the German transportation system, many of these bulk plants are located on rivers and canals, and have both rail and water connections.

As mentioned in the preceding section dealing with strategic storage, in addition to the large strategic reserve storage plants of the W.I.F.O., the Army and the Air Force own a number of secondary bulk plants. During the war they have also taken over many commercial bulk plants for military supply and distribution purposes (a). The Air Force, particularly, has taken over numerous commercial aviation fuel storage plants and servicing facilities.

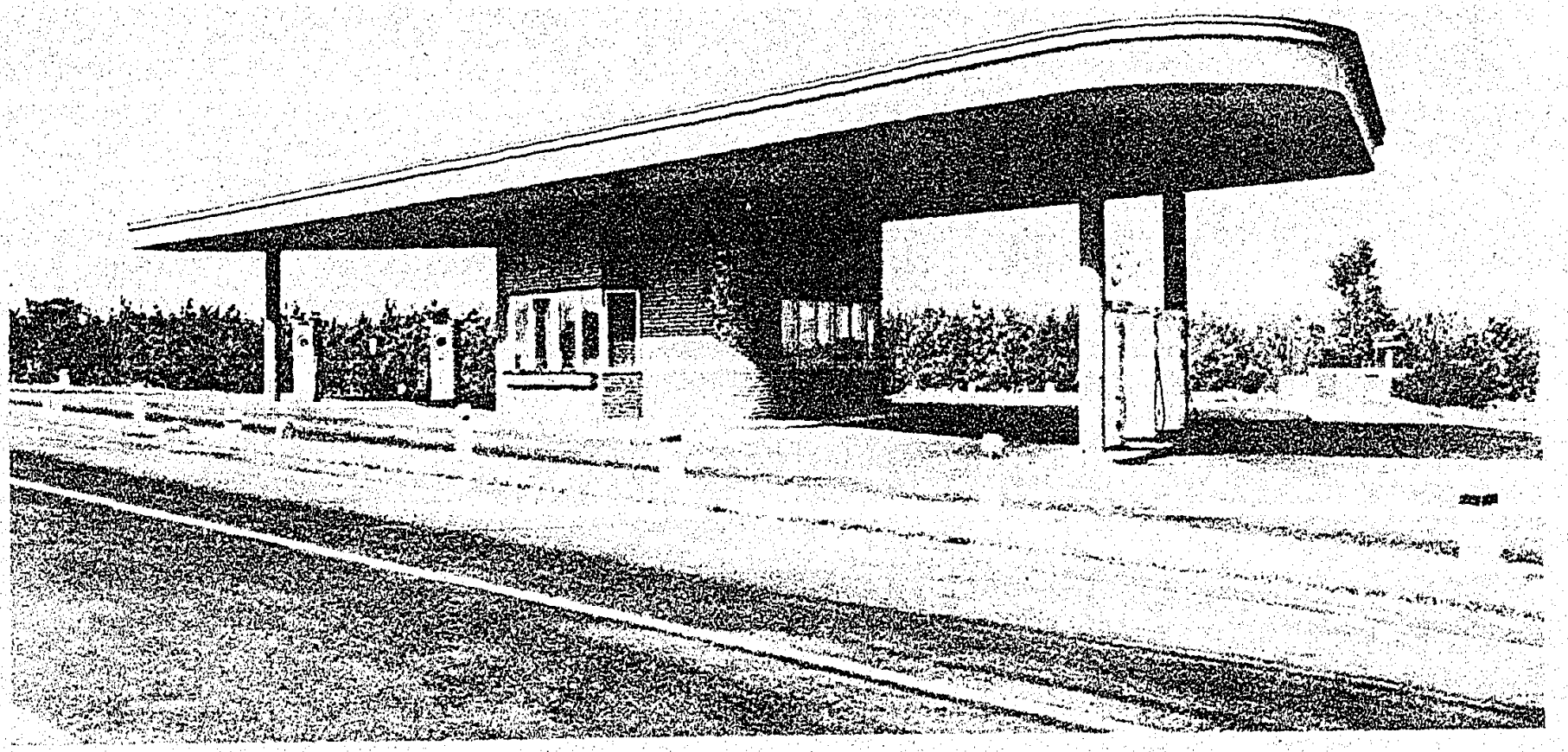
All localities where bulk oil storage plants, of any kind, are known or reported to exist are listed in the table on pages 310 to 328. The information on storage plants has been assembled from a variety of sources, some of which are of uncertain reliability. The parent companies of Rhenania-Ossag and of "Olex" were able to furnish more or less complete prewar tankage lists which, however, were far from up to date, even at the outbreak of the war. Information available from other companies owning subsidiaries in Germany was even more incomplete and anti-dated. Prior to the war the oil companies in Germany were given strong encouragement by the Government to build storage tankage underground, and there appears to be reason to believe that, at least in some instances, such tankage was installed but not reflected in reports circulating outside of Germany. However, the list referred to above will provide some indication as to the number and size of bulk plants that may be encountered. A map showing all the localities listed appears on page 329.

5.10 DISTRIBUTING COMPANIES

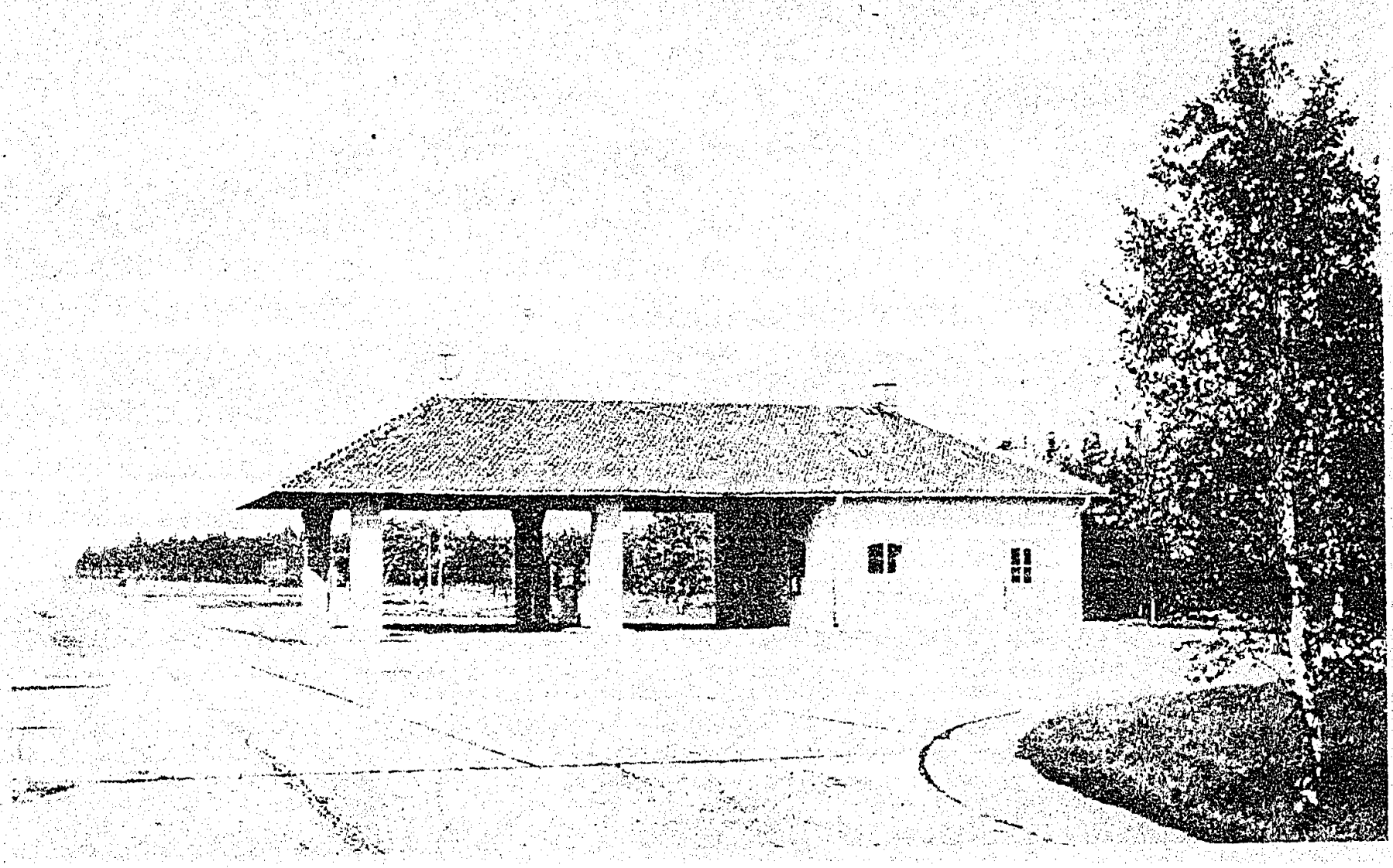
Although prior to the war a very large number of firms were engaged in the distribution of petroleum products in Germany, approximately 75 per cent of the trade was in the hands of five companies: Deutsch-Amerikanische Petroleum-Gesellschaft (D.A.P.G.), Rhenania-Ossag, Benzol Verband, "Olex" Deutsche Benzin- und Petroleum-Gesellschaft m.b.H., and Deutsche Gasolin A.G., in that order. It is also noteworthy that some 50 per cent of the total trade was held by the American controlled Deutsch-Amerikanische Petroleum-Gesellschaft and the British controlled Rhenania-Ossag, and an additional 10 per cent or so was held by other American and British controlled companies, such as "Olex", Deutsche Vacuum Oel A.G., Maschinenoel-Import G.m.b.H., Atlantic Refining Company of Germany, G.m.b.H., Hamburg Amerikanische Mineralöl G.m.b.H. and others. The remaining 40 per cent (approximate) was divided among a large number of independents, smaller subsidiaries, and local distributors and jobbers. Prominent among these were Allgemeine Oel-Handels G.m.b.H. (Oelhag), Deutsche Petroleums A.G. (Deag), Reichskraftspirit G.m.b.H., and Naphta Industrie and Tankanlagen A.G. (Nitag). The more important distributors are included in the list of principal German oil companies on pages 18 to 20. For additional data, refer to the "Handbuch der Internationalen Petroleum Industrie".

Sales figures for 1938 for the principal distributing companies appears on page 292.

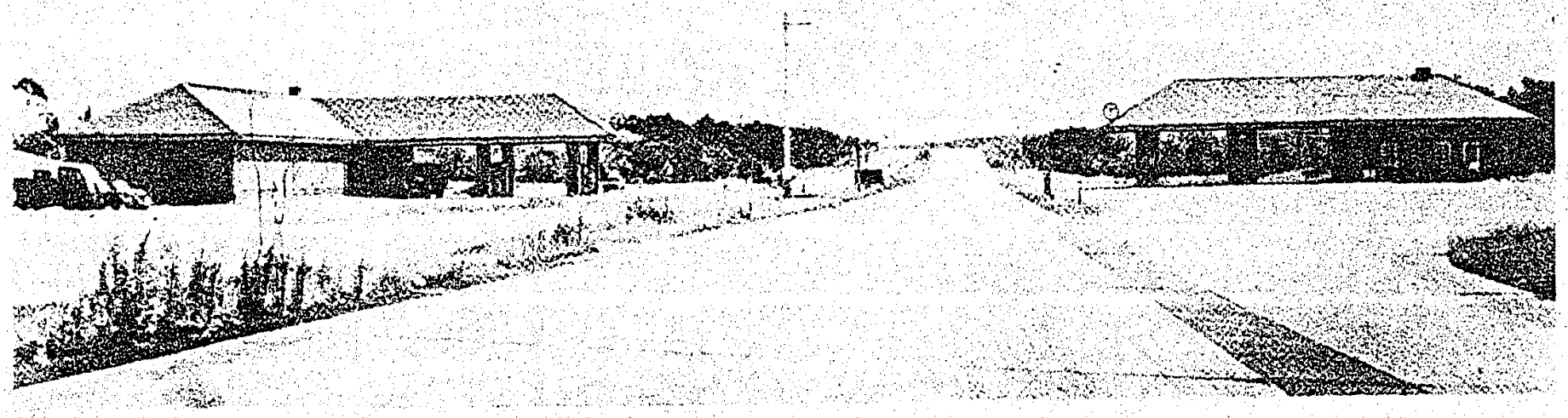
(a) The Germans have a series of secret geographical handbooks, one for each sheet and bearing the same numbers as the G.S.G.S. series 4081 Army maps, entitled Militar-Geographische Einzelangaben für die Trappenfuhrung. These books contain sections on bulk oil storage suitable for Army purposes within the area. For refernce purposes these map sheet numbers are shown on the map on page 329.



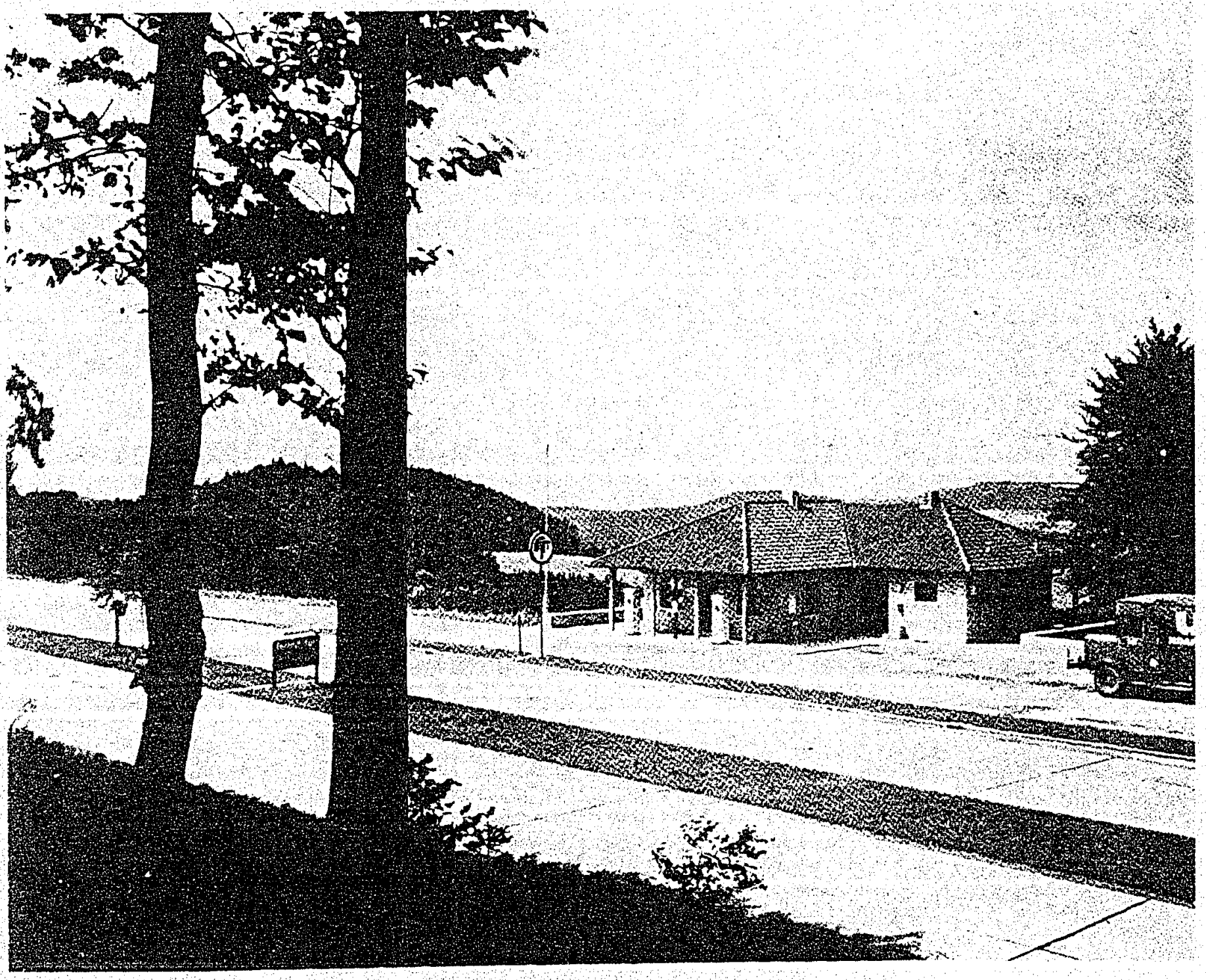
SERVICE STATION ON AUTOBAHN NEAR HANNOVER



SERVICE STATION ON AUTOBAHN NEAR HERMSDORF



SERVICE STATIONS ON AUTOBAHN NEAR MICHENDORF



SERVICE STATION ON AUTOBAHN NEAR HIENBERG

In the years immediately prior to the war the oil companies had already been subjected to considerable government control and through membership in compulsory trade associations their normal percentages of the market were, more or less, allotted to them. Since the war, both allocations and rationing are of course complete, but it appears that foreign owned oil companies have continued in operation by their German personnel under the supervision of State appointed commissioners.

As a general rule the distributing companies owned their own bulk storage plants, barges, railway tank cars, tank trucks. Gasoline stations and gasoline outlets were numerous and of modern design. Ownership as of 1939 was estimated to be approximately as follows:

Company	Gasoline Stations
Deutsch—Amerikanische Petroleum-Gesellschaft	17,500
Rhenania-Ossag Mineralölwerke A.G.	16,500
Benzol-Verband G.m.b.H.	11,000
"Olex" Deutsche Benzin- und Petroleum-Ges.m.b.H.	7,000
Deutsche Gasolin A.G.	7,000
Naphta Industrie und Tankanlagen A.G. (Nitag)	2,000
Others	3,000
Total	64,000

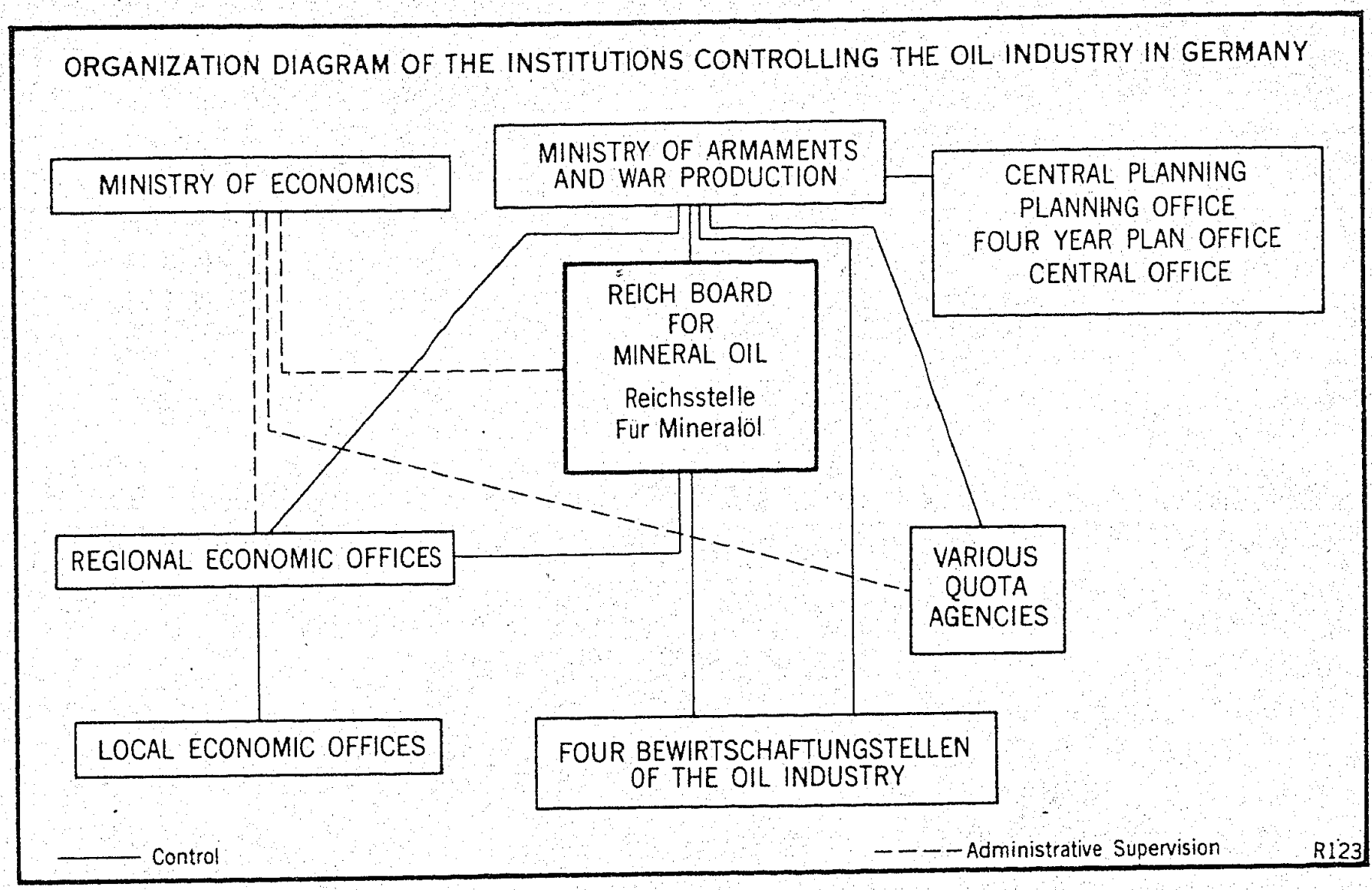
A feature of German automobile travel before the war, and military traffic since, is the system of State built super-highways known as Autobahn. Their routes are shown on the map on page 10 . At the time they were built the State also built elaborate service stations at frequent intervals. Photographs of typical stations are given on pages 294 and 295. These service stations were operated by the Reichsautobahn-Kraftstoff-Gesellschaft, organized by the Government for that purpose. Gasoline of standard quality was obtained from the various producers and marketed unbranded under the Government's guaranty of quality.

With the advent of substitute fuels at the beginning of the war, provisions were being made to provide these stations with stocks and dispensing equipment for servicing solid and gaseous substitute-using vehicles, but as further stringencies developed, this was abandoned and the stations closed. It is possible that some of them may have been utilized by the Army.

5.11 GOVERNMENT CONTROL AND RATIONING

5.11.1 Official and Semi-Official Agencies

The top government agency controlling the German overall war economy is the Reichministerium für Rustings- und Kriegsproduktion (Ministry of Armaments and War Production), headed by Dr. Speer, and in which enormous powers were concentrated by the decree of September 2, 1943, "Concerning Concentration of the War Economy". This ministry is also in close relationship with the Vierjahresplan (Four Year Plan) office, one of the agencies through which the Four Year Plan is conducted, under the direction of Herman Göring. These, and other high governmental agencies, work in close cooperation in the preparation of basic or master plans. The inter-relationship of these agencies is often strengthened by "interlocking directorates". For instance, Dr. Speer also serves as Commissioner General for Armament Tasks and War Production in the Vierjahresplan (Four Year Plan) office, a position which empowers him to adapt sectors of German economy not otherwise directly under his control to the requirements of the war economy. Likewise, Dr. E. R. Fischer, of I. G. Farbenindustrie, is the Reichkomissar für Mineralöl (Reich Commissioner for Mineral Oil) in the Four year Plan office and also the leader of the Reichsstelle für Mineralöl (Reich Board for Mineral Oil).



The Zentral Planung (Central Planning Office) under the Four Year Plan is said to be limited in its functions to basic decisions such as transfer of whole industries, etc. The technical preparation for the work of the Central Planning Office is done by the Planungsamt (Planning Offices). In these offices plans for both the production and distribution of oil are prepared.

Matters pertaining directly to oil are handled at the Reichswirtschaftsministerium (Ministry of Economics) by the Abteilung Mineralölwirtschaft (Mineral Oil Section) of the Hauptabteilung II (Main Section II). For a breakdown of the internal organization of the Abteilung Mineralölwirtschaft, see Appendix 13.

The Reichsstelle für Mineralöl (Reich Board for Mineral Oil) with headquarters at Krausenstrasse 22-24, Berlin SW 68, under the Reichswirtschaftsministerium (Ministry of Economics)(a) is, due to its central position between the planning agencies and those which merely execute orders and instructions, the most important single agency in the administration and control of the distributing section of the oil industry. It is, by German law, a juristic person financed by fees levied upon the firms under its control and headed by the Reichsbeauftragte für Mineralöl (Reich Commissioner for Mineral Oil) appointed by the Minister of Economics, and who is advised by a Beirat (council), also appointed by the Minister from representatives of the industrial groups.

The Reichsstelle für Mineralöl is the key agency controlling the distribution of petroleum products. Once the overall allocation of petroleum products for the domestic economy for a given period has been set, the Reichsstelle prepares a plan--presumably in consultation with the various interested parties--dividing the allocation among the various claimants, such as the chemical industry, the textile industry, motor transportation, household consumption, etc. This plan, after approval becomes the official program for oil distribution for the period to which it refers.

(a) There are a number of Reichsstelle, each for a different industry, and though they are still nominally agencies of the Ministry of Economics, they are in fact under the control of Dr. Speer.

In general, the Reichsstelle für Mineralöl assigns to the leading organization in a given industry (such as another Reichsstelle or a group or a cartel) the task of dividing the quota for the industry among the member firms (quota agencies). Likewise, it assigns quotas, for household consumption, to the Regional Economic Offices leaving the setting of individual rations to those offices. The operation of the system in relation to the rationing of the various products is described below.

The orders and regulations concerning the distribution, rationing, use, storing, etc., of the materials within the jurisdiction of the Reichsstelle (see Appendix 12 for list of these materials) are either:

(1) Anordnungen (orders of a general nature addressed to an unlimited number of persons, published in the Deutscher Reichsanzeiger);

(2) Einzelverordnungen (orders given to individual firms, not published);

(3) Anweisungen (directions issued in connection with rationing, etc., to other agencies, not published);

(4) Auflagen (impositions: instructions given to individual firms in connection with, and as a condition of, the granting of licenses, not published).

For the internal organization and personnel of the Reichsstelle für Mineralöl, see Appendix 14.

Numerous agencies for oil distribution exist under the Reichsstelle für Mineralöl. Whereas the planning agencies and the Reichsstelle für Mineralöl are all governmental agencies, the various organizations through which the Board operates are partly Government agencies, and partly business organizations. The Regional and Local Economic Offices are Government agencies, and, broadly speaking, deal with allocations to the general public and the issuance of ration cards. The allocations to individual industrialists are established through so-called quota agencies or Kontingentstellen, which vary greatly in organization and character and are mostly business organizations or associations and rarely other Reichsstelle (Reich Boards). In respect to certain types of oil, such as lubricants, special and testbenzine, etc., the Reichsstelle für Mineralöl set up four Bewirtschaftungstellen to which wide powers were delegated in the distribution of the specific products within their jurisdiction. These Bewirtschaftungstellen are also business organizations; one is a trade group, the rest are cartels.

Before describing the functions of the quota agencies and the Bewirtschaftungstellen, a brief resumé concerning the groups and cartels from which these agencies were constituted is given. (a)

The Group System

The groups are compulsory trade associations. Every firm must belong to one or more groups, depending upon the firms' business functions. In many business lines these groups exercise almost unlimited powers over the individual members, controlling the administration of the business, allocating materials and Government and private orders, interfering with personnel matters, etc. The groups are organized on the "führer principle", with a leader at the top and the rest of the personnel subordinated to him. The leaders are appointed by the Government; the rest of the personnel by the leader.

There are seven Reichsgruppen or Reich groups: Industry, Commerce, Banking, Insurance, Power, Tourist Industry, Handicraft. These seven Reich Groups, together with the six Transportation Groups, form the Reich Economic Chamber (Reichswirtschaftskammer). The Reich Groups are subdivided into Economic Groups (Wirtschaftsgruppen). There are, for instance, 31 economic groups in industry and four in

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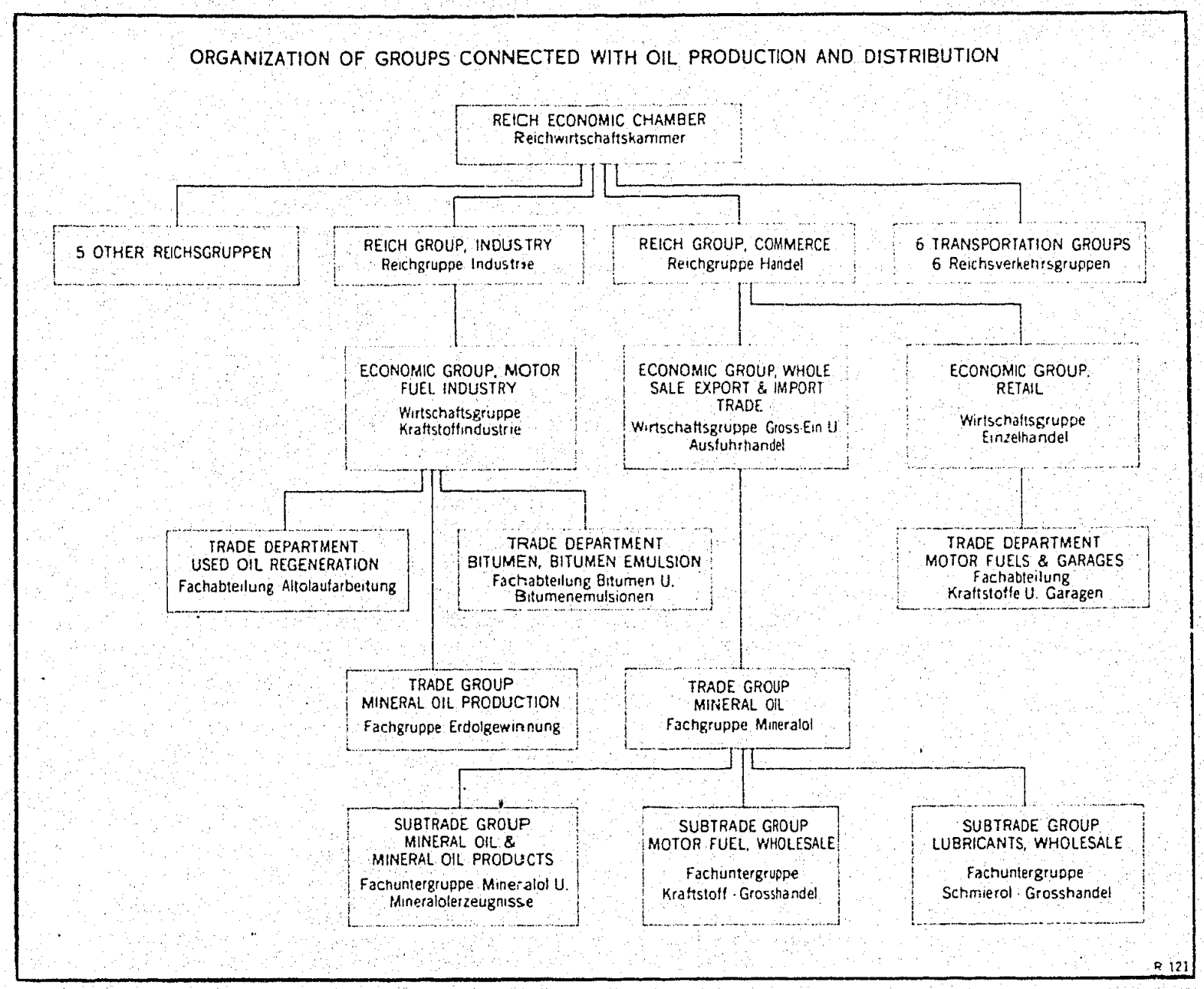
(a) More complete information concerning official and semi-official agencies and also many other data relating to petroleum and Allied industries are contained in the Jahrbuch der Deutchen Mineralölwirtschaft by Karl Heindrich v. Thämen and printed by Naturkunde und Technik Verlag Fritz Knapp, Frankfurt a. Main.

commerce. The economic groups are subdivided into Trade Groups (Fachgruppen), some of which are further divided into Sub-trade Groups (Fachuntergruppen).

Firms engaged in the production of oil belong to the Wirtschaftsgruppe Kraftstoffindustrie (Economic Group, Fuel), subdivision of the Reichsgruppe Industrie (Reich Group, Industry), and its subdivisions; those which are engaged in the distribution of oil belong to the subdivisions of the Reichsgruppe Handel (Reich Group, Commerce). Many firms engaged both in the production and distribution are members of several subdivisions of both Reich Groups. A further breakdown of the groups and lists of their personnel are given in Appendix 15.



The Cartels

Cartels in Germany are at present much more than "associations of independent enterprises for the control of the market". They are Government sponsored associations, membership in which, in many instances, is compulsory for every firm in a particular business and they are vested with dictatorial powers over their members.

In the distribution of oil, a number of cartels have a paramount role. Some cartels, such as the Zentralbüro für Mineralöl (Central Bureau for Mineral Oil), are the sole buyers and distributors of the total output of production and the materials imported; some cartels were made into the Bewirtschaftungsstellen, described on pages 300 and 301.

The leading cartels of the oil industry are the following:

Working Community of Mineral Oil Distributors (Arbeitsgemeinschaft Mineralölverteilung) and its administrative office, the Zentralbüro für Mineralöl (Central Bureau for Mineral Oil). The distribution of all domestically produced and all imported liquid fuels except power kerosene is supervised by the Zentralbüro für

Mineralöl. It is the compulsory cartel of the mineral oil distributors. The distributing facilities of the cartel members have been pooled and are utilized according to the directions of the Zentralbüro; in other words, the cartel members act as agents of the Zentralbüro in the distribution of liquid fuels.

The Kerosene Cartel (Petroleumgemeinschaft) is a voluntary cartel of kerosene producers and traders and has the same functions in the distribution of kerosene as the Zentralbüro für Mineralöl has in the distribution of liquid fuels.

Lubricants Cartel (Schmierstoffgemeinschaft) and Working Community of Lubricant Distributors (Arbeitsgemeinschaft Schmierstoffverteilung). During 1943 the members of the compulsory Lubricants Cartel, composed of all lubricants producers and traders, formed a Working Community of Lubricant Distributors (Arbeitsgemeinschaft Schmierstoffverteilung). This pool is now the sole wholesaler of lubricants in Germany. Wholesalers make deliveries to retailers against retailers' certificates (Händlerscheine), which the retailer receives from the Sub-branch Group of Lubricant Wholesalers (Fachuntergruppe Schmierstoffgrosshandel) and which are based on the retailers' previous share in the business. The Lubricants Cartel acts as a Bewirtschaftungsstelle.

Special- and Test-Benzine Cartel (Spezial and Testbenzingemeinschaft). The Special and Test Benzine Cartel is a voluntary cartel of benzine producers and traders. Its exact functions in the distribution of benzine are not known, but presumably it has the same position in benzine distribution as the Kerosene Cartel in kerosene distribution.

Cartel of Bitumen Distributors (Verteilungstelle Bitumen). The Cartel of Bitumen (Asphalt) Distributors is a voluntary cartel. Its exact functions in the distribution of asphalt are not known, but presumably it has a position comparable to the Kerosene Cartel.

Working Community of German Producers of Benzol (Arbeitsgemeinschaft Deutscher Benzolerzeuger) is a compulsory cartel which was made a Bewirtschaftungsstelle for the distribution of technical benzol.

Working Community of Distributors of Coal Products (Arbeitsgemeinschaft Verteilung der Steinkohlenerzeugnisse) is the cartel for the distribution of the by-products of the production, hydrogenation and distillation of raw coal tar, especially coal-tar pitch and coal-tar oil.

Regional Economic Offices and Economic Offices (Landeswirtschaftsämter and Wirtschaftsämter)

The Regional Economic Offices (Landeswirtschaftsämter), which were established in the fall of 1939, are regional agencies of the Ministry of Economics. They are presided over by the provincial Presidents (Oberpräsidenten) in Prussia and by the Reich Governors or Prime Ministers in other German states. They receive, from the Reichsstelle, quotas for household consumption which they distribute to the Economic Offices under them. The Economic Offices (Wirtschaftsämter) are local agencies of the Ministry of Economics and are subordinated to the Regional Economic Offices. They are presided over by mayors in the cities and by county chiefs (Landrate) in rural areas. They issue the ration cards to the public and also issue ration cards to industrial consumers in exchange for their quota certificates. Both the regional economic offices and the economic offices deal, it should be noted, with a long list of other rationed commodities in addition to oil and oil products.

Quota Agencies for Specific Industries (Fachliche Kontingentstellen)

Whereas the Reichsstelle für Mineralöl deals exclusively with oil and oil products, the numerous agencies to which the Reichsstelle allocates quotas for further distribution among the claimants under them (besides the quotas given to the Regional Economic Offices and Economic Offices for distribution to the consuming public) usually deal also with the other rationed products and materials which these claimants need. These agencies, often organized as Bewirtschaftungsstellen, were established so that a factory would have to deal with only one agency for the allocations

of all its requirements. This system is time-saving and a convenience to the manufacturers. It also claims an additional advantage over centralizing all allocation of quotas in one agency, in that the distributing agencies of the various industries, with an intimate knowledge of the character and needs of the individual firms under their supervision, are better equipped to handle the oil allocation to them than any agency, Governmental or otherwise, specializing only in the field of oil. Appendix 17 outlines the jurisdiction of the various quota recipients for the allocation of lubricants. For instance, the need for transformer oil of any firm manufacturing electrical transformers can, it is believed, be better evaluated by the authority controlling the firms manufacturing the transformers than by the oil specialists of the Reichsstelle für Mineralöl. The allocation of transformer oil for the first filling of transformers is done, therefore, by the Economic Group Electrical Industry. Similarly, lubricants used in the production of certain chemical products are allocated to the individual firms by the Reich Board Chemistry. On the other hand, the lubricants needed in the production of oil or other products in the jurisdiction of the Reichsstelle für Mineralöl are allocated by the Economic Group Fuel, because this organization is considered to be most familiar with the capacity and other circumstances of the oil-producing plants.

These quota agencies are either government agencies (such as the Reich Board Chemistry), which control different products in the same way as the Reichsstelle für Mineralöl controls oil and oil products, or they are business organizations (groups, cartels).

Quota Agencies for Use in Agriculture

According to recent reports, petroleum products are allocated to individual farmers by the district farmers organizations (Kreisbauernschaften). The individual allocation is based on the advice of the local peasant leader (Ortsbauernführer). It seems that the Reich Board for Mineral Oil makes an overall allocation for agriculture to the Reich farmers leader (Reichbauernführer), who divides that quota among the regional farmers organizations who, in turn, allocate the quotas to the district farmers organizations. No information is available as to whether or not the district farmers organizations make their individual allocations for petroleum products through the local peasant organizations (Ortsbauernschaften) as is done in connection with seeds, fertilizers, and the like.

Bewirtschaftungsstellen in the Oil Industry

In December 1943, the Reich Commissar established the following four Bewirtschaftungsstellen within the oil industry. Reference to these was made under "Cartels" on page 299.

(1) The Schmierstoffgemeinschaft (Neuer Jungfernsteig 21, Hamburg 36); the lubricating oil cartel for the distribution of lubricants;

(2) The Trade Group Mineral Oil (Kurfürstendamm 74, Berlin-Haleusere) for the distribution of kerosene, special- and test-benzine;

(3) The Arbeitsgemeinschaft Deutscher Benzolerzeuger (Wittenerstrasse 45, Bochum) for technical benzol;

(4) The Arbeitsgemeinschaft Verteilung der Steinkohlenteererzeugnisse (Wittenerstrasse 45, Bochum) for the products obtained in connection with the production, hydrogenation and distillation of coal tar--especially coal-tar pitch and coal-tar oil.

The order specifies the power of these Bewirtschaftungsstellen to be as follows:

To steer the distribution in accordance with special instructions of the Reich Board for Mineral Oil;

To prescribe sales to purchasers specified by the Bewirtschaftungsstellen, and deliveries to certain storing establishments by producers and distributors;

To control the transactions in commodities within their jurisdiction, to regulate the same, especially their acquisition, distribution, use, and storing (the order transfers to the Bewirtschaftungsstellen the powers originally granted within their jurisdiction to the Reich Board).

The organizations enumerated above, when acting as Bewirtschaftungsstellen, add to their name "als Bewirtschaftungsstelle des Reichsbeauftragten für Mineralöl" (as Managing Agency of the Reich Commissioner for Mineral Oil). The Bewirtschaftungsstellen are empowered to issue orders, (described as Anordnungen), which are, however, to be approved by the Reich Commissioner unless they are instructions in individual cases (Einzelanweisungen).

5.11.2 Allocations and Rationing

The basic regulations and decrees controlling the allocation and distributing of oil products are issued by the Reichsstelle für Mineralöl. The sanctions and penalties for non-compliance with these regulations are extremely severe. The specific regulations concerning allocations of the various types of oil are summarized below.

Motor Fuel.- All liquid motor fuel, produced or imported, must be sold exclusively to the Zentralbüro für Mineralöl (Central Bureau for Mineral Oil), the administrative office of the compulsory cartel for the distribution of liquid fuel. Producers and importers are prohibited from making sales to any purchaser other than the Zentralbüro. The fuel is sold by this bureau, through the distributive system of its members, to the consumers holding ration cards. These ration cards are issued by the Economic Offices, in accordance with general directives, to consumers, or against supply certificates (Bezugsscheine) to industrial users. The supply certificates are allocated to manufacturers, etc., by the various quota agencies to which the Reichsstelle delegated that power.

The generic term for these different licenses, entitling the beneficiary to receive oil, is Supply Permits (Bezugsberechtigung). Several types of Supply Permits are issued in connection with the rationing of fuel:

(1) Filling-station cards (Tankausweiskarten):

a. Filling station cards for light motor fuel (Tankausweiskarten für Vergaserkraftstoff)

b. Filling station cards for diesel fuel (Tankausweiskarten für Dieselkraftstoff)

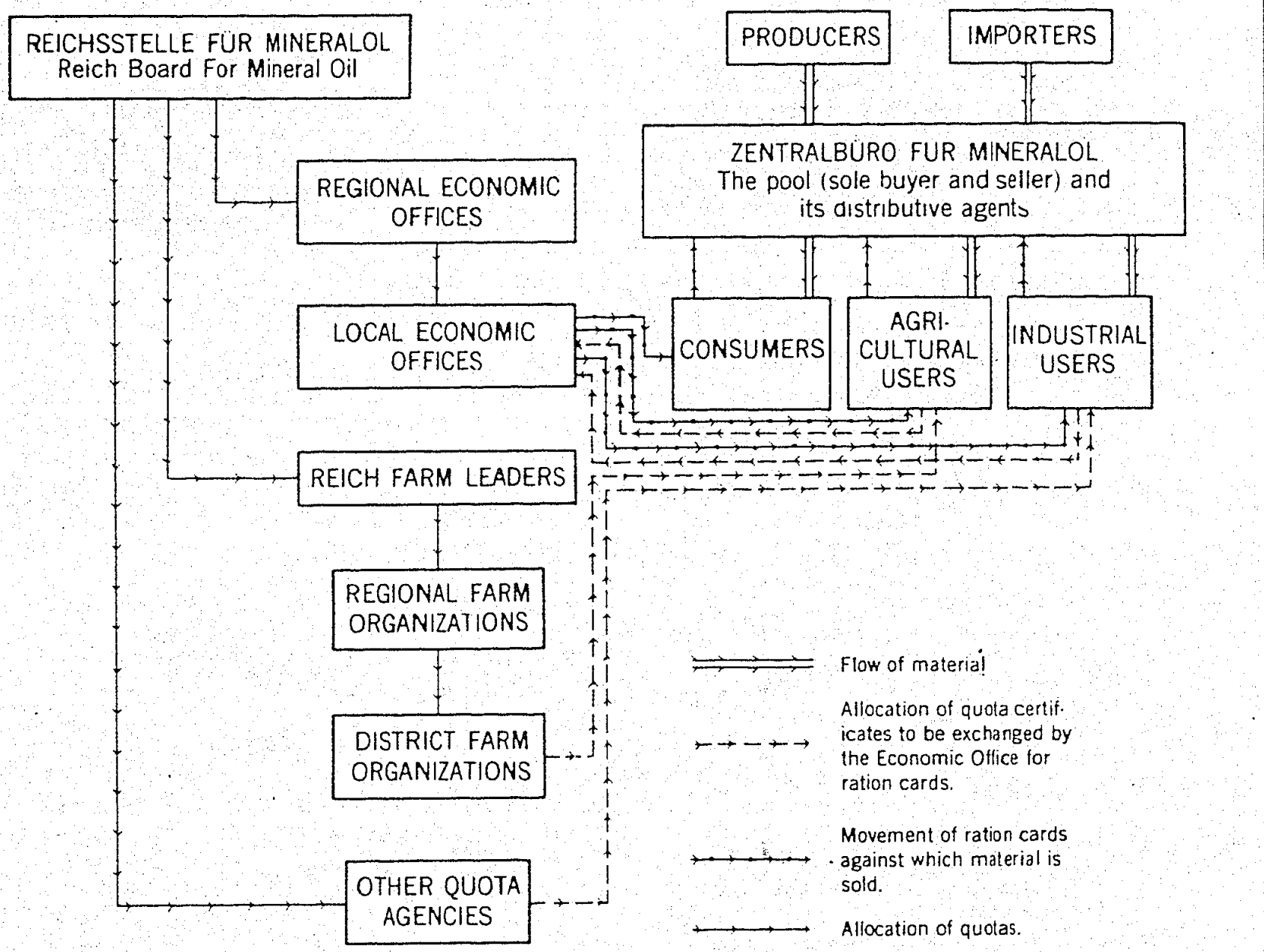
c. Filling-station cards for motor kerosene (Tankausweiskarten für Motorenpetroleum) which are also valid for certain tractor fuels.

(2) Mineral Oil Supply Certificates (Mineralölbezugscheine) which are valid, according to their tenor, for light motor fuel or diesel fuel.

(3) Liquid gas control stamps (Treibgas-Kontrollmarken)

The filling station cards and liquid gas control stamps may be used both for delivery from filling-stations and from warehouses. They must be surrendered to the vendor prior to the delivery of the merchandise, but not before the day of delivery. They must be preserved by the supplier and invalidated by his stamp. Against mineral oil supply certificates, however, fuel may be delivered only from the place of storage. The certificate must previously, or simultaneously, be surrendered and the supplier must mark the quantity delivered on the back of the certificate. All these supply permits are issued by the Economic Offices, but the Reichsstelle may also designate other agencies for their issuance.

THE SYSTEM CONTROLLING THE WARTIME DISTRIBUTION OF MOTOR FUEL IN GERMANY



Liquid fuel (a) must not be sold or purchased for use in combustion engines without filling station cards (Tankausweiskarten), nor liquid gas (b) without liquid gas control stamps (Treibgaskontrollmarken). Liquid fuel and liquid gas must not be delivered for purposes other than use on combustion engines without the permission of the Reichsstelle. It is prohibited to offer for sale or to deliver mineral oils, other than liquid fuels, for use as fuel, for the stretching of fuels, or for the production of fuel mixtures.

There are special provisions concerning delivery of fuel to the armed forces, and concerning aviation fuel and coal-tar fuel oil.

The regulations concerning the prohibition of sale without licenses do not apply to the sales to the Zentralbüro für Mineralöl.

(a) Liquid fuels in the meaning of these rules comprise:
1. Light motor fuel (Vergaserkraftstoff);
2. Diesel oil, with the exception of coal-tar fuel oil (Dieselkraftstoff, ausschliesslich Steinkolelenteer Treiböl);
3. Motor kerosene (Motorenpetroleum) and tractor fuel (Traktorenkraftstoff).

(b) Liquid gas, in the meaning of this rule, is any gas in liquid form that can be used as fuel or in the manufacture of gas fuel, whether it is used as a fuel in the individual case or not.

Motor fuel obtained against a supply permit must not be sold by a consumer to other consumers. Motor manufacturers, however, and repair shops are permitted to deliver the motors manufactured or repaired by them with a supply of fuel. Consumers are nevertheless permitted to sell the fuel to authorized distributing companies and are even obliged to do so if directed by the agency that issued the supply permit.

Lubricants.- Large distributors of lubricants obtain monthly quotas corresponding to their previous share in the total business. They make deliveries to wholesalers against dealer's certificates (Händlerscheine) which the wholesalers receive from the Sub-Trade Group of Lubricant Wholesalers, granted in accordance with their previous share. Consumers get their materials against various ration cards.

The rules governing allocation and distribution of lubricants differ regarding use in internal combustion engines and other uses (Schmierstoffe fur nichtmoterische Zwecke). The general rule for both types is as follows:

"Lubricants must be applied for, bought, and used exclusively for war and other most essential purposes, and only in quantities which are necessary for those purposes under the most economical use and in compliance with the regulations concerning used oil."

The order lists all materials to be regarded as lubricants. (See Appendix 16)

In the allocation of lubricants for purposes other than for use in internal combustion engines the rules differentiate between large consumers,,medium consumers (Normalverbraucher), and small consumers.

Large consumers are those who had been designated as such by the Reichsstelle in unpublished orders given to individual firms (Einzelverordnungen). These firms obtain permits for the acquisition of lubricants from the Schmierstoffgemeinschaft, the cartel for lubricants.

Medium consumers are all those who do not specifically or automatically fall into one of the other two classifications. They obtain their permits for the acquisition of lubricants from the Regional Economic Offices.

Small consumers are those who did not use any lubricants in 1943, or who did not use more than 60 kilos. They are permitted to acquire lubricants up to 20 kilos per annum without a permit, or, if the quantity used in 1943 was more than 20 kilos, the same quantity as used in 1943, but not in excess of 60 kilos. Quantities in excess of that amount must be authorized by the Regional Economic Office.

Contrary to the rules outlined above, the acquisition of certain lubricants, or lubricants for certain uses, must be authorized by steering boards. The order lists these lubricants and uses, indicating the respective steering boards. These boards are listed in Appendix 17.

Another exception to the general rules was made in connection with so-called special lubricants (Sonderschmiermitteln). These are defined for the purpose of the order as "watch oil, graphite suspensions and other specialities used and acquired ordinarily in very small quantities". Large and medium consumers may acquire these without a permit up to 20 kilos per annum.

The foregoing account has referred to permits to acquire lubricants. Permits, however, are not sufficient to obtain the material, for lubricants must not be delivered to consumers without lubricant stamps (Schmierstoffmarken) of the Reichsstelle für Mineralöl. The stamps are issued on the basis of the permits, apparently by the Economic Offices, as in the case of other materials.

Small consumers, who obtain their limited quantities without rationing, must make a written declaration as to quantities used in a form prescribed in the order.

In the allocation of lubricants for use in Internal combustion engines, lubricating oil must not be delivered or accepted without motor oil certificates (Motor-

Ölscheine) issued by the Economic Offices.

Distributors of mineral oils are obliged to transact with the owners of ration cards the business allocated to them by the Regional Economic Offices. There are special provisions concerning supplies of all kinds of lubricants to the armed forces and elaborate regulations concerning the use of lubricants as cooling agents in cutting and other mechanical procedures.

Kerosene.- Industrial consumers obtain their rations from the quotas allocated to the various trade groups to which the industrialist belongs and from the Economic Offices. Household rations are issued by the Economic Offices.

The ration cards for industrial users, the kerosene licenses (Petroleum Berechtigungsscheine) are issued for fixed amounts, whereas those for homes, the kerosene certificates (Petroleumbezugsauweise) are issued without fixed quantities, and the quantities are being established by the Regional Economic Offices from month to month.

The retailers pass on the kerosene certificates to wholesalers, but the kerosene licenses are first exchanged by the Economic Offices into Kerosene Certificates. Wholesalers make out their own "Kerosene Orders" (Petroleumbestallscheine) on the basis of the ration cards they receive, and obtain their supplies against these from the cartel. The kerosene cartel (Petroleumgemeinschaft) is the supplier of kerosene; all imports and all material produced domestically are concentrated in their hands.

Kerosene used in motors is treated as motor fuel (see page 302).

Benzol.- Benzol used as fuel is distributed exclusively through the Zentralbüro für Mineralöl, in accordance with the rules relating to motor fuel. Industrial benzol is handled by the benzol cartel (Arbeitsgemeinschaft Deutscher Benzolerzeuger) which is the sole buyer of all benzol and the sole supplier of the trade.

Producers and importers are not allowed to use or sell any kind of benzol until its toluol content has been reduced to one per cent. Producers and importers who are not in a position to carry out this instruction must deliver the benzol to a distillery assigned to them by the benzol cartel.

Industrial benzol is allocated to certain types of manufacturers by steering boards designated for that purpose; these steering boards are listed below. Other users of benzol (those not enumerated below) and retailers may obtain the same quantity of benzol they had during the preceding year without a license, and 10 kilos per month may be obtained without license for analytic purposes. Any requirement beyond that quantity, however, must be authorized by the benzol cartel.

The industrial users for whom steering boards were designated are the following:

Industrial Users	Steering Boards
"Large Consumers" (I.G. Farbenindustrie, manufacturers of explosives, and of phenol)	Reich Board, Chemistry
Producers of pharmaceutical products (except I.G. Farbenindustries)	" " "
Other organical-chemical industries	" " "
Producers of lacquer and paint	" " "
Producers of artificial lacquers	" " "
Manufacturers of certain materials used in the conservation of leather.	" " "

Industrial Users (Continued)	Steering Boards
Producers of materials used in the textile industry	Reich Board, Chemistry
Producers of materials used in the preservation of buildings	" " "
Producers of printers' ink	" " "
Producers of saccharine	" " "
Rubber industry	Reich Board, Rubber
Printers	Economic Group, Printers

Special and Test-Benzine.- These materials may be sold only against supply permits (Berechtigungscheine) issued by the Reich Board. Resellers may use, for their purchases, supply permits which expired during the preceding quarter.

Bitumen.- Bitumen and building material containing bitumen must not be delivered, sold, or used without the permission of the Reichsstelle für Mineralöl. This power was transferred by the Reichsstelle to so-called distributing boards (Verteflungsstellen) which have jurisdiction to authorize the distribution and use of certain bitumens for certain purposes. (For list see Appendix 18)

Tar and tar products.- These products must not be sold without permission of the Reichsstelle or the agencies appointed by that board.

Paraffin and Vaseline.- These products must not be sold without a permit. The permits are issued either by the Reichsstelle für Mineralöl itself, or by agencies appointed by that board for specific purposes, which are listed partly in the decree itself, partly in its appendix, on similar principles as for the other materials discussed above.

Used Oil and Remnants.- Used oil (oil that cannot be utilized for its original purpose in its existing state), remnants of Fuller's earth containing mineral oils, mineral waxes, oils of vegetable or animal origin, and brewer's pitch must be reprocessed. Only plants authorized by the Reichsstelle für Mineralöl are permitted to recondition these materials. A list of individual firms to which this authority was granted was published by the Reichsstelle in December 1942.

The plants must collect and preserve the used material, selected separately by kind, and sell it to authorized dealers, authorized regenerating plants, or have it regenerated by these. The dealers purchasing such used materials are under the same obligation. The collected material must be regenerated, or offered for sale, within three months.

The regenerated lubricating oil must meet the standards prescribed by the Committee of Trade-Norms for Lubricants (Fachnormen-Ausschuss für Schmiermittel-Anforderungen), which may be obtained from the firm Beuth-Vertriebs-Gesellschaft m.b.H., Dresdner Strasse 97, Berlin SW 19. Should the regenerated material fall short of these standards, it must not be sold in the open market.

The plants which regenerated their own oil before July 18, 1941 are permitted to continue to do so; and all plants are permitted to clean their own material by mechanical processes (centrifugal devices, filtration, etc.). This latter rule does not apply to the used oil of internal-combustion engines.

5.11.3 Miscellaneous Regulations

Regulations Restricting the Uses of All Types of Oil Products

In addition to the rules regulating the acquisition of materials, there are numerous restrictions on the use of materials by the owner.

Liquid fuel and liquid gas must not be used without the license of the Reichsstelle, or the agency to which the Reichsstelle may delegate that power, and it must not be used for any other purpose than the one stated in the license. The issuance of ration cards implies a permit to use the material only for the specific purpose for which it was issued.

Mineral Oils, other than liquid fuels, must not be used as motor fuels, for the stretching of motor fuels, or for the manufacture of motor fuel mixtures.

Lubricating oil issued for use in internal-combustion engines must be used only on the machine and for the purpose for which it was allocated.

Heating.- Mineral oils, of any kind, must not be used for the purpose of heating without the permission of the Reichsstelle. This does not apply, however, to the kerosene obtained against kerosene certificates, mentioned above, to uses by the Navy, and to beneficiaries to whom special permission was given under order 19/A of the Reichsstelle für Mineralöl.

Other restrictions of uses.- The use of mineral oils, of any kind, is prohibited in the manufacture of artificial fertilizers, or as floor polishes, furniture polishes, wood preservers, or in the manufacture of such materials.

Regulations Concerning Storage

Minimum quantities.- The Reichsstelle issues individual orders to certain firms instructing them to keep minimum supplies. These orders are not published. The firm must preserve these stocks, not letting them fall below the prescribed level, even if customers wish to draw against valid allotments or ration cards.

Maximum quantities.- The ownership of a supply permit or of a ration card does not of itself necessarily give the authority to purchase materials, since there are ceilings as to the maximum quantity that the owner of the permit may hold:

"Supply permissions, even if duly issued, may not be utilized if the material to be ordered together with the available supplies and the quantities in transitu, exceed the quantity actually used by the consumer during the last preceding three months."

There are provisions to the same effect concerning other oil products such as lubricants, kerosene, and special- and test-benzine.

Control of Means of Transportation and of Containers

The basic legislation is the decree of the Reichsstelle für Mineralöl, No. XI/43 of December 21, 1942, concerning the control of means of transportation and containers of mineral oil. The decree covers all private railroad cars, tankers on inland waterways, road tank-cars, tanks, and other containers (barrels, cans, and small containers) which were used on or before September 4, 1939 for the transportation or storing of materials under the jurisdiction of the Reichsstelle für Mineralol (a) or which were manufactured after that date for that purpose. These means of transportation and containers must be used according to instructions of the Reichsstelle für Mineralöl, and must be sold, rented, or their use permitted, to third persons if the Reichsstelle so directs.

The following regulations were enacted in order to speed up the circulation of containers:

1) If the material is delivered in containers lent by the supplier, a corresponding capacity of containers previously lent must be first returned.

2) The purchaser must empty the containers of the supplier and return them without delay. The time limit is four months, after which time the containers not returned must be reported by the supplier to the Reichsstelle für Mineralol.

(a) For list of these materials, see Appendix 12.

The preceding rules do not apply to deliveries to the armed forces.

The tanks of filling stations must not be sold, rented, or their use permitted to third persons, without the permission of the Reichsstelle, except to the Zentralbüro für Mineralöl. An amendment to the original decree, dated July 1, 1943, made the sale, renting, or permitting the use to third persons, of unused tanks of any kind (if they are built-in and have a capacity between 20 and 200 cubic meters) unlawful, unless the Reichsstelle für Mineralöl licensed the transaction.

Duty to Furnish Information

The Nazis, in recognition of the fact that control over the German economy would be difficult without centralized information, enacted laws covering every field of national life, compelling individuals and firms to supply information required by the Government. The basic legislation on which the Nazi orders were based was an old decree of July 17, 1923, enacting penal provisions for not supplying required information. If a punishable act was committed by non-compliance, a fine up to 300,000 marks could be levied on the guilty party, unless he could prove that he had acted with all necessary care. Under the Nazis the Reich Commissioners were permitted to levy fines by registered letter, and without proceedings, up to 10,000 marks.

As the raw material situation became strained, the regulations concerning information became even more strict. Hitler's decree of March 21, 1942, imposed a punishment of imprisonment or fine without any limitation, or the death penalty in severe cases, for anyone who gave false reports concerning needs or supplies of goods or labor important in the war economy. However, immunity was granted to the person rectifying his false statement before proceedings started against him, if the amendment was filed within three months. Non-recurrent reports filed before the enactment of the order had to be amended only if the competent agency so ordered.

The reports in the sphere of the Reichsstelle für Mineralöl, to which those severe penalties are attached, are those concerning bitumen (order No. 31/A of the 14.8.4., Sect. 7), paraffin (order No. 34, of 21.3.40, Sect. 3), vaseline (order No. 36 of 17.6.40, Sect. 3), and the use of mineral oil for certain restricted purposes (order No. 33 of 16.3.40. Sect. 3). Otherwise, the report had to be rectified only to obtain immunity from the penalties of the order if the non-disclosed quantity exceeded 2,000 kilos of diesel fuel, or 1,000 liters of light motor fuel, or 200 kilos of other materials in the sphere of control of the Reichsstelle für Mineralöl.

5.11.4 Allocation and Distribution of Substitute Fuels

In June 1942 the Zentralstelle für Generatoren (Central Office for Generators) was established in the Four Year Plan Office for development of adequate generators and fuels and the creation of a distribution system. One of the first actions of the Zentralstelle für Generatoren was the reorganization of the Generatorkraft A.G., a state corporation. Its share capital was raised from RM. 1.8 million, mostly owned by the timber industry, to RM. 9 million. Of the increased capital, fifty per cent was taken by the Rüstungskontor, A Ministry of Armaments and War production corporation, 22.5 per cent by the Reichsvereinigung Kohle, ten per cent by timber interests, and most of the remaining capital by oil companies. The Generatorkraft A.G. had, and presumably still has, a monopoly of the distribution of solid substitute fuels. It has established a chain of filling stations in Germany.

Since April 2, 1943, solid fuels have been delivered only against solid fuel cards (Festkraftstoffkarte), though rationing was not introduced. The holder of a card is entitled to purchase solid fuels. Restriction of consumption was accomplished by regulations concerning the use of generator vehicles. There are two types of cards, one for solid fuels with a high tar content (timber, peat, and lignite) and one for solid fuels with a low tar content (anthracite and coke). Each purchase of fuel must be registered on the card. In general, the validity of a card is limited to filling stations within a certain radius, usually 50 kilometers,

of the place in which the vehicle for which it was issued is usually garaged and special permits are required for long distance hauls.

Little information is available on the control of the distribution of gaseous substitute fuels. It was announced in March 1943 that under the supervision of the Zentrallstelle für Generatoren the A.G. der Kohlenwertstoffverbände was to undertake, in cooperation with various urban communities, the completion or construction of a number of filling stations for high pressure gas. It was also announced that low pressure gas stations were to be erected by the association of German bus traffic companies.

A resumé of the effects on German civilian economy of these regulations and restrictions have already been presented in the sections on civilian consumption and use of substitute fuels on pages 217 to 233.

5.12 SUMMARY OF BULK STORAGE FACILITIES

The table on pages 310 to 328 summarizes the available information concerning bulk storage points known or reported to exist in Germany. The table is followed by a number of layout plans illustrative of the type of commercial bulk plants common in Germany. Also included are maps showing the locations of known petroleum facilities at Berlin, Dresden, Düsseldorf, Frankfurt am Main, Magdeburg, Mannheim-Ludwigshafen and Regensburg. A map, showing the locations of all storage points listed in the summaries and also showing the Werkreise boundaries and the map sheet reference numbers, appears on page 329.

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

X = Unknown - = Not Applicable

IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		Remarks
							Plant Capacity		Total for Place				
Werkreise(a)	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates (g) Lat. N	Long. E	Owner of Plant	Location of Plant	M^3	Barrels	M^3	Barrels	Water	Rail	
VI	Aachen (Aix la Chapelle)	94A	50° 47'	6° 05'	D.A.P.G. (b)	Julius Strasse, 501	x	x	-	-	x	x	Bulk storage uncertain.
					Rhenania-Ossag	Grunerweg 100	60	378	60	378	-	Yes	RR siding with three underground tanks for gasoline.
V	Aalen	139	48° 51'	10° 07'	Rhenania-Ossag	Adjoining the railway yard.	90	567	90	567	-	Yes	Three underground tanks for gasoline and gas oil.
X	Achim	47	53° 01'	9° 02'	Navy	-	290,500	1,830,150	290,500	1,830,150	-	Yes	Major black oil underground Government strategic storage installation.
XI	Aken	75	51° 51'	12° 02'	"Olex" (c)	-	12,100	76,230	12,100	76,230	Yes	Yes	Tankage: 3 of 3,750 M^3, 2 of 300 M^3, 1 of 250 M^3.
I	Allenstein	29	53° 46'	20° 29'	Rhenania-Ossag	Junction of Karl-Roensch-str. and Giseviusstr.	210	1,323	210	1,323	-	Yes	Two underground tanks with three compartments each.
IX	Alsfeld	96	50° 46'	9° 16'	WIFO or Armed Forces (i)	-	x	x	x	x	x	x	Underground storage reported but unconfirmed.
XII	Altenkirchen	108	50° 41'	7° 39'	WIFO or Armed Forces	-	x	x	x	x	x	x	Unconfirmed military storage reported (also mentioned as Hochtenbach).
II	Angermünde	52	53° 01'	14° 01'	Rhenania-Ossag	-	x	x	x	x	x	x	
IV	Annaburg	88	51° 44'	13° 02'	German Air Forces	-	5,400	34,020	5,400	34,020	x	Yes	A GAF center; 12 aboveground tanks in forest.
IX	Aschaffenburg a. Main	121	49° 58'	9° 08'	Rhenania-Ossag	Bahnhofstrasse adjoining railway	120	756	-	-	-	Yes	Three underground tanks for gasoline and gas oil.
					Fischer & Co.	-	x	x	120	756	x	x	Bulk dealer.
IV	Aschersleben	87	51° 45'	11° 28'	Rhenania-Ossag	Bahnhofstrasse, depot adjoins railway.	120	756	120	756	-	Yes	Three underground tanks.
IV	Aue	113	50° 34'	12° 42'	Rhenania-Ossag	Druidenstrasse	155	977	155	977	-	Yes	Four underground tanks for gasoline and gas oil.
VII	Augsburg	150	48° 22'	10° 53'	D.A.P.G. (b)	-	x	x	-	-	x	x	Possibly office only.
					Deutsche Gasolin A.G.	-	x	x	-	-	x	x	Possibly office only.
					"Olex" (c)	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Rehmstrasse 17c	205	1,292	x	x	-	Yes	Six underground tanks for gasoline.
X	Aurich	318	53° 29'	7° 29'	H. Wiemers	-	x	x	x	x	x	x	Bulk dealer.
IV	Aussig	88	51° 24'	13° 12'	WIFO or Armed Forces	-	x	x	x	x	x	x	Underground strategic storage reported on the Elbe River.
II	Bad Berka	98	50° 54'	11° 17'	German Air Forces	-	6,500	40,950	6,500	40,950	x	x	Aboveground tanks in forest.
XIII	Bad Kissingen	122	50° 13'	10° 05'	Tanklage Sturzenberger	-	50	315	50	315	x	x	
IX	Bad Wildungen	96	51° 08'	9° 07'	Army (?)	-	x	x	x	x	-	Yes	SE of Kassel. Doubtful confirmation in air cover of military storage in tunnels in the hillside, between Wega and Anralf.
XIII	Bamberg	123	49° 58'	10° 53'	D.A.P.G. (b)	-	x	x	-	-	Yes	-	Important distributing plant.
					Rhenania-Ossag	In the harbor	60	378	60	378	Yes	Yes	Two underground tanks for gasoline.
IV	Bautzen	101	51° 11'	14° 25'	Rhenania-Ossag	Staatsstrasse Bautzen-Neusalza	120	756	120	756	-	Yes	Three underground tanks.
XIII	Bayreuth	129	49° 57'	11° 34'	Rhenania-Ossag	Bayreuth Kreustein	200	1,260	200	1,260	x	x	Two underground tanks.
XII	Bendorf	108	50° 26'	7° 34'	D.A.P.G. (b)	On Rhine N. of Koblenz	x	x	x	x	Yes	x	Important distributing plant.
XII	Bensheim	131	49° 40'	8° 38'	D.A.P.G. (b)	-	60	378	60	378	x	x	

III	Berlin Britz	65	52° 32'	13° 25'	"Brenntag" Brennstoff Chemikalien- und Transport-A.G.	-	x	x	-	-	x	x	Small refinery formerly belonging to Philip Müsham.
	Lichtenberg	65			Milag	-	13,800	86,940	-	-	x	Yes	? Partly for lubes.
					Mineralölwerke Lichtenberg	Herzbergstrasse 35	4,000	25,200	-	-	-	Yes	Small refinery.
	Rummelsburg	65			"Olex" (c)	On Spree River	22,375	140,963	-	-	x	x	Tankage: 4 of 3750 M^3, 3 of 1,900 M^3, 1 of 625 M^3, 5 of approx. 100 M^3.
					Rhenania-Ossag	-	17,573	110,710	-	-	x	Yes	43 tanks, principally for gasoline.
	Schöneberg	65			D.P.A.G. (h)	Karlin Luthevstrasse 61-66	15,500	97,650	-	-	x	Yes	Possibly office address. Storage at "Nobelsdorf".
	Spandau	64			Alminag (d)	Adjoins Betalag plant	x	x	-	-	x	x	
					Betalag	Cottzstrasse 18-21	35,000	220,500	-	-	Yes	Yes	Storage primarily for gasoline and alcohol, which were blended at the adjacent Allessinwerke.
					Depi (e)	Unterhafen on Havel River	x	x	-	-	x	x	Plant at Spandau. Office, Grunewald Salzbrunnerstrasse 17 (?).
					Nitag	Unterhafen on Havel River	x	x	-	-	x	x	
					Rhenania-Ossag	On Havel River	25,407	160,064	-	-	Yes	Yes	Tankage: 3 of 5,330 M^3, 4 of 1,530 M^3, and 22 small tanks. Primarily for gasoline.
	Tempelhof	65			D.A.P.G. (f)	On Teltow Kanal	33,150	208,845	-	-	Yes	Yes	Gasoline processing refinery.
	Velten	64			Werner Geisneat	-	x	x	166,805	1,050,872	-	Yes	Small synthetic plant in munitions works
VI	Beuel (Bonn)	107B	50° 44'	7° 07'	Assenmacher	-	x	x	-	-	x	x	Bulk dealer in motor gasoline.
					Heinen	-	x	x	-	-	x	x	Bulk dealer in motor gasoline.
					Schumann	-	x	x	-	-	x	x	Bulk dealer in motor gasoline.
					Steineman	-	x	x	x	x	x	x	Bulk dealer in motor gasoline.
VI	Bielefeld	72	52° 02'	8° 32'	Chemische Fabrik Lichtenberg	-	x	x	-	-	Yes	Yes	Bulk plant for motor fuel.
					D.A.P.G. (b)	Borsigsstrasse	x	x	-	-	x	x	Possibly office only.
					Army	-	20,000?	126,000	-	-	No	Yes	A probable divisional center-unconfirmed
					"Olex" (c)	Stadtholz 71	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Zokerndorfstrasse	300	1,890	x	x	-	Yes	Three underground tanks for gasoline.
XI	Bingen	120	49° 58'	7° 54'	D.A.P.G. (b)	-	? large	?	-	-	-	Yes	Important distributing plant.
					Rhenania-Ossag	On the Rhine	30	189	x	x	-	Yes?	Gas oil bunkering station for river craft.
XII	Bitburg	119B	49° 58'	6° 32'	D.A.P.G. (b)	-	70	441	70	441	x	x	
XI	Bitterfeld	87	51° 37'	12° 20'	D.A.P.G. (b)	-	20	126	-	-	x	x	
					Rhenania-Ossag	Sternstrasse	65	410	85	536	-	Yes	Two underground tanks for gas oil.
VIII	Blechhammer North	118	50° 21'	18° 17'	Oberschlesische Hydrierwerke A.G.	On S. bank of Adolf Hitler Canal.	74,600	469,980	74,600	469,980	Yes	Yes	Bergius synthetic plant.
VIII	Blechhammer South	118	50° 18'	18° 15'	Oberschlesische Hydrierwerke A.G.	4 miles SW of Blechhammer North	41,000	258,300	41,000	256,300	Yes	Yes	Bergius synthetic plant.
X	Bleckede	34	53° 18'	10° 46'	Navy	-	370,000	2,331,000	370,000	2,331,000	Yes	Yes	Major strategic underground fuel reserve storage.
X	Blexen	32	53° 32'	8° 31'	See Bremerhaven								
VI	Bochum	82B	51° 29'	7° 11'	Benzol Verband	Wittenstrasse 45	x	x	-	-	x	x	Headquarters of this concern.
					Bergbau A.G.	Wilhelmstrasse 15-17	x	x	-	-	x	x	Steel and iron works producing benzol.
					D.A.P.G. (b)	Oskar Hoffmanstrasse 61	x	x	-	-	x	x	Possibly office only.
					Derop (f)	Wittenstrasse 47	x	x	x	x	x	x	Possibly office only.
IV	Böhlen-Rötha ▲	100	51° 11'	12° 23'	Braunkohle Benzin A.G.	One mile S of Bohlen and ten miles S of Leipzig.	54,000	340,200	54,000	340,200	-	Yes	Large synthetic plant.

(a) Army District. (b) Deutsch-Amerikanische Petroleum-Gesellschaft. (c) "Olex" Deutsche Benzin- und Petroleum-Gesellschaft m.b.H. (d) Alminag Allgemeine Mineralöl und Asphalt K.G. (e) "Depi" Petroleum-A.G. (f) Derop Deutsche Vertriebsges. für Russische Ölprodukte A.G. (g) Latitudes and longitudes taken from Index Gazetteer to "The Times" Survey Atlas of the World, London, 1922; edited by John Bartholomew of the Edinburgh Geographical Institute, except those marked ▲, which were taken from maps furnished by Army Map Service. (h) Deutsche Petroleum A. G. (i) WIFO--see "Strategic Storage".

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		Remarks
							Plant Capacity		Total for Place				
Werk-reise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates Lat. N	Long. E	Owner of Plant	Location of Plant	M^3	Barrels	M^3	Barrels	Water	Rail	
VI	Bonn	107B	50° 44'	7° 04'	Allgemeine Brennstoff H.G.	Bornheimer Str. 230	x	x	-	-	x	x	Bulk dealer in motor gasoline.
					D.B.V.	Eller Str. 31-33	x	x	-	-	x	x	Bulk dealer in motor gasoline.
					WIFO	-	x	x	x	x	x	x	Strategic storage reported but not located.
X	Borkum	31A	53° 36'	6° 40'	Navy	At south end of island	19,000	119,700	19,000	119,700	Yes	-	On Borkum Island in North Sea.
VI	Bottrop	82B	51° 32	6° 59'	Ruhrchemie A.G.	At Welheim south of Bottrop	26,000+	163,800	26,000	163,800	-	Yes	Large synthetic plant.
X	Brake	32	53° 20'	8° 29'	?	West bank of Weser just north of Brake.	119,500	752,850	-	-	Yes	Yes	41 tanks. Believed to be a marine terminal of vegetable oil refinery.
					Navy ?	Harrier Sand on east bank of Weser	20,000	126,000	139,500	878,850	Yes	No	4 underground tanks believed to be Naval bunkering installation.
III	Brandenburg	64	52° 25'	12° 33'	Rhenania-Ossag	On the Havel about 60 km. west of Berlin.	810	5,103	810	5,103	x	x	Five tanks. Gas oil bunkering for river craft.
XI	Braunschweig (Brunswick)	62	52° 15'	10° 30'	D.A.P.G.	Ernst Amnestrasse 22	x	x	-	-	x	x	Office address.
					Deutsche Gasolin A.G.	Baawhofstrasse 10	x	x	-	-	x	x	
					Army	-	6,000	37,800	-	-	No	Yes	Underground storage.
					Motogen	-	300	1,890	-	-	x	x	
					Rhenania-Ossag	L. Hannoverschestrasse 67	260	1,638	-	-	-	Yes	3 underground tanks, 8 aboveground.
					Wipperman	Steinwes 11	x	x	6,560	41,328	x	x	
X	Bremen	47	53° 5'	8° 43'	Besigheimer Oelfabriken A.G.	Between Cuxhavenstrasse and Bremerhavenstrasse	5,200	32,760	-	-	Yes ?	-	Vegetable oil refinery. Tankage: 1 of 60 feet, 4 of 30 feet, 1 of 15 feet.
					Deutsche Schiffs und Maschinenbau	Weser shipyard	3,500	22,050	-	-	Yes ?	-	One 50-foot tank and two or three smaller.
					Deutsche Vacuum Oel A.G.	Oslebhauser Vorstadt	164,300	1,035,090	-	-	Yes	Yes	Refinery for lube oil and greases.
					Mineralöl-Raffinerie vorm.Aug. Korff	Stephanikirchenweide 20	1,800	11,340	-	-	Yes	-	Lube oil treating plant. Tankage: 1 of 40 ft., 2 of 25 ft.; 2 large tanks destroyed in 1942.
					Rhenania-Ossag	Neuenhangerfeld Vulkanstrasse	236	1,487	-	-	-	Yes	Seven underground tanks for gasoline.
					x	Gropelinger Heerstrasse	x	x	175,036	1,102,727	x	x	An unspecified number of 850-ton tanks is reported. No confirmation.
X	Bremerhaven (Wesermünde)	32	53° 33'	8° 35'	D.A.P.G.	Colombus Kaje	31,200	196,560	-	-	Yes	-	Bunkering terminal. Eight tanks for fuel oil and gas oil.
					Naval ?	N. of Wendebecken	21,000	132,300	-	-	x	x	2 underground tanks, estimated capacity 10,500 M^3 each.
					Naval ?	Kaiserhof 2 (SE corner)	23,200	146,160	-	-	x	x	Partially buried. 2 tanks of 11,000 M^3 and 3 tanks of 400 M^3 each.
					Rhenania-Ossag	-	56	353	-	-	-	Yes	Four underground tanks.
	Blexen	32	53° 32'	8° 31'	Rhenania-Ossag	On west bank of Weser River	19,061	120,084	-	-	Yes	Yes	Ocean terminal for gasoline, 4 large tanks and one small.
	Einswarden	32	53° 31'	8° 31'		On west bank of Weser, S. of Blexen	150,000	945,000	-	-	Yes	Yes	Marine terminal, ten 140-foot tanks, owner unknown.
	Imsum	32	53° 37	8° 32'		4 miles N of Bremerhaven	x	x	244,517	1,540,457	x	x	Large underground storage reported at balloon field. No confirmation.
VIII	Breslau	104	51° 07'	17° 00'	D.A.P.G.	-	x	x	-	-	Yes	-	Important distributing plant.
					"Olex"	Naftaweiche	4,475	28,193	-	-	x	x	1 tank of 2,650 M^3, 1 of 1,200 M^3, 1 of 625 M^3.
	Woischwitz	104			"Olex"	East of Breslau proper	9,692	61,060	14,167	89,253	x	x	1 tank of 2,000 M^3, 1 of 1,500 M^3, 4 of 1,000 M^3 and 19 smaller tanks.
XII	Bruchsal	138	49° 7'	8° 36'	Baumann	-	x	x	-	-	x	x	Possibly office only.
					Reuter W	-	x	x	x	x	x	x	Possibly office only.
X	Brunsbüttel	17	53° 54'	9° 09'	D.A.P.G.	West end of Kiel Canal	1,875?	11,813	-	-	Yes	-	Gas oil bunkering station, 17 tanks.
					?	West end of Kiel Canal	14,275	89,933	16,150	101,746	Yes	-	For bunkering.
X	Brunshausen Near Stade	33	53° 38'	9° 30'	Mineralölwerk Stade, Andresen, Tafel & Co. K.G.	On Elbe River N of Hamburg	122,000T	768,600	122,000	768,600	Yes	Yes	Installation: 10 x 110 ft. 10,000 100,000 4 x 75 ft. 4,000 16,000 2 x 46 ft. 1,000 2,000 2 x 50 ft. 2,000 4,000 15 122,000

X	Büchen	35	53° 29'	10° 29'	German Air Force	-	20,000	126,000	20,000	126,000	x	x	Underground storage for jet fuel.
VI	Buer (Ruhr)	82B	51° 34'	7° 03'	Rex Mineralöl A.G.	Station, Buer-Süd	1,500	9,450	-	-	-	Yes	Manufactures lubricants.
	(Scholven)	82B			Hibernia A.G.	-	x	x	x	x	-	Yes	Hydrogenation plant. The main storage consists of seven large and one small tanks (all except one boxed in), N. of the railway at the NE angle of the plant.
V	Bühl i. Baden	144	48° 41'	8° 8'	George Oest et Cie.	-	x	x	x	x	x	x	Storage reported, no details.
IX	Burbach Kriessiesen	95	50° 45'	8° 5'	Karl Zahn	-	x	x	x	x	x	x	Manufacturer of technical oils and fats.
X	Busum	17	54° 9'	8° 52'	Carstens, J.	-	x	x	x	x	Yes	Yes?	Bulk dealer.
VI	Castrop-Rauxel	82B	51° 33'	7° 18'	Gewerkschaft Viktor	2 miles north of Castrop-Rauxel	22,700	143,010	22,700	143,010	-	Yes	Fischer-Tropsch synthetic plant.
XI	Celle	61	52° 37'	10° 05'			x	x	x	x	x	x	Several producing companies operating in the Hannover oil fields.
IV	Chemnitz	100	50° 50'	12° 55'	D.A.P.G.	-	264	1,663	-	-	x	x	
					Rhenania-Ossag	Near Annabergerstrasse and Solbrigstrasse	280	1,764	544	3,427	-	Yes	Ten underground tanks.
XIII	Coburg	112	50° 16'	10° 58'	Rhenania-Ossag	Adjoining railway station	60	378	60	378	-	Yes	Two underground tanks for gasoline and gas oil.
III	Cottbus or Kottbus	77	51° 46'	14° 20'	Rhenania-Ossag	Merzdorferweg	45	284	45	284	-	Yes	Three tanks.
VI	Crefeld or Krefeld	82B	51° 20	6° 22'	Rhenania-Ossag	Ritterstrasse, opposite the railway freight station.	10	63	10	63	x	x	Three tanks.
X	Cuxhaven	17	53° 53'	8° 42'	Navy	1/4 mile SE of SE corner of Amerika Hafen.	80,000	504,000	-	-	x	x	Four buried tanks, 170 ft. in diameter, connected by pipe line to extreme north end of East Quay and to the large strategic storage installation near Nordholz, 6-1/2 miles south.
					Rhenania-Ossag	Lentz Quay close to harbor railway station.	360	2,268	80,360	506,268	Yes	Yes	1 - 300 M^3 tank, gas oil aboveground. 2 - 30 M^3 tanks, gasoline underground.
IX	Darmstadt	121	49° 52'	8° 39'	D.A.P.G.	Blumenthalstrasse 28	x	x	-	-	x	x	Possibly office only.
					Army	-	900	5,670	-	-	No	Yes	Two horizontal buried cylinders in the woods immediately S. of the parade grounds (possibly also a center holding 20,000 M^3--not confirmed).
					Motogen	-	40	252	-	-	x	x	
					Rhenania-Ossag	Opposite main railway station on the Zweifallter and Dornheimerweg.	95	599	1,035	6,521	-	Yes	Three underground tanks for gasoline and gas oil.
XIII	Deggendorf	142	48° 50'	12° 58'	"Amiag" Allgemeine Mineralöl-industrie A.G.	-	x	x	-	-	Yes	-	Some storage, no details.
					Creditul Minier	-	4,000	25,200	4,000	25,200	Yes	-	
XI	Derben-Ferchland	63	52° 25'	12° 01'	WIFO	On the Elbe NE of Magdeburg.	159,900	1,007,370	159,900	1,007,370	Yes	Yes	Major government strategic underground reserve storage.
VIII	Deschowitz (Odertal)	117	50° 25'	18° 08	Schaffgotsch Benzin G.m.b.H.	5 miles N. of Cosel	8,400	52,920	8,400	52,920	Yes	Yes	Fischer-Tropsch synthetic plant.
XI	Dessau	75	51° 50'	12° 14'	D.A.P.G.	-	x	x	-	-	Yes	-	Important distributing plant.
					Rhenania-Ossag	Atle-Magdeburg Str.	105	662	105	662	-	Yes	One underground tank of three compartments.
VI	Detmold	72	51° 56'	8° 52'	Mannheim-Bremer A.G.	-	x	x	x	x	x	x	Possibly bulk storage
	Deutsch-Krone		53° 16'	16° 28'	Rhenania-Ossag	Adjoining the Ostbahnof on the road to Wittkow.	60	378	60	378	-	Yes	One underground tank.
IV	Döbeln	100	51° 07'	13° 07'	D.A.P.G.	-	150	945	150	945	x	x	
X	Diepholz	60	52° 38'	8° 23'	Wendt	-	x	x	x	x	x	x	Dealer with bulk storage.
XI	Dollbergen	61	52° 25'	10° 11'	Deutsche Gasolin	-	16,000?	100,800	16,000	100,800	-	Yes	Believe storage capacity larger than 16,000 M^3; also another small refinery at Dollbergen making cylinder oil from German crude.
VII	Donauwörth	147	48° 43'	10° 48'	"Naphta"	-	x	x	x	x	x	x	? storage.
V	Dornstetten	145	48° 28'	8° 30'	Rhenania-Ossag	Adjoining railway station	150	945	150	945	-	Yes	Three underground tanks for gasoline.

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		Remarks
							Plant Capacity		Total for Place				
Werk-reise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates Lat. N	Long. E	Owner Of Plant	Location of Plant	M³	Barrels	M³	Barrels	Water	Rail	
VI	Dortmund	83	51° 31'	7° 27'	Army	-	20,000	126,000	-	-	x	x	A reported military center not yet identified.
					Benzol Verband	Markischestrat	x	x	-	-	x	x	
					D.A.P.G.	Tankweg 44	x	x	-	-	x	x	Possibly office only.
					D.A.P.G.	-	3,000	18,900	-	-	Yes	-	
					Deutsche Gasolin	-	8,000	50,400	-	-	x	x	
					Hoesch Benzin A.G.	In suburb of Wambelerholz, 2-1/2 miles NE of Dortmund	23,400	147,420	-	-	-	Yes	Fischer-Tropsch synthetic plant, 13 storage tanks.
					"Olex"	Franzius Strasse 15-29	268	1,688	-	-	x	x	Seven tanks.
					"Olex"	Tankweg, 32	4,0004-	25,200	-	-	x	x	Two 2,000 M³ tanks and some smaller tanks formerly leased to Benzol Verband.
					Rhenania-Ossag	Tankweg, 18	1,511	9,519	-	-	Yes	-	Ten tanks, all for gasoline.
					Westfälische Mineraloel- und Asphaltwerke W.H. Schmitz K.G.	On north side of petroleum basin.	x	x	60,179	379,127	Yes	Yes	Small refinery.
IV	Dresden	101	51° 3'	13° 45'	Allgemeine Oel-Handels-Ges.m.b.H.	-	160	1,008	-	-	x	x	
					Army	On the Elbe (?)	50,000	315,000	-	-	Yes?	Yes?	Important underground storage reported, not yet identified.
					Betreibestoff und Mineralöl Vertrieb G.m.b.H.	Radebeul II	1,000	6,300	-	-	Yes	Yes	
					Benzol Verband G.m.b.H.	Alberthafen	x	x	-	-	x	x	
					D.A.P.G.	Alberthafen	3,500	22,050	-	-	Yes	Yes	
					Deutsche Gasolin	-	30	189	-	-	x	x	
					"Olex"	Alberthafen	4,136	26,057	-	-	Yes	-	Tankage: 1 of 3,140 M³, 1 of 500 M³, 2 of 200 M³, 2 of 48 M³.
					"Olex"	Neustadt Eisenbahnstrasse 1	217	1,367	-	-	x	x	Six small tanks.
					Rhenania-Ossag	Alberthafen	11,497	73,691	-	-	-	Yes	31 tanks: 9,526 M³ gasoline, 571 M³ gas oil, 1,600 M³ lube oils.
	Alberthafen	101	51° 3'	13° 45'	"Olex"	Bremerstrasse	4,136	26,057	-	-	x	x	Tankage: 1 of 3,140 M³, 1 of 500 M³, 2 of 200 M³, 2 of 48 M³.
	Brockwitz ▲	101	51° 7'	13° 33'	Mileg	-	x	x	-	-	x	x	Main bulk plant.
	Freital ▲	101	51° 0'	13° 40'	Rhenania-Ossag	-	756	4,763	-	-	-	Yes	Lube oil plant.
	Nieder Sedlitz ▲	101	50° 59'	13° 50'	D.A.P.G.	-	x	x	-	-	x	x	Bulk storage uncertain.
	Neustadt ▲	101	51° 02'	14° 14'	"Olex"	Eisenbahnstrasse 1	217	1,367	75,849	477,849	x	x	Six small tanks.
I	Drugehen	14	54° 49'	20° 16'	WIFO	-	x	x	x	x	x	x	Large strategic storage NW of Konigsberg
VI	Duisburg	82B	51° 26'	6° 45'	Benzol Verband	Eichelkamp 20	x	x	-	-	x	x	Possibly office only.
					D.A.P.G.	Kuhstrasse 2-4, between Parallelhaven and Aussenhaven.	23,252	146,488	-	-	Yes	Yes	23 tanks from 20 to 50 feet in diameter, many smaller tanks. Boilerhouse with 3 boilers total rating 300 h.p.
					Deutsche Vacuum Oel A.G.	Innerhaven	x	x	-	-	x	x	
					Edgar Markmann	Mulheimstrasse 84	x	x	-	-	x	x	
					Grosstank Justitia	Havenstrasse 55	x	x	-	-	x	x	
					M.O.I.C.	-	x	x	-	-	x	x	Black oils and lubes.
					"Olex"	Kulterstrasse 21	x	x	-	-	x	x	Possibly office only.
	Ruhrort		51° 27'	6° 44'	Army	-	38,500	242,550	61,752	389,038	Yes	Yes	Surface tanks visible in air cover. Underground storage also reported.
VI	Dülmen	70	51° 50'	7° 16	German Air Force	-	20,000?	126,000	20,000	126,000	No	Yes	An important GAF storage center. Tanks aboveground in forest.
VI	Düren (Hoven)	94B	50° 48'	6° 29'	Julius Hoesch	Schliesfach 64	x	x	-	-	x	x	Chemical factory and tank storage.
					Rhenania-Ossag	Provinciale Strasse	160	1,008	160	1,008	-	Yes	4 underground tanks for gasoline.
VI	Düsseldorf	94B	51° 13'	6° 47'	Army ?	-	20,000	126,000	-	-	Yes	Yes	Underground storage reported. Location unidentified.
					D.A.P.G.	Albert Leo Schlageter Allee	20,000	126,000	-	-	Yes	Yes	Small refinery, 2-75 foot and 1-60 foot tanks. Also see Neuss.
					M.O.I.C.	-	x	x	-	-	x	x	Black oils and lubes.

VI	Düsseldorf (cont'd) Heerdt ▲	94B	51° 13'	6° 43'	"Olex"	Weissemstrasse	8,745*	55,094	-	-	Yes	Yes	Tankage: 1 of 3,100 M³, 1 of 2,000 M³, 1 of 1,500 M³, 1 of 1,130 M³, 1 of 625 M³, and smaller tanks.
	Neuss	94B	51° 12'	6° 42'	D.A.P.G.	-	9,000	56,700	57,905	364,802	Yes	Yes	3 large tanks, about 60 feet in diameter, and several smaller tanks.
XIII	Ebenhausen ▲	122	50° 07'	10° 06'	German Air Force	-	13,000	81,900	13,000	81,900	No	Yes	Two military depots in forest, one of which may be a dummy.
V	Ebingen	152A	48° 13'	9° 02'	Rhenania Ossag	-	60	378	60	378	-	Yes	Two underground tanks for gasoline and gas oil.
X	Eckernförde	8	54° 29'	9° 52'	Armed Forces ?	-	x	x	x	x	x	x	Underground storage reported near Lootzenholm. No confirmation.
XI	Ehmen ▲	62	52° 24'	10° 41'	German Air Force	-	5,900	37,170	5,900	37,170	No	Yes	11 tanks of 500 M³, 2 of 200 M³ concealed in forest.
XI	Eickeloh ▲	61	52° 43'	9° 36'	WIFO	-	6,000	37,800	6,000	37,800	-	Yes	12 vertical cylindrical tanks concealed in forest.
X	Einswarden	32			See Bremerhaven								
V	Eislingen	146	48° 43'	9° 44'	Zeller & Gmelin	-	5,000	31,500	5,000	31,500	x	x	Small refinery and storage, no details.
VI	Elberfeld	82B	51° 15'	7° 03'	Rhenania-Ossag	Koenigstrasse	10	63	-	-	x	x	Three tanks.
					"Olex"	Schwesternstrasse 11	130	756	130	819	x	x	Four tanks.
I	Elbing	28	54° 10'	19° 24'	"Olex"	Fliegerstrasse	160	1,008	160	1,008	-	Yes	Four tanks.
X	Elmshorn	18	53° 46'	9° 41'	Ahrens & Son	-	x	x	x	x	x	x	Bulk dealer.
X	Emden	31A	53° 23'	7° 13'	Navy ?	Southwest end of outer harbor	3,500	22,050	-	-	x	x	One 55-foot tank and two 30-foot tanks. Probably for bunkering.
					Navy?	Entrance to Dortmund-Ems Canal	40,000 ?	252,000	-	-	Yes	x	2 tanks 160 ft. in diameter for fuel oil.
					Patent Fuel Works	N. side of Industrie Hafen	x	x	-	-	x	x	Stock of several thousand tons is maintained.
					Rhenania-Ossag	Neptunplatz	40	252	-	-	-	Yes	Two underground tanks.
					?	Nesserland	150	945	43,690	275,247	x	x	Bunkering for small craft, probably gas oil.
VI	Emmerich	70A	51° 49'	6° 15'	Deutsche Gasolin	-	3,000	18,900	-	-	Yes	-	Refinery.
					-	Solhaven	x	x	3,000	18,900	x	x	Oil tanks reported.
IX	Erfurt	98	50° 58'	11° 02'	Allgemeine	-	50	315	-	-	x	x	
					D.P.A.G.	-	48	302	-	-	x	x	
					D.P.A.G.	-	120	756	-	-	x	x	
					Deutsche Gasolin	Adolf Hitler strasse 39	120	756	-	-	x	x	
					Motogen	-	90	567	-	-	x	x	
					"Olex"	Diesel strasse	239	1,506	-	-	x	x	Six small tanks.
					Rhenania-Ossag	Lagerstrasse 1	392	2,470	-	-	-	Yes	9 underground tanks for motor and aviation gasoline and gas oil.
					Other companies	-	592	3,730	-	-	x	x	
					Armed Forces ?	-	x	x	1,651	10,402	x	x	Military plant reported but may refer to a commercial plant requisitioned by GAF.
VI	Essen	82B	51° 26'	7° 00'	D.A.P.G.	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Moltke strasse 98	x	x	x	x	x	x	3 underground tanks. No details available.
VI	Euskirchen	107B	50° 40'	6° 47'	"Olex"	-	x	x	-	-	x	x	Plant reported, no details.
					Rhenania-Ossag	-	x	x	x	x	x	x	Plant reported, no details.
X	Farge	47	53° 12'	8° 32'	WIFO and Navy	-	611,000	3,849,300	611,000	3,849,300	Yes	Yes	Underground strategic storage installation. If construction, in progress in 1943, was completed, capacity may be doubled.
V	Feuerbach	138	48° 49'	9° 10'	Deutsche Gasolin	-	2,000	12,600	-	-	x	x	
					Rhenania-Ossag	Wienenstrasse, close to railway station.	867	5,462	-	-	-	Yes	23 aboveground tanks.
					Other companies	-	3,000	18,900	5,867	36,962	x	x	

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		Remarks
			Coordinates				Plant Capacity		Total for Place				
Werk-reise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Lat. N	Long. E	Owner Of Plant	Location of Plant	M³	Barrels	M³	Barrels	Water	Rail	
X	Flemhude	8	54° 20'	9° 58'	Navy	S. of canal, 8-1/2 miles W of Kiel.	257,000	1,619,100	257,000	1,619,100	Yes	Yes	Major underground fuel reserve sometimes referred to as Achterwehr. If tankage under construction in 1944 was completed, total capacity would amount to 417,000 M³.
X	Flensburg	3 & 7	54° 48' 20"	9° 27'	Deutsche Gasolin	-	48	302	-	-	x	x	
					Navy	On bluff NW of Sportstadium and E of the Free Port	14,000	88,200	-	-	Yes	Yes	Two tanks of 7,000 M³ partly buried. Believed to be for Naval bunkering.
					Rhenania-Ossag	Frichafen	100	630	-	-	---	Yes	6 underground tanks for gasoline and gas oil.
					?	-	135	851	14,235	89,681	Yes	-	Six tanks for gasoline and gas oil.
IX	Frankfurt a. Main	121	50° 6'	8° 40'	Armed Forces ?	-	x	x	-	-	Yes?	Yes?	Several indefinite reports of very important underground storage in the Frankfurt area. Unconfirmed.
					D.A.P.G.	Hafenbecke 1, adjoins the Rhenania plant.	x	x	-	-	Yes	-	6 large vertical cylindrical tanks, 12 horizontal tanks.
					D.A.P.G.	-	25	158	-	-	x	x	
					Deutsche Gasolin	Gutleustrasse	8,800	55,440	-	-	x	x	
					Deutsche Vacuum Oel A.G.	Weserstrasse 26	x	x	-	-	x	x	Possibly office only.
					"Oler"	-	x	x	-	-	x	x	
					Rhenania-Ossag	Diesel strasse (Hafenbacker II)	13,595	85,649	22,420	141,247	Yes	-	28 tanks: 7,699 M³ motor gasoline, 1,322 M³ gas oil, and other tankage for 4,574 M³.
IV	Freiburg (Im Breisgau)	151A	48° 00'	7° 52'	Allgemeine Oel-Handels	-	15	95	-	-	x	x	
					D.A.P.G.	Freiladstr. 17	60	378	-	-	x	x	
					D.A.P.G.	-	48	302	-	-	x	x	
					D.A.P.G.	-	40	252	-	-	x	x	
					Deutsche Gasolin	Kantinenstr. 2	x	x	-	-	x	x	Possibly office only.
					Oest et Cie.	-	x	x	-	-	x	x	
					Rhenania-Ossag	Waldkirchestr.	283	1,783	-	-	-	Yes	Nine underground tanks for fuel oils.
					WIFO	-	x	x	446	2,810	x	x	Underground oil storage reported but unconfirmed.
VII	Freiham (unter Pfaffenhaven) ▲	155	48° 07'	11° 22'	WIFO	-	131,000	825,300	131,000	825,300	No	Yes	Underground strategic storage plant near Munich. Capacity is possibly much greater.
V	Freudenstadt	145	48° 28'	8° 25'	Oest et Cie.	-	x	x	x -	-	-	Yes	Some storage--no details.
					Rhenania-Ossag	Wallstrasse, close to railway station.	105	662	105	662	-	Yes?	One underground tank.
XII	Friesenheim	144	48° 22'	7° 53'	Army	-	x	x	x	x	x	x	Reported underground storage, exact location uncertain. See strategic storage list.
XI	Fuhrburg	61	52° 33'	9° 51'	-	At oil field	11,600	73,080	11,600	73,080	x	x	One 110-ft and two 35-ft. tanks.
IX	Fulda	110	50° 33'	9° 40'	Deutsche Gasolin	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Petersberger Strasse	50	315	50	315	-	Yes	2 underground tanks for gasoline.
XII	Gaggenau	137	48° 47'	8° 20'	Oest et Cie.	-	x	x	x	x	x	x	Bulk dealer with tank storage.
XI	Gardelegen	62	52° 31'	11° 24'	D.A.P.G.	-	40	252	40	252	x	x	
V	Geislingen ▲	146	48° 36'	9° 54'	WIFO	-	6,000	37,800	6,000	37,800	Yes	No	Twelve 30-ft. tanks in Ziegel Forest NNW of Ulm, also referred to as Amstettin.
VI	Gelsenkirchen	822	51° 30'	7° 05'	Gelsenberg Benzin A.G.	Gluckaufstrasse 57, N of Emscher Canal.	87,000	548,100	-	-	Yes	Yes	Bergius hydrogenation plant. Storage for 58,000 tons primary and intermediate products and 29,000 tons finished products.
					"Olex"	At Rotthausen station	505	3,182	-	-	-	Yes	25 small tanks.
					Rhenania-Ossag	Havenstrasse 55, at junction with Ruhrstrasse.	x	x	87,505	551,282	-	Yes	Three underground tanks.

IX	Gera	99	50° 53'	12° 06'	Rhenania-Ossag	-	275	1,733	275	1,733	-	Yes	5 underground tanks for gasoline and gas oil.
IX	Giessen	109	50° 36'	8° 41'	Army	-	20,000	126,000	-	-	x	x	Underground military storage reported.
					D.A.P.G.	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Railway goods yard	60	378	20,060	126,378	-	Yes	2 underground tanks for gasoline.
VIII	Gleiwitz	118	50° 17'	18° 39'	Rhenania-Ossag	Barbarastrasse. Plant has siding from the railway.	x	x	x	x	-	Yes	3 underground tanks totaling 120 M³ and additional tankage.
VIII	Glogau	91	51° 40'	16° 06'	Rhenania-Ossag		x	x	x	x	x	x	
X	Glückstadt	18	53° 48'	9° 25'	D.A.P.G.	-	x	x	x	x	x	x	Possibly office only.
VI	Godesberg (Bad)	107B	50° 41'	7° 09'	Wittrock	Hohenzollernstr. 21	x	x	x	x	x	x	Bulk dealer in motor gasoline.
VIII	Görlitz	102	51° 09'	14° 59'	Rhenania-Ossag	On the road to Reichenbach, close to the railway yard Schlauroth.	220	1,386	220	1,386	-	Yes	Four tanks.
V	Göppingen	146	48° 43'	9° 39'	Rhenania-Ossag	Adjoining railway yards	105	662	105	662	-	Yes	Three underground tanks for gasoline and gas oil.
XI	Göttingen	85	51° 32'	9° 56'	D.A.P.G.	-	x	x	-	-	x	x	Possibly office only.
					"Olex"	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Maschmuelenweg	205	1,292	x	x	-	Yes	Five underground tanks for gasoline and gas oil.
X	Grossensiel ▲	32	53° 28'	8° 09'	Navy ?	-	9,000	56,700	9,000	56,700	x	x	Bunkering station reported but no confirmation from air cover. Storage of this magnitude appears doubtful.
VI	Hagen	83	51° 22'	7° 27'	D.A.P.G.	Hordenstrasse 25	x	x	-	-	x	x	Possibly office only.
					Orsoil	Berlinstrasse 21	x	x	-	-	x	x	Bulk dealer.
					Rhenania-Ossag	Spickerstrasse	160	1,008	x	x	-	Yes	4 underground tanks for gasoline and gas oil. Supplied by rail tank car from Reiseholz.
XI	Halberstadt	74	51° 53'	11° 03'	Allgemeine Oel-Handels	-	160	1,008	-	-	x	x	
					Reiniger & Rossing	-	x	x	-	-	x	x	Bulk dealers.
					Rhenania-Ossag	-	120	756	-	-	-	Yes	3 underground tanks and some additional tankage.
					Other companies	-	72	454	352	2,218	x	x	
IV	Halle (Halle-Diemitz)	87	52° 04'	8° 22'	D.A.P.G.	-	264	1,663	-	-	x	x	
					Motogen	-	64	403	-	-	x	x	
					"Olex"	Delitzscherstrasse	190	1,197	-	-	x	x	Four small tanks.
					Rhenania-Ossag	Sternstrasse	65	410	583	3,673	-	Yes	Eight underground tanks for gasoline and gas oil.
X	Hamburg	33	53° 33'	10° 00'									
	Altona						x	x	-	-	x	x	Two small commercial storage plants reported, but details unavailable.
	Grasbrook				Atlantic Refining Co.	Between Stitch Canal and Grenz Canal.	10,136	64,184	-	-	Yes	Yes	Eighteen tanks.
					Ernst Schliemann's Ölwerke and Mineralölwerke Albrecht & Co.	On Reiherstieg Canal south of Rhenania-Ossag refinery.	50,000	315,000	-	-	Yes	Yes	These lube oil refining plants adjoin each other.
					Rhenania-Ossag	At north end of Reiherstieg Canal.	46,250	291,375	-	-	Yes	Yes	Lube oil refinery. 86 storage tanks.
					Maschinenoel-Import G.m.b.H.	-	30,000	189,000	-	-	Yes	Yes	
X	Harburg		53° 29'	9° 58'	Brinkman & Mergel	-	50,000	315,000	-	-	x	x	Reported underground storage not located.
					Ebano Asphalt	Seehaven 4	108,476	683,400	-	-	Yes	Yes	Refinery for asphalt and black oils.
					Mobler & Thörl	Seehaven 1-2-3	109,000	686,700	-	-	Yes	Yes	Vegetable oil plant.
					Rhenania-Ossag	Seehaven 3-4	124,000	781,200	-	-	Yes	Yes	Large refinery. 88 tanks.
					Vereinigte Harburger Oel Fabrik	-	x	x	-	-	x	x	Technical and edible oils. Twenty small tanks.
	Neuhof		53° 33'	10° 00'	Deutsche Erdöl A.G.	At juncture of Neuhofer Canal, Rethe Canal and the Köhlbrand.	46,000	289,800	-	-	Yes	Yes	Formerly used by "Olex"
					Oelwerke Julius Schindler G.m.b.H.	Between Neuhofer Canal and Rethe Canal, S. of Deutsche Erdöl.	40,000	252,000	-	-	Yes	Yes	Lubricating oil refinery.

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

Werk-	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates Lat. N	Coordinates Long. E.	Owner of Plant	Location of Plant	Capacity of Storage Tanks: Plant Capacity M³	Capacity of Storage Tanks: Plant Capacity Barrels	Capacity of Storage Tanks: Total for Place M³	Capacity of Storage Tanks: Total for Place Barrels	Supplied by: Water	Supplied by: Rail	Remarks
X	Hamburg (Cont'd)												
	Neuhof (Cont'd)	33	53° 33'	10° 00'	Hansa Mohle	N side of Neuhofer Canal	10,000	63,000	-	-	Yes	Yes	Vegetable oil plant.
					-	Kohlenschiffhafen	16,400	103,320	-	-	Yes	Yes	Owner and use unknown. Rhenania-Ossag formerly had one tank for bunker oil near here.
	Petroleumhafen				Various companies	S of Elbe River at west end of port area.	681,237	4,291,793	-	-	Yes	Yes	Tankage at Petroleumhafen owned by various major oil companies. Europäische Tanklager also has refinery here.
	Schulau		53° 34'	9° 43'	Deutsche Vacuum Oel A.G.	On N. bank of Elbe near Wedel, W of Hamburg	50,700	319,410	-	-	Yes	Yes	Refinery--46 tanks.
	Wilhelmsburg				Deutsche Petroleum A.G.	At bend of Reiherstieg	75,000?	472,500	-	-	Yes	Yes	Refinery.
					J. Haltermann	At bend of Reiherstieg	17,000	107,100	-	-	Yes	Yes	
					Nordische Oel Werke (?)	At bend of Reiherstieg	2,000	12,600	-	-	x	x	2 tanks of 50 ft. and 5 smaller tanks.
					Rhenania-Ossag	At bend of Reiherstieg.	19,191	120,903	-	-	Yes	Yes	White oil installation and refinery.
					Unidentified	At juncture of Reiherstieg and August Canal.	24,500	154,350	-	-	Yes	Yes	
					Unidentified	Just E. of J. Haltermann	5,000	31,500	1,514,942	9,544,135	x	x	Also see Brunshausen (Stade)
XI	Hameln	73	52° 07'	9° 22'	Deutsche Gasolin	-	72	454	-	-	x	x	
					WIFO (?)	-	x	x	72	454	x	x	Important stocks reported but location unknown.
VI	Hamm	83	51° 40'	7° 48'	Chemische Fabrik Lichtenberg A.G.	Herringen bei Hamm	x	x	x	x	Yes	Yes	Benzol producer with tank storage.
XI	Hänigsen	61	52° 28'	10° 12'	-	-	x	x	x	x			See Nienhagen oil field development.
XI	Hannover (Hannover-Linden)	61	52° 23'	9° 44'	Army	-	20,000	126,000	-	-	-	Yes	Underground storage reported but not identified.
					Allgemeine Oel-Handels	-	98	605	-	-	x	x	
					Bolte & Co.	Hinkerstrasse	250	1,575	-	-	-	Yes	
					D.A.P.G.	Prinzelstrasse 13	160	1,008	-	-	x	x	
					D.P.A.G.	-	64	403	-	-	x	x	
					Deutsche Gasolin	Jordan strasse 82	900	5,670	-	-	x	x	
					Kokemuller	Waldstrasse 16	x	x	-	-	x	x	
					Motogen	-	48	302	-	-	x	x	
					"Olex"	An der Weide 20	x	x	-	-	x	x	
					Rhenania-Ossag	Lindner Hafen	x	x	-	-	-	Yes	
					Other companies	-	x	x	21,518	135,563	x	x	Many other dealers. Storage uncertain.
X	Heide (Schleswig)	17	54° 10'	9° 05'	Holsteinische Erdölwerke	Near village of Hemmingstedt.	28,000	176,400	28,000	176,400	x	x	Small refinery handling crude from nearby oil field.
XII	Heidelberg	131	49° 24'	8° 42'	D.A.P.G.	-	30	189	-	-	x	x	
					Rhenania-Ossag	Railway freight yard	120	756	150	945	-	Yes	Three underground tanks for gasoline and gas oil.
V	Heilbronn	138	49° 08'	9° 13'	D.A.P.G.	-	60	378	-	-	x	x	
					Rhenania-Ossag	Adjoining the harbor railway station.	134	844	194	1,122	-	Yes	Six underground tanks for gasoline and gas oil.
IX	Heiligenstadt	85	51° 23'	10° 08'	WIFO	-	6,000	37,800	6,000	37,800	x	x	Strategic storage, exact location unknown.
XI	Helmstedt	74	52° 14'	11° 01'	Brunswick Kohlen Bergewerke	-	x	x	x	x	x	x	Tar and benzine distillery.
X	Hemelingen (Bremen)	47	53° 03'	8° 54'	"Nitag"	-	x	x	x	x	x	x	Storage. Shown in air cover.
VI	Herford	72	52° 07'	8° 40'	Wilke	Diebruckerstrasse 8	x	x	x	x	x	x	Possibly bulk storage.
VI	Herwest (Dorsten)	82B	51° 40'	7° 00'	Duesburg & Co.	-	x	x	x	x	x	x	Mineral oil importers and refiners.
XI	Hildesheim	73	52° 09'	9° 58'	Müller	Goethstrasse 27	x	x	x	x	x	x	Bulk dealer.
XIII	Hirschberg ▲	141	49° 02'	11° 27'	Rhenania-Ossag	-	125	788	125	788	-	Yes	Three underground tanks for gasoline and gas oil.

XI	Hitzacker	49	53° 09'	11° 03'	WIFO	On the Elbe	300,000	1,890,000	300,000	1,890,000	Yes	Yes	Major strategic underground storage plant. Capacity may be larger.
VI	Homberg	82B	51° 28'	6° 38'	Rheinpreussen G.m.b.H.	Mörs-Mörbeck, W of Duisburg	11,300	71,190	11,300	71,190	-	Yes	Fischer-Tropsch synthetic plant. 3 large tanks and 15 small tanks.
XIII	Hof	135	50° 19'	11° 56'	Rhenania-Ossag	On main road to Naila	200	1,260	200	1,260	-	Yes	Six underground tanks for gasoline and gas oil.
VI	Holten	82B	51° 32'	6° 46'	Ruhrbenzin A.G.	1/2 mile E. of Holton on the road to Sterkrade.	33,465	210,830	33,465	210,830	-	Yes	Fischer-Tropsch synthetic plant.
XI	Hornbostel ▲	61	52° 40'	9° 51'	Oelwerke Julius Schindler G.m.b.H.	-	x	x	x	x	-	Yes	Barge loading point for oil from Wietze field.
X	Husum	7	54° 30'	9° 03'	D.A.P.G.	-	190	1,197	190	1,197	x	x	
XII	Idar-Oberstein	129	49° 43'	7° 18'	Conradt	Adolf Hitler str. 146	x	x	x	x	x	x	Bulk dealer. Storage uncertain.
VII	Ingolstadt	141	48° 46'	11° 26'	Rhenania-Ossag	Adjoining railway.	904	567	90	567	-	Yes	Two underground tanks and some additional tankage.
I	Insterburg	16A	54° 38'	21° 48'	Rhenania-Ossag	-	x	x	x	x	x	x	
X	Itzehoe	18	53° 56'	9° 33'	Rhenania-Ossag	In the industrial part of the town.	1304	819	130	819	-	Yes	Three underground tanks plus an unknown additional amount.
IX	Jena	99	50° 56'	11° 35'	D.A.P.G.	-	88	554	-	-	x	x	
					Rhenania-Ossag	Loebstedter Strasse	190	1,197	278	1,751	-	Yes	Four underground tanks for gasoline and gas oil.
XII	Kaiserslautern	130	49° 27'	7° 47'	D.A.P.G.	-	30	189	-	-	x	x	
					Rhenania-Ossag	Neue Trippstadter Str., W. of Rhine.	150	945	180	1,134	-	Yes	Three underground tanks for gasoline and gas oil.
VI	Kamen	83	51° 36'	7° 39'	Chemische Werke Essener Steinkohle A.G.	2-1/2 miles NW of Kamen adjoining Monopole Grimburg coal mine.	16,000	100,800	16,000	100,800	-	Yes	Fischer-Tropsch synthetic plant. Nine storage tanks.
V	Karlsruhe	138	49° 01'	8° 23'	A.O.H.G.	Werkstrasse 22	x	x	-	-	x	x	Possibly office only.
					Army	-	x	x	-	-	x	x	Army supply center. May refer to a requisitioned commercial plant.
					D.A.P.G.	-	10,000	63,000	-	-	x	x	19 tanks.
					Pennsylvania	Sudbeckstrasse 26a	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Becken 4 (in the harbor)	12,340	77,742	x	x	-	Yes	19 tanks; 9,307 M³ gasoline, 3,033 M³ gas oil.
XII	Kassel	119B	49° 46'	6° 44'	Army ?	Near Trier	20,000	126,000	20,000	126,000	x	x	Underground storage reported.
IX	Kassel ▲	85	51° 19'	9° 28'	A.O.H.G.	Bremerstrasse 2	x	x	-	-	x	x	Possibly office only.
					D.A.P.G.	Mombachstrasse 49	330	2,079	-	-	x	x	
					Deutsche Gasolin	Bahnofstrasse 15	40	252	-	-	x	x	
					Motogen	-	60	378	-	-	x	x	
					Rhenania-Ossag	Fuldahaven	320	2,016	750	4,725	-	Yes	9 underground tanks, 1 aboveground.
V	Kehl a. Rhein	144	48° 34'	7° 49'	Arthur Baum	Kinzigstr. 12	x	x	x	x	x	x	Some storage--no details.
VI	Kempen	82B	51° 22'	6° 25'	Herman Seiffurth	-	x	x	x	x	x	x	Dealer with bulk storage.
VII	Kempten	157	47° 43'	10° 18'	Allgäuer Handels G.m.b.H.	Residenzplatz 31	x	x	-	-	-	Yes	Bulk dealer, storage unconfirmed.
					Rhenania-Ossag	Ladehofstrasse	504	315	50	315	-	Yes	3 underground tanks plus some additional tankage.
X	Kiel												
	Binnenhof	8	54° 20'	10° 09'	D.A.P.G.	Bahnhoffstrasse	x	x	-	-	x	x	
					Deutsche Werft	Ausrustung Basin	x	x	-	-	x	x	There formerly was a surface oil tank on each side of the entrance to this basin. These tanks are no longer visible.
	Holtenau		54° 23'	10° 10'	Zerssen	-	x	x	-	-	Yes	-	Oil bunkering, one small tank.
	Klausdorf (Voesbrook)				German Air Force ?	-	6,000	37, 800	-	-	-	Yes	Underground storage for gasoline and motor oil reported in woods. Exact nature not known.
	Korugen				-	-	x	x	-	-	x	x	Opposite Frederichsort on E. shore of the Kielor Fjord. Construction of a possible oil storage depot has been reported.

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

Work-reise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates Lat. N	Coordinates Long. E	Owner of Plant	Location of Plant	Capacity of Storage Tanks: Plant Capacity M³	Capacity of Storage Tanks: Plant Capacity Barrels	Capacity of Storage Tanks: Total for Place M³	Capacity of Storage Tanks: Total for Place Barrels	Supplied By: Water	Supplied By: Rail	Remarks
X	Kiel (Cont'd.)												
	Mönkeburg	8	54° 2'	10° 11'	German Navy	On cliff on E. side of Kiel harbor.	206,600	1,301,580	-	-	Yes	x	Buried storage for Naval bunkering, 10 large tanks and 4 groups of horizontal cylinders.
	Projendorf		54° 22' 6"	10° 06' 37"	Navy	400 yds west of Prince Hendrich bridge on Kiel Canal.	60,000	378,000	-	-	Yes	Yes	Three circular tanks 100 ft. in diameter. Estimated capacity 20,000 M³ each Under construction in 1943.
	Wik				Deutsche Gasolin (partly)	-	46,502	292,963			Yes	Yes	2 x 120 ft. 11,000 = 22,000 3 x 100 ft. 8,000 = 24,000 1 x 30 ft. 502 = 502
IV	Klaffenbach ▲	100	50° 45'	12° 55'	Bremer Chemische Fabrik A.G.	-	1,000	6,300	1,000	6,300	-	Yes	Small synthetic plant.
VI	Kleve ▲	83	51° 34'	8° 17'	H. Ebben & Co.	-	x	x	x	x	x	x	Bulk dealer in motor gasoline.
XII	Koblenz or Coblenz	108	50° 21'	7° 36'	Army	-	20,000	126,000	-	-	-	Yes	Underground storage reported but unidentified.
					Koblenzer Benzin und Oel Vertrieb.	In Lutzel	x	x	-	-	x	x	Bulk dealer.
					Rhenania-Ossag	Moselweiserstr. adjoining the Mosel station.	240	1,512	20,240	127,512	-	Yes	Five underground tanks for gasoline, kerosene and gas oil.
	Kolberg	24	54° 11'	15° 35'	Rhenania-Ossag	Junction of Winterhafen-strasse and Kaikuhlenweg. Depot has siding from the railway.	110	693	110	693	-	Yes	Five tanks.
VI	Köln or Cologne	94B	50 56'	6 57'	Benzin und Autoöl Vertrieb	Alteburger strasse 140	x	x	-	-	x	x	Possibly office only.
					D.P.A.G.	-	100	630	-	-	x	x	
	Deutz				D.A.P.G.	Neumarket 15-19	8,000	50,400	-	-	Yes	-	Almost completely destroyed by fire in 1942.
	Braunsfeld				"Olex"	Kupenerstrasse	846	5,330	-	-	-	Yes	Nine tanks including one of 300 M³ and 3 of 100 M³.
	Niehl				Rhenania-Ossag	Geestemunde strasse	15,737	99,143	24,683	155,503	Yes	Yes	17 tanks: 11,890 M³ gasoline and 3,147 M³ gas oil, and additional tankage for 700 M³.
I	Königsberg	15	54° 42'	20° 30'	D.A.P.G.	-	x	x	-	-	Yes	-	Important distributing plant.
					Rhenania-Ossag	-	x	x	x	x	x	x	
V	Konstanz	152A	47° 39'	9° 10'	D.A.P.G.	-	x	x	x	x	x	x	Possibly office only.
VIII	Kosel (Cosel)	118	50° 20'	18° 08'	D.A.P.G.	-	x	x	x	x	Yes	-	Important distributing plant.
VI	Krefeld	82B	51° 20'	6° 22'	Rhenania-Ossag	Ritter strasse, opposite railway station.	30	189	30	189	x	x	Three underground tanks.
XIII	Kulmbach	124	50° 06'	11° 28'	Rhenania-Ossag	On main road from Kulmbach to Lichtenfels.	120	756	120	756	-	Yes	3 underground tanks for gasoline.
III	Küstrin	66	52° 35'	14° 39'	D.A.P.G.	-	x	x	x	x	Yes	-	Important distributing plant.
XII	Landau	137	49° 12'	8° 07'	Rhenania-Ossag	Railway yard.	60	378	60	378	-	Yes	Two underground tanks for gasoline.
III	Landsberg	66	52° 44'	15° 15'	Rhenania-Ossag	Adjoining the railway station at Nepritz near Landau	x	x	x	x	-	Yes	3 tanks totaling 120 M³ and additional tankage.
IX	Langenselbold	121	50° 11'	9° 03'	German Air Force	-	20,000	126,000	20,000	126,000	No	Yes	18 miles ENE of Frankfurt. Construction of underground fuel storage reported in a wood, 6 km. N. of Neuenhasslau. Used by GAF and possibly Army also.
X	Lauenburg	34	53° 23'	10° 33'	Army (?)	Between Lauenburg and Boizenburg.	7,000	44,100	7,000	44,100	x	x	Exact location unknown. 6 underground tanks reported.
	Leignitz	103	51° 12'	16° 10'	Rhenania-Ossag	Kronenstrasse	130	819	130	819	-	Yes	Three tanks.
IV	Leipzig (Leipzig-Lindenau?)	88	51° 20'	12° 23'	Allgemeine Oel-Handels	-	235	1,481	-	-	x	x	
					D.P.A.G.	-	70	441	-	-	x	x	
					Motogen	-	730	4,599	-	-	x	x	

IV	Leipzig (Cont'd)	88	51° 20'	12° 23'	"Olex"	Lindenau Plau	554	3,490	-	-	x	x	14 small tanks.
					Rhenania-Ossag	Plaustrasse	440	2,772	2,029	12,783	-	Yes	One underground tank of 100 M³ for gasoline.
VI	Leverkusen ▲	94B	51° 02'	7° 00'	Army	-	14,000	88,200	14,000	88,200	x	x	13 aboveground tanks reported.
X	Loccum ▲	60	52° 27'	9° 07'	German Air Force	-	13,500	85,050	13,500	85,050	No	Yes	Underground storage for aviation gasoline, 26 buried vertical cylinders.
X	Lübeck	19	53° 52'	10° 40'	D.A.P.G.	Bei der Gassenstrasse 10	2,000?	12,600	-	-	x	x	
					D.P.P.G.	-	2,400	15,120	-	-	x	x	
					Rhenania-Ossag	Bei der Gassenstatt 14	125	788	-	-	-	Yes	Three underground tanks for gasoline and gas oil.
	Teerhof Island				Armed Forces ?	-	x	x	-	-	x	x	Underground storage--no details.
					"Olex"	-	3,750	23,625	-	-	x	x	Two 1,875 M³ tanks.
					x	x	x	x	8,275	52,133	x	x	Another plant reported on opposite side of river. May be D.A.P. or D.P.A.G
XII	Ludwigshafen	131	49° 28'	8° 27'	D.A.P.G.	Mundenheimer Altrhein	10,000?	63,000	-	-	Yes	-	Important distributing plant.
					Derop	Mundenheimer Altrhein	1,125	7,088	-	-	x	x	
					Deutsche Gasolin A.G.	Mundeheimer Altrhein	125	788	-	-	x	x	
					Rhenania-Ossag	Mundenheimer Altrhein	12,765	80,420	24,015	151,296	Yes	Yes	Main distributing center. 46 tanks: 9,044 M³ gasoline, 1,509 M³ gas oil, 2,212 M³ lubes.
X	Lützenholm (Eckernförde)	8	540 29'	90 52'	Navy	-	x	x	x	x	x	x	Underground storage reported near Eckernförde but unconfirmed.
IV	Lützkendorf	87	51° 17'	11° 52'	See Mücheln								
X	Maasholm ▲	8	54° 42'	10° 00'	Navy	-	x	x	x	x	x	x	Underground storage reported. No confirmation.
XI	Magdeburg	75	52° 08'	11° 38'	Allgemeine Oel-Handels	-	8,150	51,345	-	-	Yes	-	
					Armed Forces	-	60,000 20,000	378,000 126,000	-	-	x	Yes	Two underground centers (one GAF) reported, but not identified. Air cover shows only commercial tankage.
					Benzol Verband G.m.b.H.	-	x	x	-	-	x	x	
					Braunkohle Benzin A.G.	On Zweig Canal, 4 miles NNE of Madgeburg.	49,100	309,330	-	-	Yes	Yes	Bergius synthetic plant. Storage tanks 10,000 M³ primary products, 9,000 M³ finished products, 29,000 M³ feedstock tanks.
					D.A.P.G.	-	10,000	63,000	-	-	Yes	-	Large storage tanks on both sides of the Elbe.
					Deutsche Fanto	-	1,350	8,505	-	-	x	x	
					Rhenania-Ossag	-	4,230	26,649	152,830	962,829	x	x	15 tanks for gasoline and gas oil.
XII	Mainz	120	50° 00'	8° 17'	D.A.P.G.	Sassner Allee 6	200	1,260	-	-	Yes	Yes	
					Deutsch Betreibsgess	Oberlauster 9	x	x	-	-	x	x	Possibly office only.
					Motogen G.m.b.H.	-	210	1,323	-	-	x	x	
					"Olex"	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Binnenhaven 26	1,591	10,023	-	-	Yes	Yes	Tankage: 1 of 1,330 M³ for gasoline, 9 totalling 261 M³ for gasoline and gas oil.
					Other companies	-	210	1,323	2,211	13,929	x	x	
XII	Mannheim	131	49° 29'	8° 28'	Allgemeine Oel-Handels	-	60	378	-	-	x	x	
					D.A.P.G.	On the point of the Neckar-spitz.	47,419	298,740	-	-	Yes	Yes	33 tanks ranging from 20 to 60 ft. in diameter with a number of smaller tanks. Two boilerhouses with three boilers, total rating 240 h.p.
					D.P.A.G.	-	2,200	13,860	-	-	Yes	-	
					Mannheim-Bremer Petroleum A.G.	-	x	x	-	-	x	x	
					M.G.I.G.	-	x	x	-	-	x	x	Black oils and lubes.
					Mineralöl Raffinerie Rheinau	-	x	x	-	-	x	x	Small refining unit reported.
					Motogen	-	800	5,040	-	-	x	x	
					Oellager G.m.b.H.	Industriehafen	x	x	-	-	x	x	
					"Olex"	Industriehafen, Waldhof	12,032	75,802	-	-	Yes	-	Tankage: 3 x 3750 M³, 1 x 500 M³, 2 x 60 M³, 6 smaller tanks.
					Raab Karcher-Thyssen G.m.b.H.	Industriehafen, Waldhof	x	x	-	-	x	-	
					Raab Karcher-Thyssen G.m.b.H.	On the Nekarspitz	x	x	62,511	393,820	x	x	

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		
							Plant Capacity		Total for Place				
Werk-reise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates Lat. N	Coordinates Long. E	Owner of Plant	Location of Plant	M³	Barrels	M³	Barrels	Water	Rail	Remarks
IX	Meiningen	111	50° 34'	10° 24'	D.A.P.G.	-	24	151	24	151	x	x	
VII	Memmingen	153	47° 59'	10° 11'	Rhenania-Ossag	Aldinstrasse	145	914	145	914	-	Yes	Three underground tanks for gasoline and gas oil.
IV	Merseburg (Leuna)	87	51° 19'	12° 00'	I. G. Farbenindustrie A.G.	2 miles S. of Merseburg	60,800	383,040	60,800	383,040	Yes	Yes	Large synthetic plant.
VI	Minden	60	52° 18'	8° 55'	Deutsche Gasolin A.G.	-	48	302	-	-	-	Yes	8 tanks and 2 pumping stations for bunkering river craft.
					Fleischer	Hermannstrasse 31	x	x	-	-	x	x	
					Rhenania-Ossag	-	x	x	x	x	x	x	Uncertain whether this plant was ever completed.
XI	Misburg	61	52° 24'	9° 51'	Deurag-Nerag	4 miles east of Hannover	235,000	1,480,500	235,000	1,480,500	-	Yes	Refinery. Dubbs cracking plant. This refinery has been heavily bombed.
VI	Monheim (Leverkusen)	94B	51° 6'	6° 53'	Rhenania-Ossag	-	46,687	294,128	46,687	294,128	Yes	Yes	A lube oil processing plant. 141 tanks.
VI	Mörs	82B	51° 27'	6° 37'	Rhenania-Ossag	-	50	315	50	315	x	x	Two underground tanks for gasoline.
IV	Mücheln (Lützkendorf)	87	51° 17'	11° 48'	Wintershall A.G.	Between Crumpa and Geisel Rohlitz, 2 miles E. of Mücheln.	75,000±	472,500	75,000	472,500	-	Yes	Bergius and Fischer-Tropsch synthetic plant. Extensive tankage.
VI	Mulheim (Ruhr)	82B	51° 25'	6° 50'	Pierburg & Wolthe	Hingberg Strasse 14	x	x	x	x	x	x	Bulk dealer.
VII	München (Munich)	155	48° 8'	11° 35'	D.A.P.G.	-	750	4,725	-	-	-	Yes?	
					D.P.A.G.	-	400	2,520	-	-	-	Yes	
					Deutche Gasolin	-	590	3,717	-	-	-	Yes	
					"Olex"	Aschanerstrasse	8004	5,040	-	-	-	Yes	16 tanks plus some additional storage.
					Rhenania-Ossag	-	308	1,940	2,848	17,942	-	Yes	12 tanks aboveground, 5 tanks underground.
IX	Münchenbernsdorf	99	50° 49'	11° 57'	WIFO	-	6,000	37,800	6,000	37,800	x	x	Exact location unidentified.
VI	München Gladbach	94B	51° 12'	6° 25'	Rhenania-Ossag	In the RR yard at Speik.	123	775	123	775	-	Yes	Three underground tanks for gasoline.
XII	Mundenheim	131	49° 28'	8° 27'	x	x	x	x	x	x	x	x	
VI	Münster (Westphalia)	71	51° 58'	7° 37'	Chemische Fabrik Lichtenberg	-	x	x	-	-	Yes	Yes	Bulk plant.
					Armed Forces	-	9,000	56,700	-	-	x	x	Probably air field storage; also an Army center holding 20,000 M³ has been reported but not confirmed.
					Rhenania-Ossag	Haverkamp (in the industrial harbor).	100	630	9,100	57,330	-	Yes	
XII	Nussbach ▲	130	49° 22'	8° 10'	Rhenania-Ossag	Railway freight yard	50	315	50	315	-	Yes	2 underground tanks and motor pump for filling tank trucks.
IV	Naumberg	99	51° 09'	11° 48'	Buschendorf	-	x	x	x	x	x	x	Possibly office only.
VI	Neheim	83	51° 27'	7° 58'	Kaiser Sohne	Mohnestrasse 57	x	x	x	x	x	x	Bulk dealer in motor gasoline etc.
VII	Neuberg a.d. Donau	147	48° 44'	11° 12'	WIFO	-	100,000±	630,000	100,000	630,000	-	Yes	Major underground storage center in forest.
VI	Neuenheerse	84	51° 40'	8° 59'	WIFO	Asseler Forest	6,000	37,800	6,000	37,800	No	Yes	12 - 500 M³ tanks aboveground, 70 yds apart in Asseler Forest.
XIII	Neumarkt (In Oberpfalz)	134	49° 17'	11° 28'	Rhenania-Ossag	On the main road to Ingelstadt and close to the RR station Neumarkt i/O.	x	x	x	x	-	Yes	2 tanks.
VIII	Neusalz	79	51° 48'	15° 43'	D.A.P.G.	-	x	x	x	x	x	x	Important distributing plant.
II	Neu-Stettin	40	53° 43'	16° 41'	Rhenania-Ossag	Adjoining the railway freight yard.	40	252	40	252	-	Yes	One tank.
V	Neu Ulm	146	48° 23'	10° 02'	D.A.P.G.	-	200	1,260	200	1,260	x	x	
XII	Neuweid am. Rhein	108	50° 26'	7° 28'	Caddum	-	x	x	x	x	x	x	Bulk dealer.
X	Nienburg a.d. Weser	60	52° 38'	9° 13'	WIFO	-	150,000	945,000	150,000	945,000	x	Yes	Major strategic underground reserve storage, 60 buried tanks.

XI	Nienhagen ▲	61	52° 33'	10° 07'	Christian Carlo	Sielstrasse 23a	x	x	x	x	x	x	Important oil fields with crude storage.
X	Norden ▲	31A	53° 36'	7° 12'	-	-	x	x	x	x	x	x	Possibly some small storage for gas oil.
X	Nordenham	32	53° 30'	8° 30'	D.A.P.G.	On west bank of Weser River, approx. 6 miles S. of Bremerhaven.	41,700	262,710	41,700	262,710	Yes	Yes	Marine terminal. Tankage for 1,100 M3 gasoline, 6,400 M3 kerosene, 9,700 M3 gas oil, 10,100 M3 fuel oil, and other tankage.
IX	Nordhausen	86	51° 30'	10° 48'	D.A.P.G.	-	20	126	-	-	x	x	
					D.A.P.G.	-	32	202	-	-	x	x	
					Deutsche Gasolin	-	86	554	-	-	x	x	
					Motogen	-	60	378	-	-	x	x	
					Oelvertrieb Nordhausen	Langenstrasse 13	x	x	-	-	-	Yes	Possibly office only.
					"Olex"	Hasseroederstrasse	180	1,134	-	-	x	x	Five small tanks.
					Rhenania-Ossag	Close to Hasse-Roeder strasse.	190	1,197	570	3,591	x	Yes	Four underground tanks for gasoline, kerosene and gas oil.
X	Nordholz (Ludingworth)	17	53° 47'	8° 36'	German Government	To NE of Nordholz-Midlum air field.	864,000	5,443,200	864,000	5,443,200	-	Yes	6-1/2 miles S. of Cuxhaven. Major buried strategic fuel reserve, 36 tanks each, 175 feet in diameter, 40 feet high. Connected by pipe line with tanks at Cuxhaven harbor.
XIII	Nürnberg	133	49° 27'	11° 05'	D.A.P.G.	-	50	315	-	-	-	Yes?	
					Deutsche Gasolin	-	216	1,361	-	-	-	Yes?	
					Durbanol Werke (Hans Durban)	Scholkhauserstrasse 65	x	x	-	-	x	x	Small oil treating plant.
					"Olex"	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Junction of Lauf Amholzstr. and Prutzstrasse.	443	2,781	709	4,467	-	Yes	Two underground tanks, 160 M3. Some small tanks aboveground totalling 283 M3.
XI	Oberg ▲	61	52° 15'	10° 14'	-	-	x	x	x	x	x	x	Small oil field.
VI	Oberhausen	82B	51° 28'	6° 50'	Ruhr	-	x	x	x	x	x	x	Underground storage reported.
IX	Obernburg	46	53° 09'	8° 13'	German Air Force	-	x	x	x	x	x	x	Location unidentified.
XII	Oberlahnstein	109	50° 17'	7° 36'	Kriens Herman	-	x	x	x	x	x	x	Bulk dealer.
XI	Obershagen ▲	61	52° 33'	10° 07'		Near Nienhagen							Oil field tankage
IX	Offenbach a. Main	121	50° 06'	8° 45'	Motogen	-	220	1,386	-	-	x	x	
V	Offenburg	144	48° 28'	7° 58'	"Olex"	Hafen 18	2,275	14,333	2,495	15,719	x	x	Twelve tanks.
					George Cest	-	x	x	-	-	x	x	Storage reported.
					Rhenania-Ossag	Adjoining the railway freight yard.	40	252	40	252	-	Yes	One underground tank for gasoline.
X	Oldenburg	46	53° 09'	8° 13'	-	-	x	x	-	-	x	x	? storage.
					"Olex"	-	x	x	-	-	x	x	Bulk dealer.
					August Pickel	Roggemannstrasse 28	x	x	-	-	No	Yes	Five small underground tanks for gasoline and gas oil.
					Rhenania-Ossag	-	115	725	-	-			
					WIFO	-	x	x	x	x	x	x	Strategic storage reported but unconfirmed.
VI	Oldendorf	60	53° 19'	8° 28'	German Air Force	1 mile west of Oldendorf, near Lübeck.	45,000	283,500	45,000	283,500	Yes	Yes	Underground storage, 60 cylinders with pipe line to Ems-Weser Canal.
VIII	Oppeln	117	50° 41'	17° 55'	Rhenania-Ossag	von Falkenberg Strasse.	235	1,481	235	1,481	-	Yes	Six tanks.
VI	Osnabrück	59	52° 17'	8° 03'	Chemisch Fabrik Mollering & Co.	-	1,300	8,190	-	-	-	Yes	
					Deutsche Gasolin	-	24	151	-	-	x	x	
					Mineraloel	-	x	x	-	-	x	x	
					Rhenania-Ossag	Rheinstrasse 122	120	756	-	-	No	Yes	Three underground tanks.
					Westfaelische Mineraloel Ges.	Rheinstrasse 36	x	x	-	-	x	x	
					WIFO	-	x	x	1,444	9,097	x	x	Important storage center reported. Details unknown.
X	Ostermoor ▲	17	53° 55'	9° 11'	Deutsche Gasolin	On Kiel Canal	76,200	480,060	-	-	Yes	x	Four large tanks.
					Mineraloel & Asphalt Werke A.G.	On SE bank of Kiel Canal, 3 miles from Brunsbuttel.	104,200	656,460	180,400	1,136,520	Yes	Yes	Refinery. 22 large tanks.
X	Papenburg	46	53° 06'	7° 25'	Gustav Freericks	-	x	x	x	x	x	x	Bulk dealer.
VII	Partenkirchen	159	47° 30'	11° 07'	Army	In wood between Walchensee and Partenkirchen.	1,200	7,560	1,200	7,560	x	x	Underground storage reported.

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		
							Plant Capacity		Total for Place				
Werk-reise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates Lat. N	Long. E	Owner of Plant	Location of Plant	M^3	Barrels	M^3	Barrels	Water	Rail	Remarks
VII	Passau	150	48° 34'	13° 27'	Rhenania-Ossag	3 km. from Passau on Main road from Passau to Regensburg.	100	630	100	630	-	Yes	Two underground tanks for gasoline. Plant possibly enlarged.
XI	Peine	61	52° 20'	10° 13'	Mineralöl Werke Peine (Julius Schindler)	N. of RR in eastern outskirts of Peine.	5,000	31,500	5,000	31,500	-	Yes	Small refinery.
V	Pforzheim	138	48° 54'	8° 42'	D.A.P.G.	Frankstrasse 10	20	126	-	-	x	x	
					D.P.A.G.	-	20	126	-	-	x	x	
					Motogen G.m.b.H.	-	100	630	-	-	x	x	
					Rhenania-Ossag	Frankstrasse 5, near freight yards.	153	964	293	1,846	-	Yes	Two underground tanks, four aboveground for gasoline.
I	Pillau	14	54° 39'	19° 53'	Navy	-	26,000	163,800	-	-	-	Yes	On Baltic Sea. Bunkering station.
					Rhenania-Ossag	In the harbor.	x	x	26,000	163,800	x	x	One tank for gas oil bunkering.
XII	Pirmasens	137	49° 12'	7° 37'	D.A.P.G.	-	30	189	-	-	x	x	
					Rhenania-Ossag	Adjoining railway goods yard.	404	252	70	441	-	Yes	This plant has been extended, amount of additional tankage unknown.
	Pirna		50° 57'	13° 57'	Mexas Kaltasphalt A.G.	-	x	x	x	x	x	x	Small asphalt plant.
IV	Plauen	112	50° 29'	12° 08'	D.A.P.G.	-	100	630	-	-	x	x	
					D.P.A.G.	-	80	504	-	-	x	x	
					Motogen	-	30	189	-	-	x	x	
					Rhenania-Ossag	Reichenbach Strasse	320	2,016	-	-	-	Yes	Eight underground tanks.
					Other companies	-	70	441	600	3,780	x	x	
II	Pölitz	38	53° 33'	14° 33'	Hydrierwerke Pölitz A.G.	On Oder River	261,100	1,644,930	261,100	1,644,930	Yes	Yes	Large Bergius synthetic plant.
IX	Pössneck	112	50° 41'	11° 35'	D.A.P.G.	-	120	756	120	756	x	x	
V	Radolfzell	152B	47° 44'	8° 59'	Oest et Cie	-	x	x	-	-	x	x	Some storage. No details.
					Rhenania-Ossag	Adjoining railway freight yard.	1204	756	120	756	-	Yes	Five underground tanks with some additional tanks.
VII	Ravensburg	153	47° 47'	9° 37'	D.A.P.G.	-	x	x	-	-	x	x	Possibly office only.
					Rhenania-Ossag	Opposite railway freight yard.	x	x	x	x	-	Yes	Three underground and three aboveground tanks.
VI	Recke	59	52° 23'	7° 43'	Middendorf	-	x	x	x	x	-	Yes	Possibly some gas oil tankage on the Mittelland Canal.
XIII	Regensburg	141	49° 01'	12° 07'	A.F. Bauer & Co. K.G.	Margaretenste 8	x	x	-	-	-	Yes	
					D.A.F.G.	Weinerstrasse 14, S. of Petroleumhafen.	4,200	27,090	-	-	Yes	Yes	Tankage: 7 of 500 M^3, 2 of 300 M^3 and 10 horizontal cylinders of 50M^3 each.
					Deutsche Erdöl A.G.	Weinerstrasse 12, S. of Petroleumhafen.	9,300	58,590	-	-	Yes?	Yes	Tankage: 1 of 3,800 M^3, 2 of 2,500 M^3, 2 of 250 M^3.
					Deutsche Gasolin	Kumpfmühlerstr. 16a	1,920	12,096	-	-	Yes?	Yes	
					Deutsche Petroleum A.G.	Southeast end of Petroleumhafen.	13,600	85,680	-	-	Yes	Yes	Tankage: 1 of 6,600 M^3, 2 of 3,500 M^3
					Mineralölwerke Bayern	East end of Petroleumhafen	13,700	86,310	-	-	Yes	Yes	Tankage: 1 of 3,000 M^3, 2 of 2,000 M^3, 3 of 1,500 M^3, 1 of 500 M^3, 3 of 400 M^3, 2 of 250 M^3.
					Rhenania-Ossag	Weinerstrasse 23, N. of Petroleumhafen	16,423	103,465	-	-	Yes	Yes	59 tanks; small gasoline treating plant.
					Steaua Romana	Budanesterstrasse, S. of Danube River.	30,400	191,520	-	-	Yes	Yes	Tankage: 6 of 3,800 M^3, 2 of 3,300 M^3, 1 of 1,000 M^3.
					Ost. Petrol G.m.b.H.	-	x	x	89,643	564,751	x	x	
VIII	Reichenbach	118	50° 44'	16° 38'	Rhenania-Ossag	-	50	315	50	315	-	Yes	Two underground tanks for gasoline.
VI	Reisholz	94B	51° 10'	6° 51'	D.P.A.G.	-	7,000	44,100	-	-	x	x	
					"Olex"	-	4,040	25,452	-	-	Yes	Yes	Tankage: 2 of 3,750 M^3, 4 of 60 M^3, 2 of 25 M^3.
					Rhenania-Ossag	On Rhine River	36,843	232,111	47,883	301,663	Yes	Yes	Gasoline processing refinery, 97 tanks for gasoline and gas oil.
X	Reitbrook ▲	33	53° 28'	10° 09'	-	-	7,500	47,250	7,500	47,250	x	x	Oil field. 2 tanks for crude oil storage.

VI	Remscheid	94B	51° 11'	7° 11'	Dattner	Haddenbacherstrasse 15	x	x	x	x	x	x	Mineral oil importer.
X	Rendsburg	8	54° 19'	9° 40'	D.A.P.G ?	-	78,000	491,400	-	-	Yes	-	14 tanks believed to be D.A.P.G. plant Hans Staat also had bunkering plant at Rendsburg.
					x	North side of Kiel Canal	64,000	403,200	-	-	Yes	-	Tankage: 2 of 140 ft., 2 of 120 ft., 2 of 90 ft. Tanks partially buried. Probably strategic storage.
	Osterrönfeld				x	South side of Kiel Canal	x	x	142,000	894,600	-	Yes	Suspected underground storage for bunkering.
V	Reutlingen	145	48° 30'	9° 13'	Rhenania-Ossag	Schieferstrasse, adjoining railway freight yard on road to Metzingen.	237	1,493	237	1,493	-	Yes	Five underground tanks for gasoline, gas oil and kerosene.
VI	Rheydt	94B	51° 10'	6° 26'	D.A.P.G.	Am Gerstaner 2	x	x	x	x	x	x	Possibly office only.
IV	Riesa	88	51° 18'	13° 18'	D.A.P.G.	-	x	x	x	x	Yes	-	Important distributing plant.
VII	Rosenheim	155	47° 52'	12° 08'	Rhenania-Ossag	Schoenfeldstr.	175	1,103	175	1,103	-	Yes	4 underground tanks- gasoline, gas oil
IV	Rositz	100	51° 1'	12° 23'	D.P.A.G.	3 miles NW of Altenburg	x	x	x	x	-	Yes	L.T.C. plant and refinery.
II	Rostock	20	54° 05'	12° 08'	Rhenania-Ossag	Rostock-Brainow, -Heinkel-strasse.	260	1,638	260	1,638	Yes	-	8 tanks. Plant probably has been enlarged.
IV	Ruhland Schwarzheide	89	51° 29'	13° 53'	Braunkohle Benzin A.G.	1-1/4 miles north of Ruhland.	44,000	277,200	44,000	277,200	Yes	Yes	Fischer-Tropsch synthetic plant.
VI	Rüthen	84	51° 29'	8° 25'	WIFO	-	6,000	37,800	6,000	37,800	No	Yes	Twelve 30-ft. tanks aboveground in woods.
XII	Saarbrücken	136	49° 14'	6° 59'	D.A.P.G.	Dudweiler Landstr. 109	x	x	-	-	x	x	Presence of bulk storage uncertain.
					"Olex"	Dudweiler Landstr. 111	x	x	-	-	x	x	Presence of bulk storage uncertain.
					Rhenania-Ossag	Am. Guterbahnhof	320	2,016	x	x	-	Yes	
VI	Salzbergen (Rheine)	59	52° 20'	7° 21'	Erdöl Raffinerie Salzbergen (Ersag)	-	35,600	224,280	35,600	224,280	No	Yes	Refinery mainly for lubes.
IV	Sangerhausen	86	51° 28'	11° 18'	Oelvertreib Nordhausen	-	x	x	x	x	-	Yes	
X	Schafstedt	17	54° 5'	9° 19'	x	On north bank of Kiel Canal 1 miles south of Schafstedt	48,000	302,400	48,000	302,400	Yes	No.	4 buried tanks, connected by pipe line with Heide-Hemmingstedt refinery, about 10 miles distant.
IX	Schmalkalden	111	50° 43'	10° 28'	Rhenania-Ossag	Adjoining railway freight yard.	55	347	55	347	-	Yes	Two underground tanks for gasoline and gas oil.
VI	Scholven	82B	51° 36'	7° 02'	Hydrierwerke Scholven A.G.	On road from Buer to Dorsten	46,000	289,800	46,000	289,800	-	Yes	Bergius synthetic plant, 10 primary products storage tanks and 18 storage tanks.
XI	Schöppenstedt ▲	74	52° 08'	10° 47'	Ruscher	-	x	x	x	x	x	x	
X	Schulau	33	53° 34'	9° 43'	See Hamburg								
XIII	Schwabach (Nurnberg)	133	49° 20'	11° 03'	Armed Forces ?		x	x	x	x	No	x	Underground storage reported N. of village of Unter Reichenbach near Schwabach. Air cover shows widely scattered groups of circular clearings including 6 main ones, 156 circles in all. If these are tank sites, the area would form a major reserve. No rail connections or pipe-line system are visible; this storage should be accepted with considerable caution.
XIII	Schweinfurt	122	50° 03'	10° 15'	Fichtal & Sachs	-	105	662	-	-	x	x	
					Hirsch	-	40	252	-	-	x	x	
					W. Kruger	-	100	630	-	-	x	x	
					"Olex"	-	40	252	-	-	x	x	
					Rhenania-Ossag	Adjoining railway freight yard at Schweinfurt Sennfeld.	90+	504	365	2,300	-	Yes	Three underground tanks and other tankage.
II	Schwerin	35	53° 38'	11° 25'	Rhenania-Ossag	In the Industriegelaende on the Ziegelsee, adjoining the harbor railway.	90	567	90	567	-	Yes	Two underground tanks.
III	Schwiebus	67	52° 16'	15° 32'	Rhenania-Ossag	Braetzerstrasse -	225	1,418	225	1,418	-	Yes	Four underground tanks.
XIII	Seligenstadt	122	50° 02'	8° 58'	Armed Forces	ENE of Wurzburg near RR station.	30,000	189,000	30,000	189,000	No	Yes	ENE of Wurzburg-- 38 buried tanks reported. Probably the Wurtzburg divisional center.

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

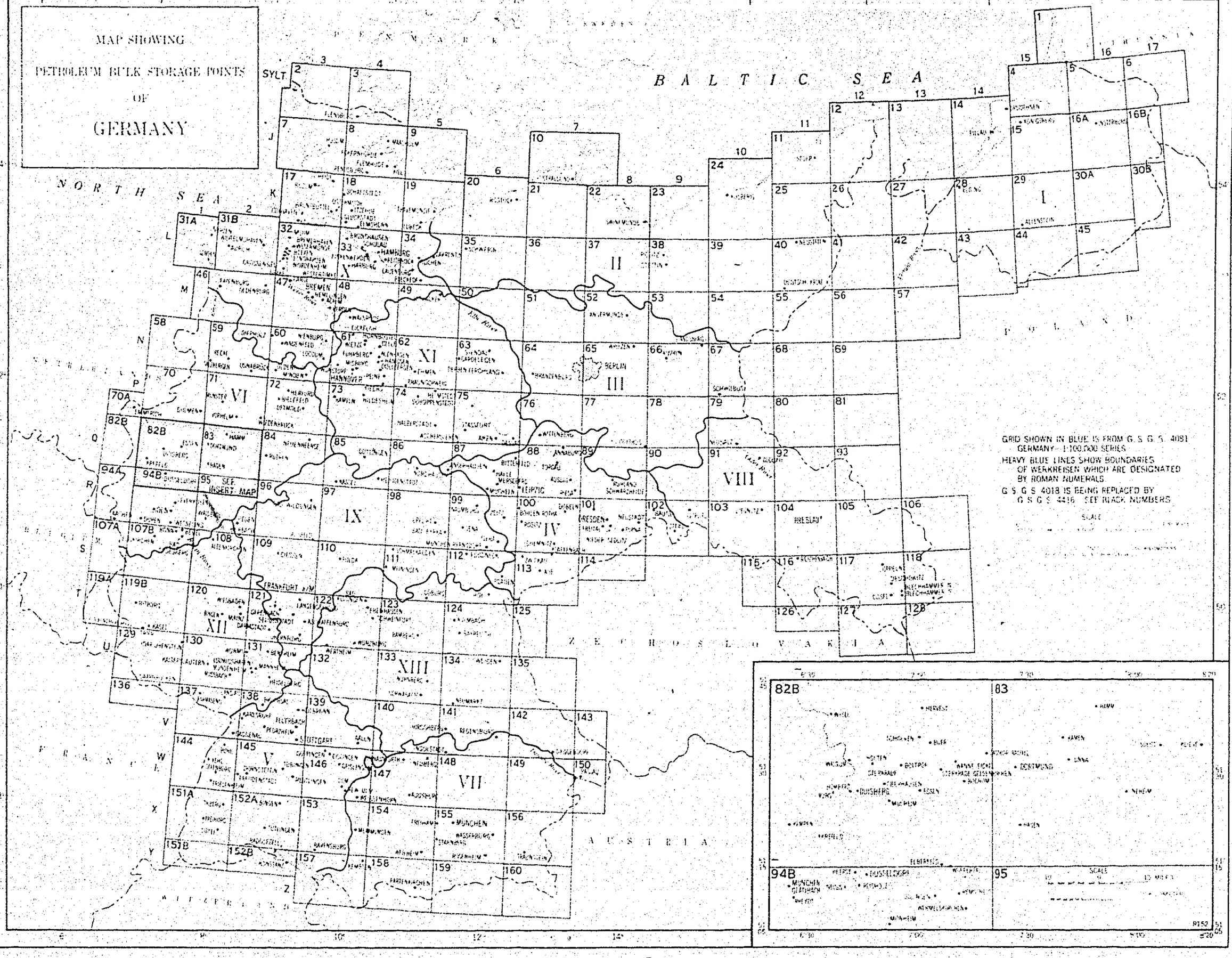
IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		Remarks
							Plant Capacity		Total for place				
Werk-reise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Coordinates Lat. N	Long. E	Owner of Plant	Location of Plant	M³	Barrels	M³	Barrels	Water	Rail	
IX	Siegen	95	50° 52'	8° 02'	Rhenania-Ossag	On main road from Eisenfeld to Siegen.	150	945	150	945	-	Yes	Four underground tanks for gasoline.
VI	Soest	83	51° 34'	8° 06'	Wilhelm Cramer Erben	Niederbergheimerstrasse 25	x	x	x	x	x	x	Tanks for gas oil and lubes.
VI	Solingen	94B	51° 10'	7° 04'	Ericke	Dusseldorfer strasse 120	x	x	x	x	x	x	Possibly office only.
VII	Starnberg	154	48° 00'	11° 20'	Armed Forces	-	x	x	x	x	x	x	Very large underground stocks reported at unidentified locality in the woods.
XI	Stassfurt	75	51° 51'	11° 34'	NIFO	-	500,000	3,150,000	500,000	3,150,000	x	x	Major strategic reserve storage reported underground in salt mines.
XI	Stendal	63	52° 36'	11° 52'	Allgemeine Oel-Handels	-	40	252	-	-	x	x	
					Rhenania-Ossag	Off the Magdeburg strasse	80	504	120	756	-	Yes	Three underground tanks for gasoline and gas oil.
VI	Sterkrade (See Holten)	82B	51° 30'	6° 50'	-	-		-					
II	Stolp	11	54° 28'	17° 03'	Rhenania-Ossag	Hochstrasse. Adjoining the railway freight yard.	125	788	125	788	-	Yes	Three underground tanks.
II	Stettin	38	53° 25'	14° 34'	D.A.P.G.	-	35,565	224,063	-	-	Yes	-	Important distributing plant.
					Rhenania-Ossag	-	4,433	27,928	40,909	257,728	x	x	1 large tank and 17 smaller tanks.
II	Stralsund	10	54° 18'	13° 06'	D.A.P.G.	-	x	x	x	x	Yes	-	Important distributing plant.
V	Stuttgart	138	48° 47'	9° 11'	A.O.H.G.	Wiesenstrasse 34	x	x	-	-	x	x	Possibly office only.
					D.A.P.G.	-	250	1,575	-	-	x	x	
					Deutsche Gasolin	Koenigstrasse 14	x	x	-	-	x	x	Possibly office only.
					"Olex"	Ulmerstrasse 187	190	1,197	440	2,772	x	x	Five small underground tanks.
II	Swinemünde	22	53° 54'	14° 16'	Navy	-	171,600	1,081,080	171,600	1,081,080	Yes	-	Strategic Naval reserve storage on Baltic Sea.
X	Sylt (List) ▲	2	55° 02'	8° 25'	German Air Force	-	12,000	75,600	12,000	75,600	x	x	Main underground storage for air fields on the island.
V	Titisee	151A	47° 54'	8° 09'	Army	SE of Frieburg	x	x	x	x	x	x	Unconfirmed underground army depot.
IV	Torgau	88	51° 34'	13° 01'	Rhenania-Ossag	-	15,188	95,684	15,188	95,684	Yes	Yes	15 tanks: 11,088 M³ gasoline, 4,100 M³ gas oil.
VII	Traunstein	160	47° 52'	12° 38'	Rhenania-Ossag	Wasserburgerstr. 50	x	x	x	x	-	Yes	One underground tank for motor gasoline
X	Travemünde (Privall)	19	53° 58'	10° 52'	Armed Forces	-	6,000	37,800	6,000	37,800	Yes	No.	Surface tankage probably supplying seaplane base. Four large underground tanks are reported to lie between the seaplane base and the race course, but cannot be detected in air cover.
V	Triberg	151A	48° 08'	8° 13'	Rhenania-Ossag	Adjoining the railway station.	20	126	20	126	-	Yes	Two underground tanks.
XII	Trier	119B	49° 46'	6° 39'	Benzol Verband	-	x	x	-	-	x	x	Possibly office only.
					D.A.P.G.	-	x	x	-	-	x	x	Possibly office only.
					Deutsche Cristalline Motorole Peter Willems-Werk	Südallee 1-4.	x	x	-	-	x	x	Small refinry, possibly making lubes.
					"Olex"	-	x	x	-	-	x	x	Possibly office only.
					"Pennsylvania" Mineralöl- und Kraftstoff-Vertrieb G.m.b.H.	Kaiserstrasse 1.	x	x	-	-	x	x	Possibly lubes only.
					Rhenania-Ossag	Eupenerstrasse adjoining Trier west station.	140	882	x	x	-	Yes	Four underground tanks.
V	Tübingen	145	48° 31'	9° 03'	Oest et Cie	-	x	x	x	x	x	x	Some storage. No details.
V	Tuttlingen	152A	47° 59'	8° 49'	D.A.P.G.	-	20	126	20	126	x	x	
V	Ulm	145	48° 24'	10° 00'	Rhenania-Ossag	On road known as "Auf der Geolde".	280	1,638	260	1,638	-	Yes	Five underground tanks.
VI	Unna	83	51° 32'	7° 41'	Toschlage Johann & Clemens	-	x	x	x	x	x	x	Bulk dealer in petroleum products.
I	Verden	47	52° 56'	9° 14'	Gebruder Frerichs	Grossestrasse 50-54	x	x	-	-	x	x	Bulk dealer.
					Welzin H	-	x	x	x	x	x	x	Bulk dealer.

VI	Vorhelm	71	51° 48'	7° 57'	Bendix	Enniger 23	x	x	x	x	x	x	Bulk dealer.
X	Wagenfeld	60	52° 34'	8° 36'	K.W. Furtmann	-	x	x	x	x	x	x	Bulk dealer.
VI	Waldbröl	95	50° 53'	7° 37'	Feldman	-	x	x	x	x	x	x	Manufacture of technical oils and fat.
XI	Walsrode	48	52° 52'	9° 35'	Army	-	x	x	x	x	x	x	Large underground storage reported, but unconfirmed, between Walsrode and Honerdingen or SW of Felingbostel. Not seen in air cover.
VI	Walsum ▲	82B	51° 32'	6° 42'	?	On the harbor.	x	x	x	x	x	x	13 oil tanks, camouflaged.
VI	Wanne Eickel	82B	51° 31'	7° 8'	Krupp Treibstoffwerke A.G.	4 miles NNW of Bochum	14,500	91,350	14,500	91,350	-	Yes	Fischer-Tropsch synthetic plant.
VII	Wasserburg a. Inn ▲	155	48° 4'	12° 15'	Deutsche Gasolin A.G.	-	16	101	16	101	x	x	
XIII	Weiden	124	49° 41'	12° 10'	Rhenania-Ossag	Regensbergerstrasse opposite railway freight yard.	50[4]	315	50	315	-	Yes	One underground tank, and some other tankage.
VII	Weilheim	154	47° 51'	11° 09'	Rhenania-Ossag	Opposite railway station 200 meters from road. Weilheim-Landsberg.	80[4]	504	80	504	-	Yes	Two underground tanks and some other tankage.
VII	Weissenhorn	146	48° 18'	10° 10'	German Air Force	-	10,400	65,520	10,400	65,520	-	Yes	German Air Force center SE of Ulm. 13 tanks 35 ft. diameter aboveground in woods.
VI	Wermelskirchen	94B	51° 8'	7° 13'	Schneider	Telegrafstrasse 11-13.	x	x	x	x	x	x	Dealer with bulk storage.
XIII	Wertheim am. Main	122	49° 46'	9° 32'	Rhenania-Ossag	Adjoining railway freight yard.	40	252	40	252	-	Yes	Two underground tanks for gasoline.
VI	Wesel	82B	51° 39'	6° 37'	Rhenania-Ossag	East bank of Rhine just above railway bridge to Venlo.	30[4]	189	-	-	-	Yes	Plant has been enlarged, extend unknown.
					Armed Forces (?)	-	x	x	x	x	x	x	Five interconnected reservoirs reported, 4 km. west of Wesel.
VI	Wesseling (Klon)	94B	50° 49'	7° 00'	Union Rheinische Braunkohlen Kraftstoff A.G.	On west bank of the Rhine, one mile east of Wesseling.	58,300	367,290	58,300	367,290	Yes	Yes	Bergius synthetic plant.
X	Westertimke ▲	47	53° 14'	9° 08'	-	-	x	x	x	x	x	x	Underground storage reported 500 yards west in the vicinity of Camp Milag Nord. Air cover suggests this may lie south of the camp.
					Strohmeier	West 22.	x	x			x	x	Bulk dealer.
VI	Wiedenbrück	71	51° 51'	8° 17'	Army	-	x	x			x	x	Possibly Army depot.
XII	Wiesbaden	120	50° 04'	8° 14'	"Olex"	-	x	x	x	x	x	x	Possibly Army depot.
XI	Wietze	61	52° 40'	9° 49'	Fachgruppe Erdolwimung	-	x	x	x	x	x	x	Underground storage reported, no confirmation. Oil field with crude storage.
X	Wilhelmshaven	31B	53° 32'	8° 08'	Deutsche Gasolin A.G.	-	1,800	11,340	-	-	x	x	
					Naval	Hipperhafen (NE side).	13,000	81,900	-	-	x	x	Two tanks of 70 ft. and one of 90 ft. diameter.
					Naval	Hipperhafen (NW corner).	1,400	8,820	-	-	x	x	Two small tanks of 40 ft, and 25 ft. diameter remaining from much large installation, most of whose tanks have been removed.
					Naval	Hipperhafen (SE corner).	x	x	-	-	x	x	Two small buried tanks reported but not confirmed.
					Naval	Sande	67,000	422,100	-	-	-	-	Main installation for fuel oil, gas oil and motor spirit. Connected by three pipe lines to SW corner of Tirpitzhafen.
					Naval	Scheerhaven, NE.	4,000	25,200	-	-	x	x	One tank estimated diameter 80 feet.
					Naval	Scheerhaven, (SE corner).	12,000	75,600	-	-	x	x	Two tanks estimated diameter 90 feet.
					Naval	Scheerhaven, (SW corner).	85,000	535,500	-	-	x	x	Five large buried tanks 160 feet diameter.
					Naval	Tirpitzhafen (SW corner).	25,500	160,650	-	-	x	x	Three large tanks and two smaller, connected by pipe line to Sande installation.
					Naval	Tirpitzhafen	1,000	6,300	-	-	x	x	Two small tanks about 30 feet diameter.
					-	Marinewerft (NW corner).	400	2,520	-	-	x	x	One 25 foot tank.
					-	No. 1 entrance (Fluthafen)	3,000	18,900	-	-	x	x	Two tanks, 50 ft. and 40 ft. diameter.
					-	Torpedobootshafen (NW end)	4,700	29,610	218,800	1,378,440	x	x	Four tanks. One of 70 foot, three of 25 ft. diameter. Believed to be for diesel oil for the adjacent generating station.

STATISTICAL SUMMARY OF BULK STORAGE FACILITIES

IDENTIFICATION OF PLACES					IDENTIFICATION OF PLANTS		CAPACITY OF STORAGE TANKS				SUPPLIED BY		
			Coordinates				Plant Capacity		Total for Place				
Werkreise	Place	Map Ref. G.S.G.S. 4081 Sheet No.	Lat. N	Long. E	Owner of Plant	Location of Plant	M³	Barrels	M³	Barrels	Water	Rail	Remarks
III	Wittenberg	76	51° 52'	12° 38'	Armed Forces (?)	-	120,000	756,000	-	-	x	x	100 underground tanks reported in the area between Wittenberg, Jüterbog and Treuenbreitzen. Unconfirmed.
					D.A.P.G.	-	100	630	120,100	756,630	x	x	
XII	Worms	131	49° 38'	8° 22'	C.C. Thoma	Rheingervarweg 10	428	2,696	-	-	x	x	
					D.A.P.G.	-	30	189	-	-	x	x	
					D.P.A.G.	-	20	126	-	-	x	x	
					Motogen	-	60	378	-	-	x	x	
					"Olex"	-	153	964	691	4,353	x	x	
III	Wriezen	65	52° 43'	14° 08'	Rhenania-Ossag	Kanal Strasse	x	x	x	x	-	Yes	One underground tank of 60 M³ and other tankage.
XI	Wunstorf	61	52° 27'	9° 25'	Armed Forces	-	x	x	-	-	x	x	Underground storage reported, no confirmation.
					Kater von Wormstoff	-	x	x	-	-	x	x	
					Oelfabrik	-	x	x	x	x	x	x	
VI	Wuppertal ▲	82B	51° 15'	7° 09'	Army (?)	-	x	x	-	-	-	Yes	Army rail depot suspected here. No details.
	Elberfelde				D.A.P.G.	Clausenstrasse 7	x	x	-	-	x	x	Possibly office only.
					"Olex"	Schwesterstrasse 11	120	756	-	-	x	x	Four underground tanks.
					Rhenania-Ossag	Koenigstrasse	30	189	x	x	x	x	Three underground tanks supplied by road.
XIII	Würzburg	122	49° 48'	9° 56'	D.A.P.G.	Nurnbergstrasse 2	119	750	-	-	x	x	
					Deutsche Gesolin	-	110	693	-	-	x	x	
					"Olex"	-	35	221	-	-	x	x	
					Rhenania-Ossag	Adjoining the Amuehlwiesen railway freight yard.	225	1,418	-	-	-	Yes	Six underground tanks for gasoline and gas oil.
					Ruchdeschebund	-	100	630	589	3,712	x	x	
II	Zarrentin	34	53° 33'	10° 57'	WIFO	-	x	x	x	x	x	x	Strategic storage not definitely identified.
IV	Zeitz Tröglitz	99	51° 03'	12° 08'	Braunkohlen Benzin A.G.	At Tröglitz. 3 miles NE of Zeitz.	97,400	613,620	97,400	613,620	x	x	Bergius synthetic plant.
IV	au Zittau	102	50° 54'	14° 48'	Rhenania-Ossag	Adjoining the railway yard at Pethau.	304	189	30	189	-	Yes	One underground tank 30 M³ and additional tankage.
IV	Zwickau	113	50° 43'	12° 29'	D.A.P.G.	-	32	202	-	-	x	x	
					Rhenania-Ossag	Reichenbacherstrasse	230	1,449	262	1,651	-	Yes	Four underground tanks for gasoline and gas oil. May have been enlarged.

MAP SHOWING PETROLEUM BULK STORAGE POINTS OF GERMANY

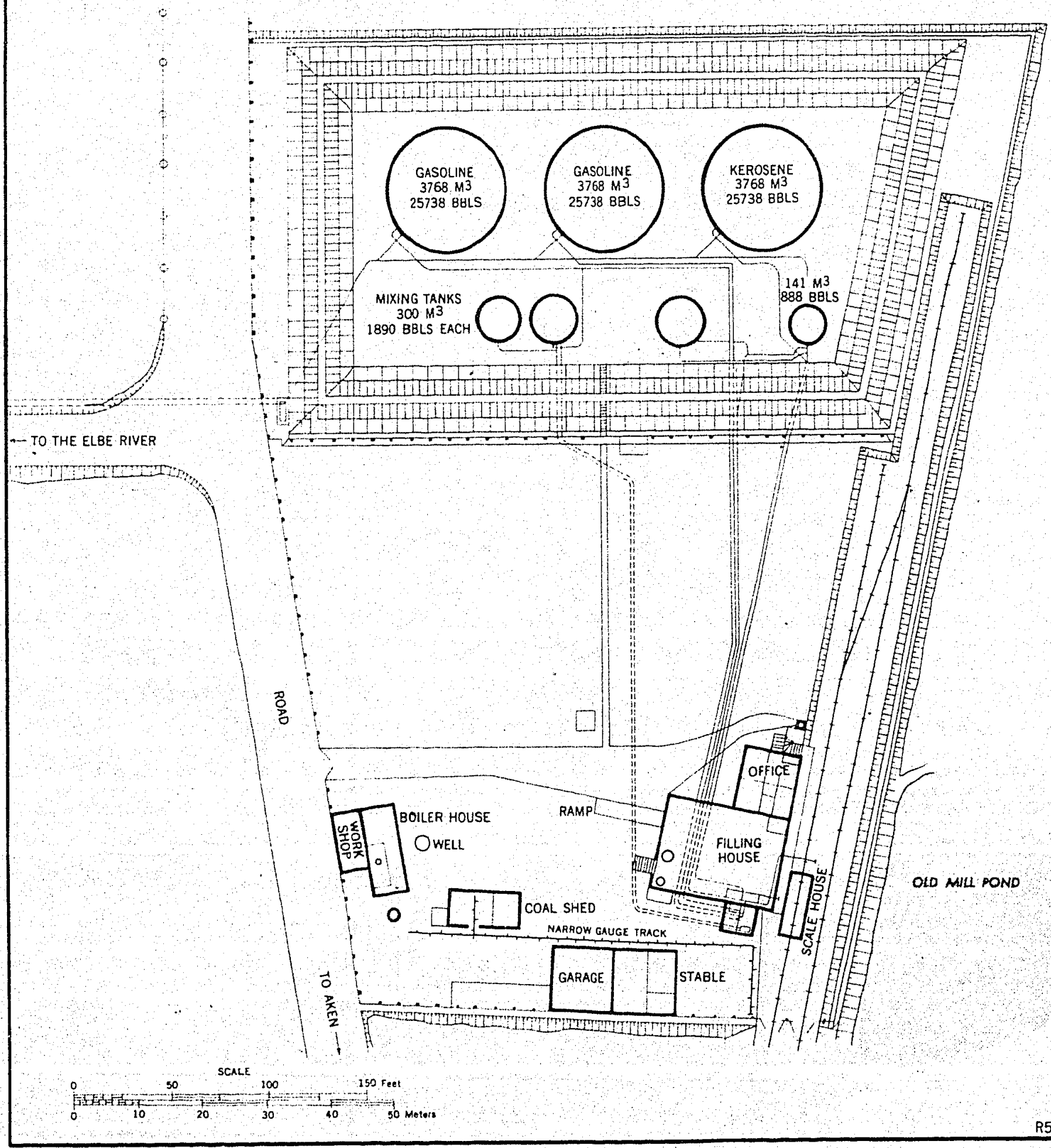


DISTRIBUTING - 329
Storage map

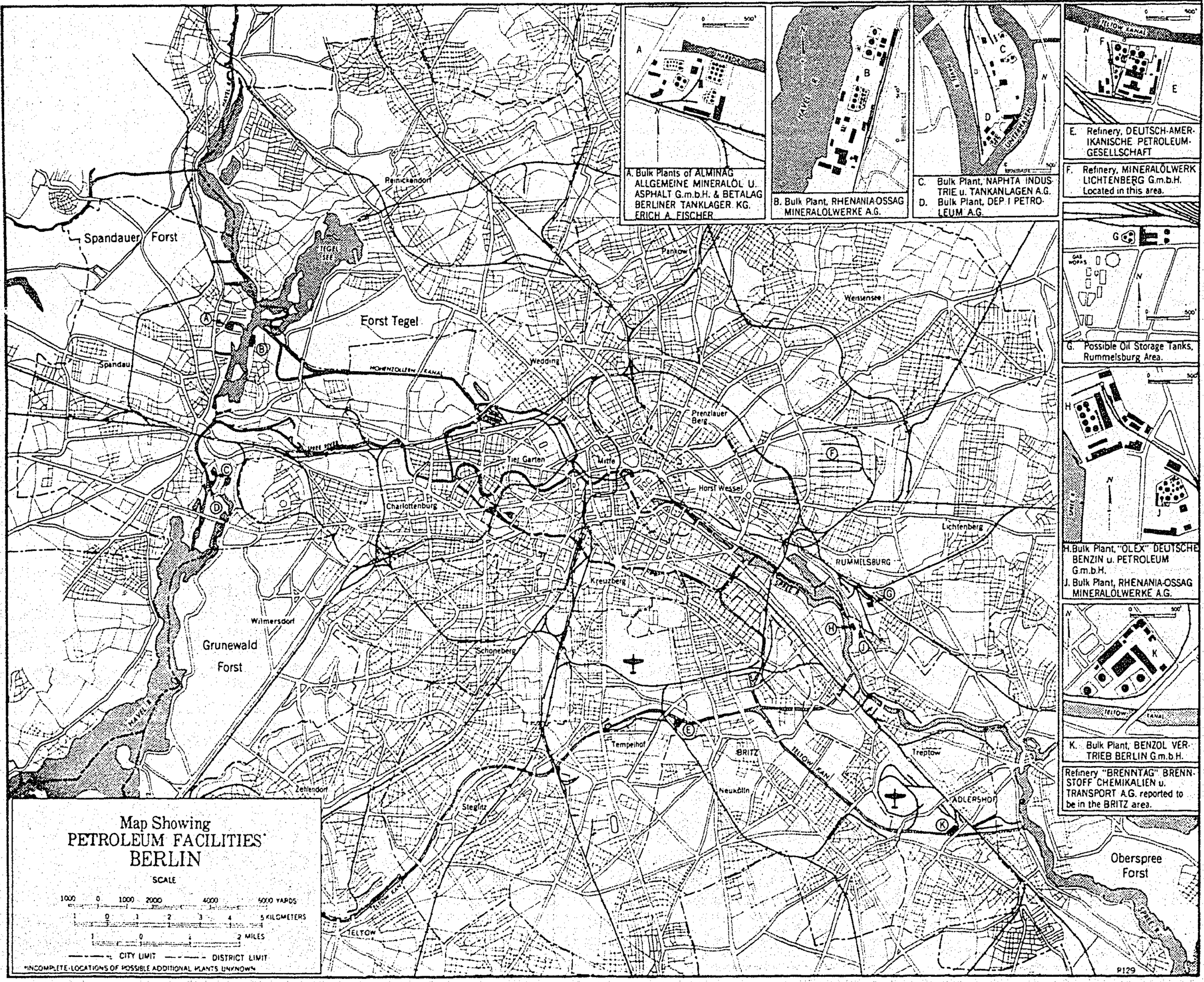
BULK PLANT

"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H.

AKEN a. d. ELBE



R5


A. Bulk Plants of ALMINAG ALLGEMEINE MINERALÖL U. ASPHALT G.m.b.H. & BETALAG BERLINER TANKLAGER KG. ERICH A. FISCHER
B. Bulk Plant, RHENANIA-OSSAG MINERALOLWERKE A.G.
C. Bulk Plant, NAPHTA INDUSTRIE u. TANKANLAGEN A.G.
D. Bulk Plant, DEP I PETROLEUM A.G.
E. Refinery, DEUTSCH-AMERIKANISCHE PETROLEUM-GESELLSCHAFT
F. Refinery, MINERALÖLWERK LICHTENBERG G.m.b.H. Located in this area.
G. Possible Oil Storage Tanks, Rummelsburg Area.
H. Bulk Plant, "OLEX" DEUTSCHE BENZIN u. PETROLEUM G.m.b.H.
J. Bulk Plant, RHENANIA-OSSAG MINERALOLWERKE A.G.
K. Bulk Plant, BENZOL VERTRIEB BERLIN G.m.b.H.
Refinery "BRENNTAG" BRENNSTOFF CHEMIKALIEN u. TRANSPORT A.G. reported to be in the BRITZ area.
Map Showing
PETROLEUM FACILITIES*
BERLIN
SCALE
1000 0 1000 2000 4000 6000 YARDS
1 0 1 2 3 4 5 KILOMETERS
1 0 1 2 MILES
CITY LIMIT DISTRICT LIMIT
*INCOMPLETE-LOCATIONS OF POSSIBLE ADDITIONAL PLANTS UNKNOWN
Spandauer Forst
Forst Tegel
Grunewald Forst
Oberspree Forst
Reinickendorf
Pankow
Wedding
Tier Garten
Mitte
Prenzlauer Berg
Weissensee
Charlottenburg
Horst Wessel
Lichtenberg
RUMMELSBURG
Kreuzberg
Wilmersdorf
Schoneberg
Tempelhof
BRITZ
Neukölln
Treptow
ADLERSHOF
Steglitz
Zehlendorf
TELTOW
TEGEL SEE
HOHENZOLLERN KANAL
TELTOW KANAL
HAVEL
SPREE
P129

BULK PLANT

"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H.

BRESLAU - WOISCHWITZ

TO ZOPTEN

RAILROAD

TO BRESLAU

TO BROCKAU

FRUIT AND VEGETABLE GARDEN

FILLING ROOM

BURIED TANK 5

R R TANKCAR FILLING SHAFT

SCALE HOUSE

ARBOR

OPEN SMITHY

WORK SHOP

BOILER HOUSE

COAL PIT

TO WOISCHWITZ

STABLE

WAREHOUSE

COOPER ROOM

1

2

3

4

PUMPHOUSE

HIGHWAY

OFFICE

OPEN WAGON SHED

PUBLIC ROAD

PAVED COURT

FILLING ROOM

LOADING PLATFORM

TO STREHLEN

R 10

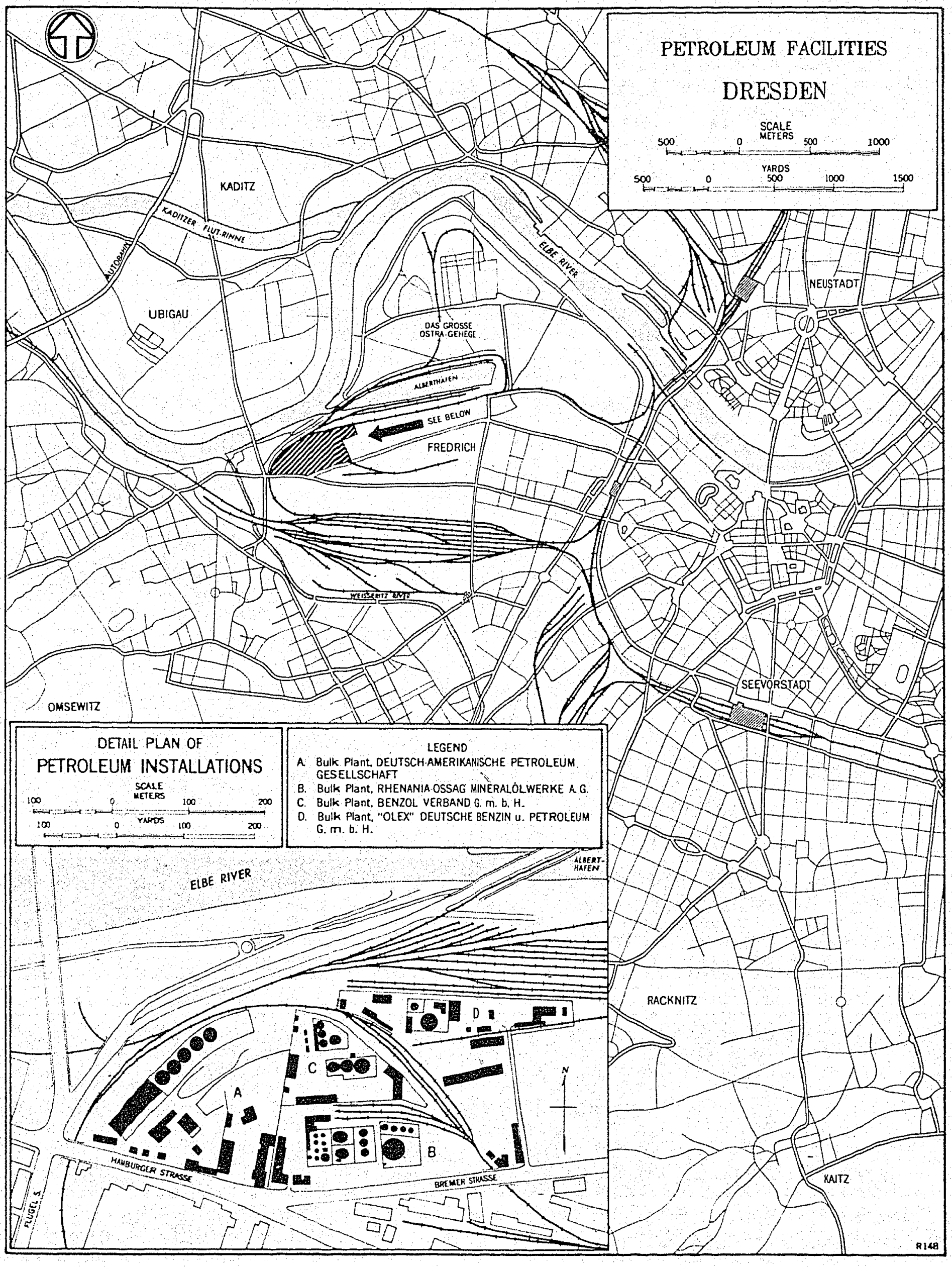
SCALE

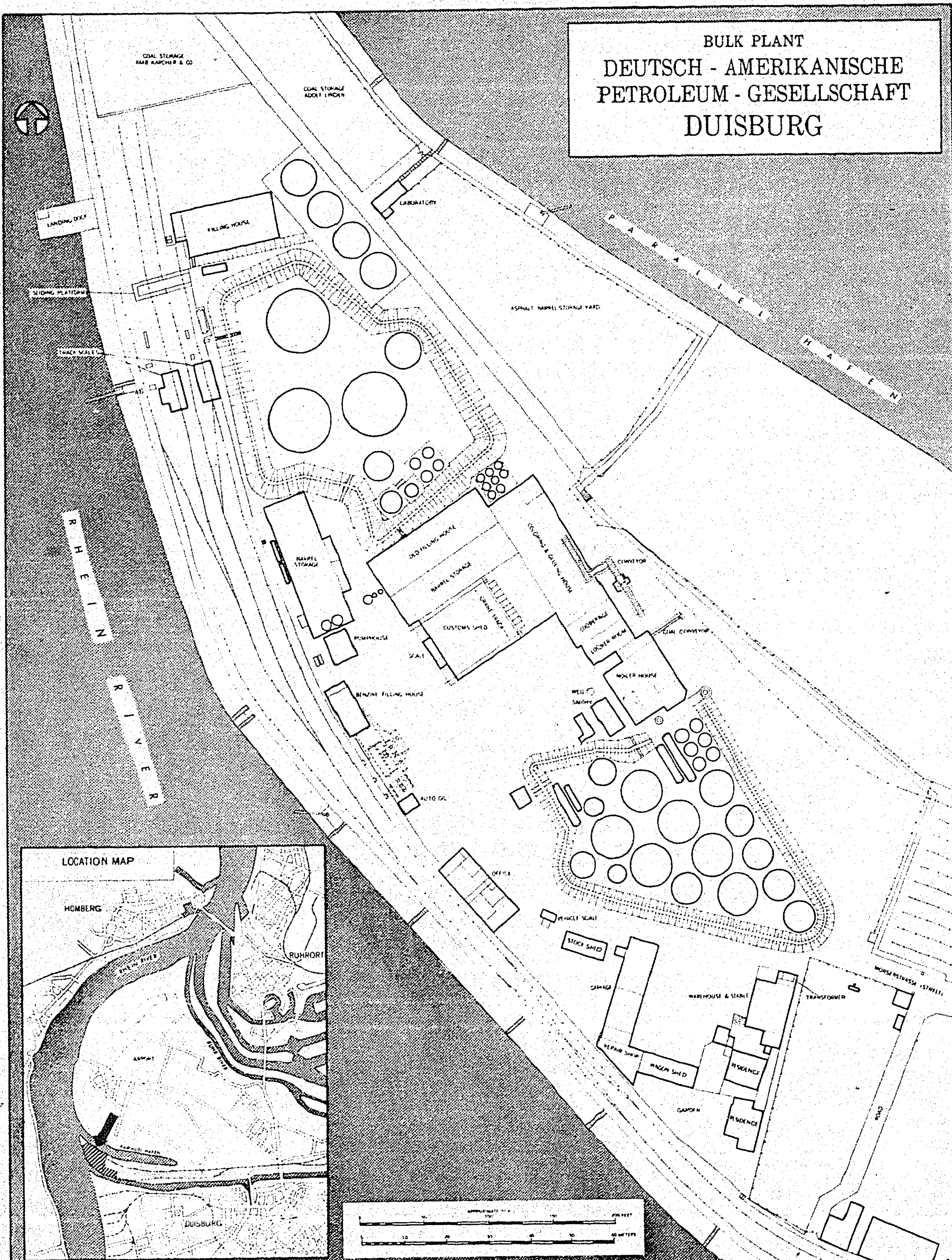
5 0 10 20 30 40 50 METERS

8 0 5 10 15 20 25 30 35 40 45 50 YARDS

DETAILS OF TANKAGE

TANK NO.		APPROXIMATE CAPACITY	
		M3	BARRELS
1		2,642	16,645
2		1,224	7,721
3		626	3,938
4		10	63
5		67	416
	* TOTAL	4,569	28,783

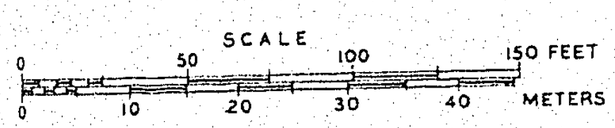

PETROLEUM FACILITIES
DRESDEN
SCALE
METERS
500 0 500 1000
YARDS
500 0 500 1000 1500
KADITZ
KADITZER FLUT-RINNE
AUTOBAHN
UBIGAU
ELBE RIVER
NEUSTADT
DAS GROSSE OSTRA-GEHEGE
ALBERTHAFEN
SEE BELOW
FREDRICH
WEISSERITZ BYPS
OMSEWITZ
SEEVORSTADT
DETAIL PLAN OF
PETROLEUM INSTALLATIONS
SCALE
METERS
100 0 100 200
YARDS
100 0 100 200
LEGEND
A. Bulk Plant, DEUTSCH-AMERIKANISCHE PETROLEUM GESELLSCHAFT
B. Bulk Plant, RHENANIA-OSSAG MINERALÖLWERKE A.G.
C. Bulk Plant, BENZOL VERBAND G. m. b. H.
D. Bulk Plant, "OLEX" DEUTSCHE BENZIN u. PETROLEUM G. m. b. H.
ELBE RIVER
ALBERT-HAFEN
RACKNITZ
A
B
C
D
N
HAMBURGER STRASSE
BREMER STRASSE
FLUGEL S
KAITZ
R148


BULK PLANT
DEUTSCH - AMERIKANISCHE
PETROLEUM - GESELLSCHAFT
DUISBURG
PARALLEL HAFEN
RHEIN RIVER
LANDING DOCK
FILLING HOUSE
LABORATORY
SIDING PLATFORM
ASPHALT BARREL STORAGE YARD
TRACK SCALES
BARREL STORAGE
OLD FILLING HOUSE
BARREL STORAGE
CUSTOMS SHED
CONVEYOR
COOPERAGE
LOCKER ROOM
COAL CONVEYOR
PUMPHOUSE
SCALE
BOILER HOUSE
BENZINE FILLING HOUSE
AUTO OIL
OFFICE
VEHICLE SCALE
STOCK SHED
GARAGE
WAREHOUSE & STABLE
TRANSFORMER
REPAIR SHOP
WAGON SHED
RESIDENCE
GARDEN
RESIDENCE
ROAD
LOCATION MAP
HOMBERG
RUHRORT
RHEIN RIVER
DUISBURG

BULK PLANT

"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H.

DÜSSELDORF - REISHOLZ



R43

Map Showing

PETROLEUM FACILITIES

DÜSSELDORF AREA

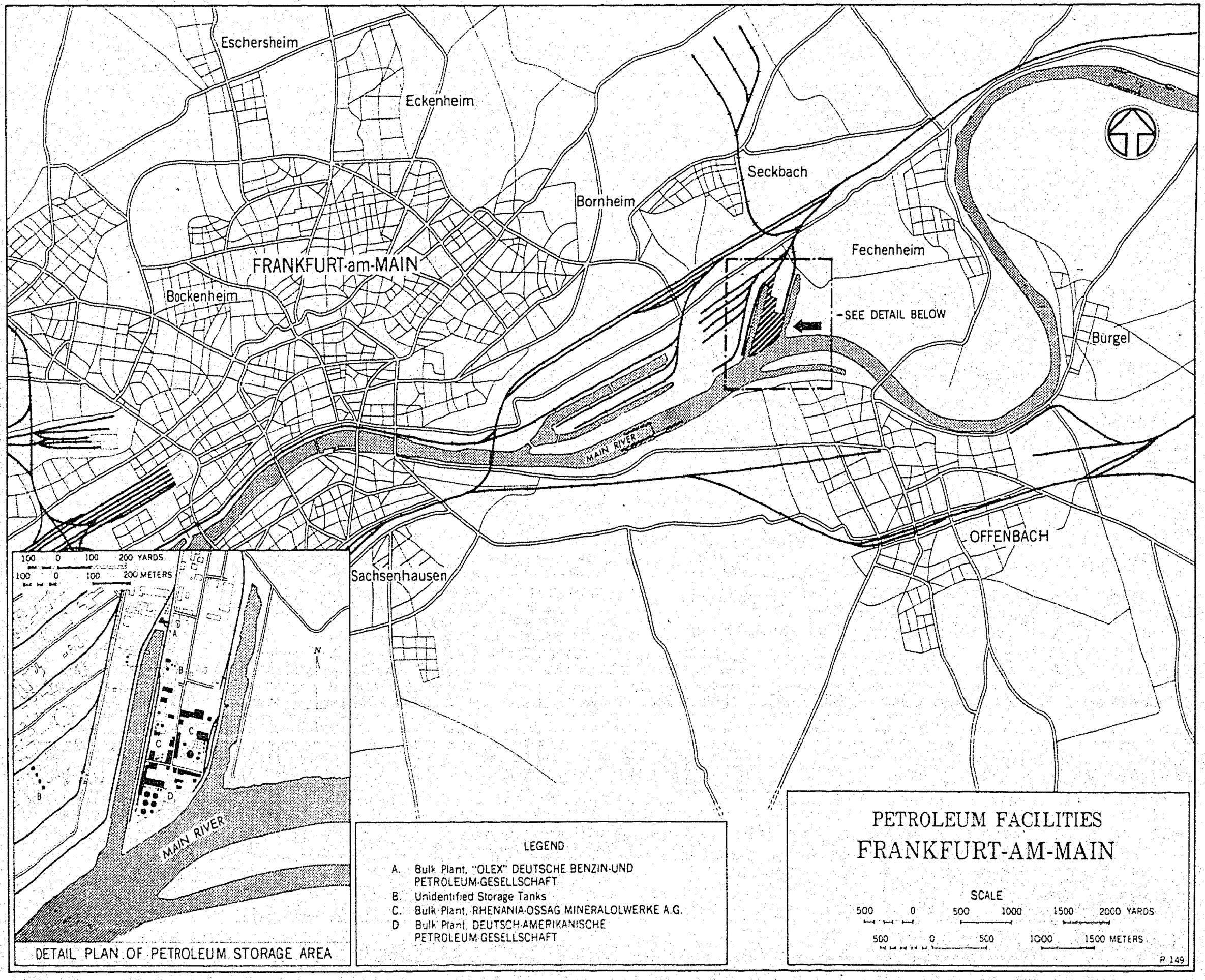
HEERDT
DUSSELDORF
Hamm
NEUSS
Volmerswerth
RHEIN RIVER
Grimlinghausen
Udesheim
Himmelgeist
WERSTEN
BENRATH
REISHOLZ
Sturzelberg
Urdenbach
Delrath
Zons
Baumberg
MONHEIM
A
B
C
D
E
F
G
H

LEGEND

A. Bulk Plant, "OLEX" DEUTSCHE BENZIN-und PETROLEUM G.m.b.H.
B. Bulk Plant, DEUTSCH-AMERIKANISCHE PETROLEUM GESELLSCHAFT
C. Vegetable Oil Storage,
D. Refinery, DEUTSCH-AMERIKANISCHE PETROLEUM GESELLSCHAFT
E. R.W.E. Power Station
F. Refinery, RHENANIA-OSSAG MINERALOLWERKE A.G.
G. Bulk Plant, "OLEX" DEUTSCHE BENZIN-und PETROLEUM G.m.b.H.
H. Refinery, RHENANIA-OSSAG MINERALOLWERKE A.G.

SCALE
1000 0 1000 2000 3000 YARDS
1000 0 1000 2000 3000 METERS

R 157



DETAIL PLAN OF PETROLEUM STORAGE AREA

LEGEND

A. Bulk Plant, "OLEX" DEUTSCHE BENZIN-UND PETROLEUM-GESELLSCHAFT
B. Unidentified Storage Tanks
C. Bulk Plant, RHENANIA-OSSAG MINERALOLWERKE A.G.
D Bulk Plant, DEUTSCH-AMERIKANISCHE PETROLEUM-GESELLSCHAFT

PETROLEUM FACILITIES
FRANKFURT-AM-MAIN

SCALE
500 0 500 1000 1500 2000 YARDS
500 0 500 1000 1500 METERS

P 149

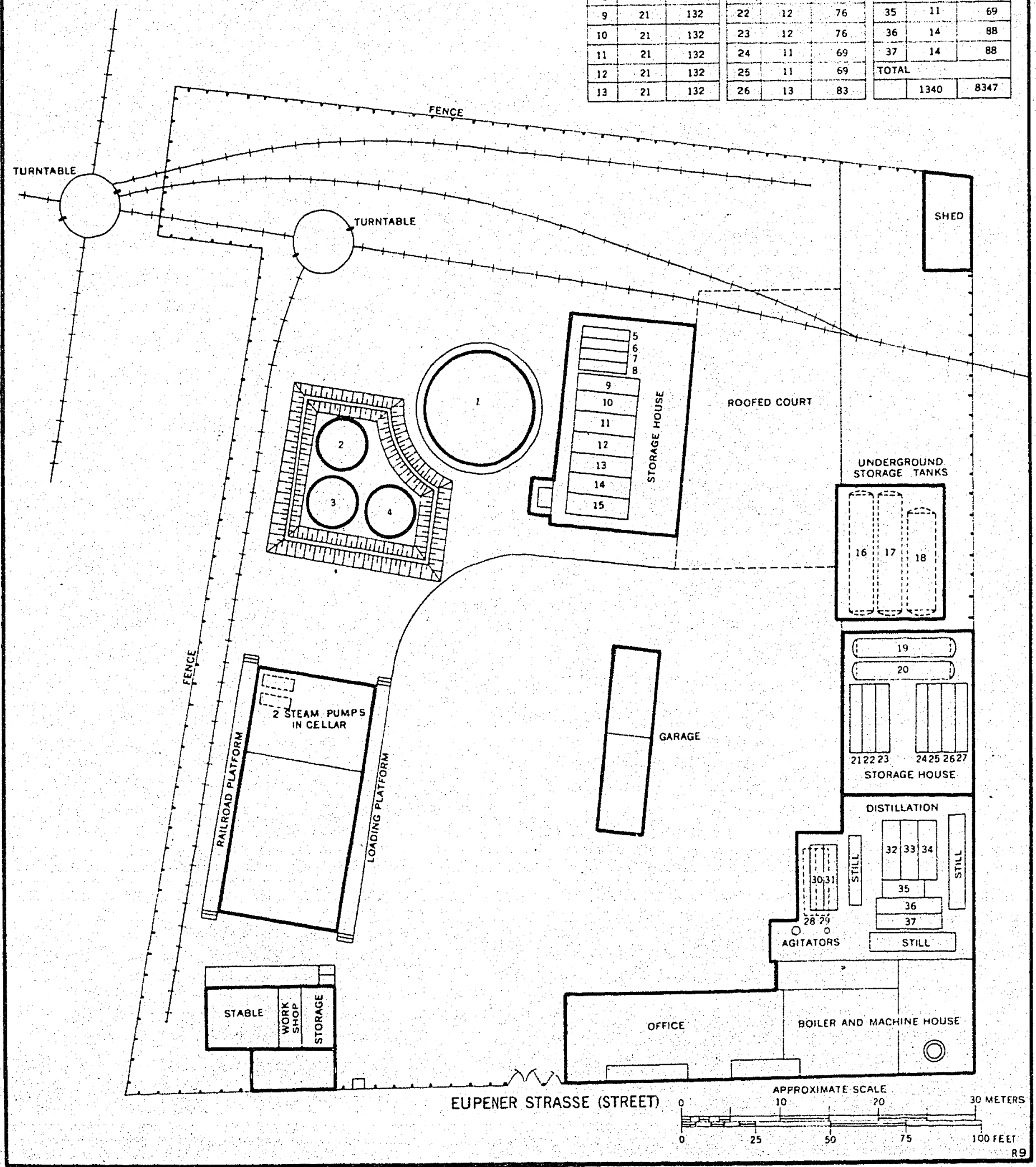
BULK PLANT

"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H.

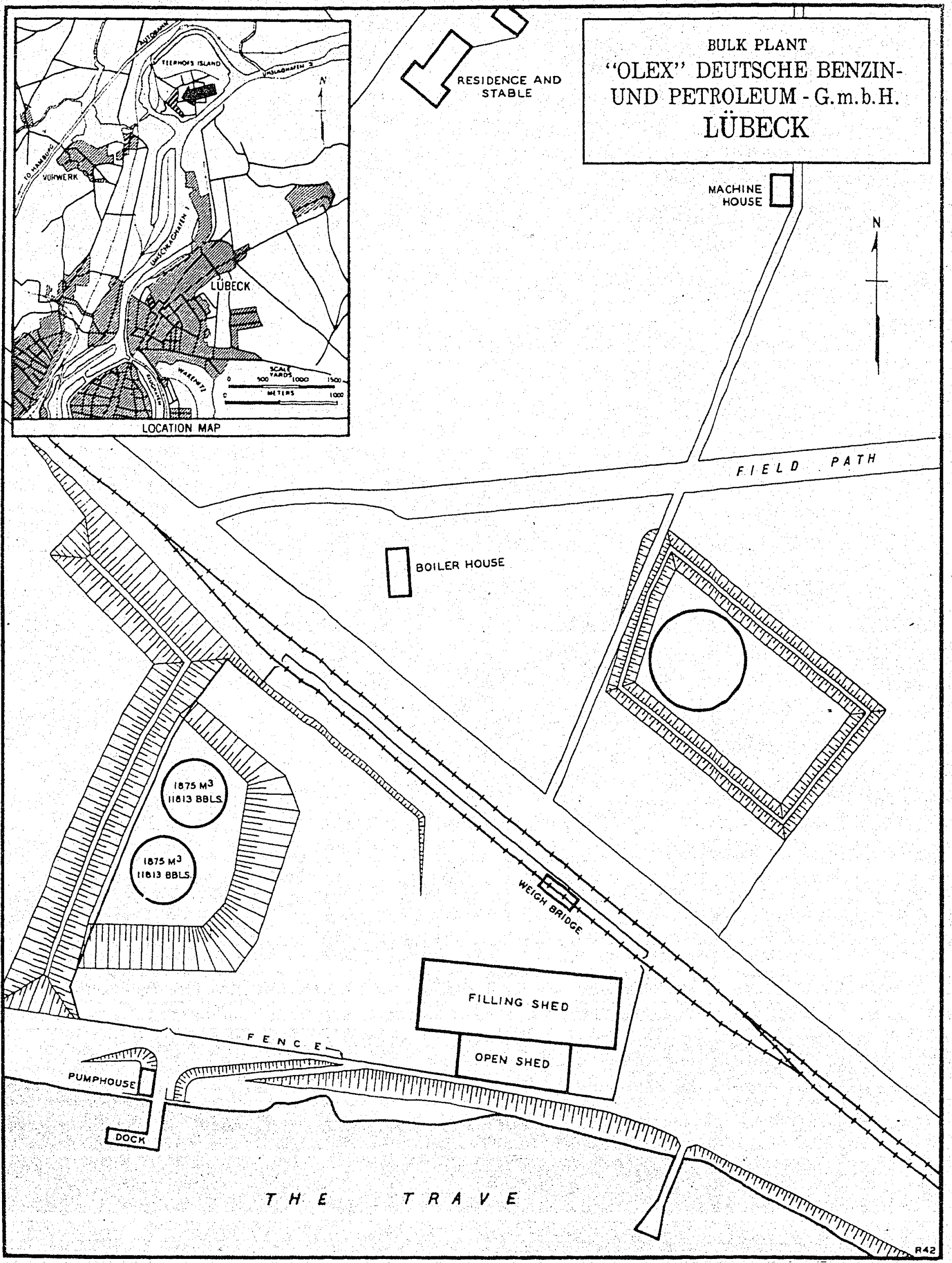
KÖLN - BRAUNSFELD

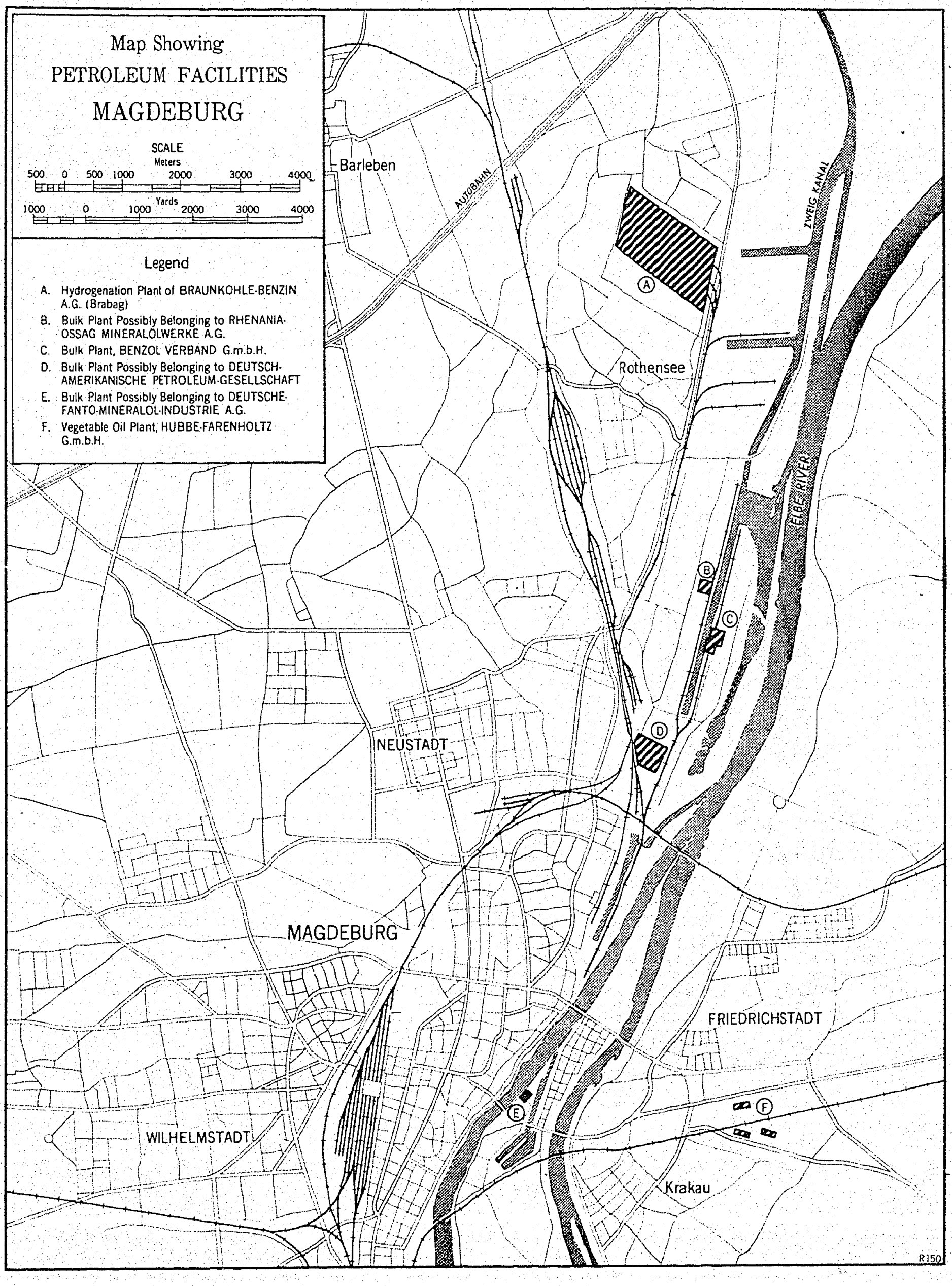
DETAILS OF TANKAGE

NO.	M3	BBLS.	NO.	M3	BBLS.	NO.	M3	BBLS.
1	400	2520	14	21	132	27	12	76
2	100	630	15	21	132	28	14	88
3	100	630	16	60	378	29	14	88
4	100	630	17	50	315	30	9	57
5	4	25	18	60	378	31	12	76
6	4	25	19	38	239	32	15	95
7	4	25	20	38	239	33	15	95
8	4	25	21	12	76	34	15	95
9	21	132	22	12	76	35	11	69
10	21	132	23	12	76	36	14	88
11	21	132	24	11	69	37	14	88
12	21	132	25	11	69	TOTAL		
13	21	132	26	13	83		1340	8347



R9

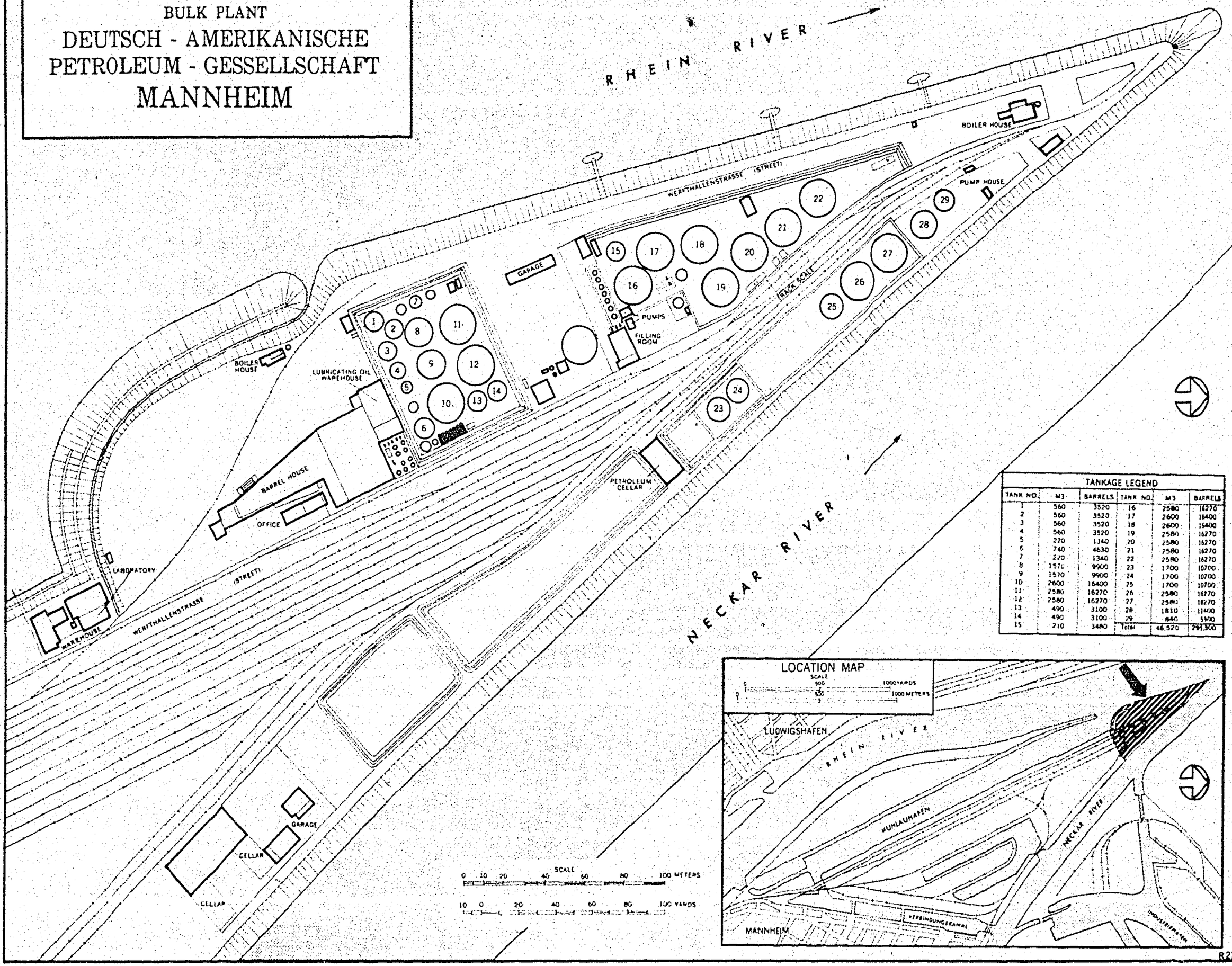

BULK PLANT
"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H.
LÜBECK
RESIDENCE AND STABLE
MACHINE HOUSE
N
FIELD PATH
BOILER HOUSE
1875 M³ 11813 BBLS.
1875 M³ 11813 BBLS.
WEIGH BRIDGE
FILLING SHED
OPEN SHED
FENCE
PUMPHOUSE
DOCK
THE TRAVE
R42
AUTOBAHN
TEERHOFS ISLAND
UMSCHLAGHAVEN 3
TO HAMBURG
VOHWERK
UMSCHLAGHAVEN 1
LÜBECK
WAKENITZ
SCALE YARDS 0 500 1000 1500
METERS 0 1000
LOCATION MAP


Map Showing
PETROLEUM FACILITIES
MAGDEBURG
SCALE
Meters
500 0 500 1000 2000 3000 4000
Yards
1000 0 1000 2000 3000 4000
Legend
A. Hydrogenation Plant of BRAUNKOHLE-BENZIN A.G. (Brabag)
B. Bulk Plant Possibly Belonging to RHENANIA-OSSAG MINERALÖLWERKE A.G.
C. Bulk Plant, BENZOL VERBAND G.m.b.H.
D. Bulk Plant Possibly Belonging to DEUTSCH-AMERIKANISCHE PETROLEUM-GESELLSCHAFT
E. Bulk Plant Possibly Belonging to DEUTSCHE-FANTO-MINERALOL-INDUSTRIE A.G.
F. Vegetable Oil Plant, HUBBE-FARENHOLTZ G.m.b.H.
Barleben
AUTOBAHN
ZWEIG KANAL
Rothensee
ELBE RIVER
NEUSTADT
MAGDEBURG
FRIEDRICHSTADT
WILHELMSTADT
Krakau
A
B
C
D
E
F
R150

BULK PLANT

DEUTSCH - AMERIKANISCHE PETROLEUM - GESSELLSCHAFT

MANNHEIM



TANKAGE LEGEND					
TANK NO.	M3	BARRELS	TANK NO.	M3	BARRELS
1	560	3520	16	2580	16270
2	560	3520	17	2600	16400
3	560	3520	18	2600	16400
4	560	3520	19	2580	16270
5	220	1340	20	2580	16270
6	760	4630	21	2580	16270
7	220	1340	22	2580	16270
8	1570	9900	23	1700	10700
9	1570	9900	24	1700	10700
10	2600	16400	25	1700	10700
11	2580	16270	26	2580	16270
12	2580	16270	27	2580	16270
13	490	3100	28	1810	11400
14	490	3100	29	840	5300
15	210	3480	Total	46,520	293,300

R21

DISTRIBUTING - 341
Mannheim

PETROLEUM FACILITIES

MANNHEIM-LUDWIGSHAFEN

SCALE
500 0 500 1000 YARDS
500 0 500 1000 METERS

Freisenheimer Island
Waldhof
Käfertal
Neckarstadt
MANNHEIM
LUDWIGSHAFEN
Neckarau
INDUSTRIEHAFEN
MÜHLAUHAFEN
LUITPOLD HAFEN
NECKAR RIVER
RHEIN RIVER
PETROLEUMHAFEN
BONADIES HAFEN
KAISERWORTHHAFEN
MUNDENHEIMER ALTRHEIN

A. Mannheim Petroleumhafen: 1. Bulk Plant of "Olex" Deutsche Benzin U. Petroleum Gesellschaft. 2. Bulk Plant of Raab Karcher-Thyssen G.m.b.H.

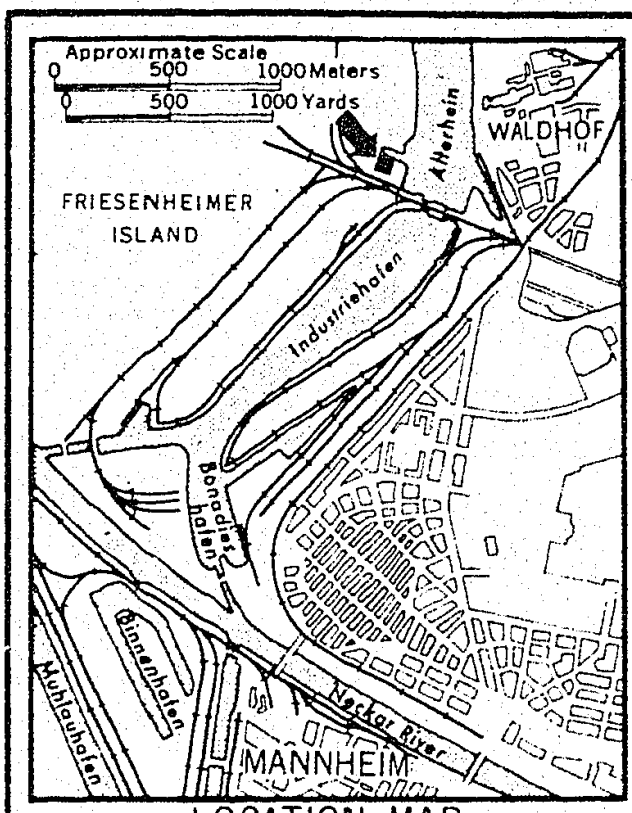
B. Mannheim Industriehafen: 1. Bulk Plant of Oellager G.m.b.H. 2. Vegetable Oil Plant of Estöl A. G.

C. Vegetable Oil Plant of Verein Deutscher Oelfabriken.

D. 1. Bulk Plant, Deutsch-Amerikanische Petroleum-Gesellschaft. 2. Bulk Plant, Mannheim Bremer Petroleum A. G. 3. Bulk Plant of Raab Karcher-Thyssen G.m.b.H.

E. Ludwigshafen Chemical Plant and Synthetic Oil Experimental Station of I. G. Farbenindustrie A. G.

F. Ludwigshafen-Mundenheimer Altrhein: 1. Unidentified Tankage. 2. Probable Location of Bulk Plant of Deutsch - Amerikanische Petroleum-Gesellschaft. 3. Bulk Plant of Renania-Ossag Mineralölwerke A. G. Other Plants in area, Derop Deutsche Vertriebsges. für Russ. Olprdkt. & Deutsche Gasolin A. G.



LOCATION MAP

BULK PLANT
"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H.
MANNHEIM

PETROLEUM HAFEN
(HARBOR)

GASOLINE
3,750 M3
23,645 BBLS

KEROSENE
3,750 M3
23,645 BBLS

GASOLINE
3,750 M3
23,645 BBLS

60 M3, 378 BBLS
50 M3, 315 BBLS
30 M3, 189 BBLS
25 M3, 158 BBLS
EACH 19 M3, 120 BBLS

MIXING TANKS
EACH 125 M3,
788 BBLS

PUMP HOUSES

OFFICE BUILDING

WALL

WAREHOUSE AND FILLING ROOM

DIFFENE STRASSE
(STREET)

FOAM
EXTINGUISHING
CONTROL ROOM

N

SCALE
METERS
10 0 10 20 30
YARDS
10 0 10 20 30

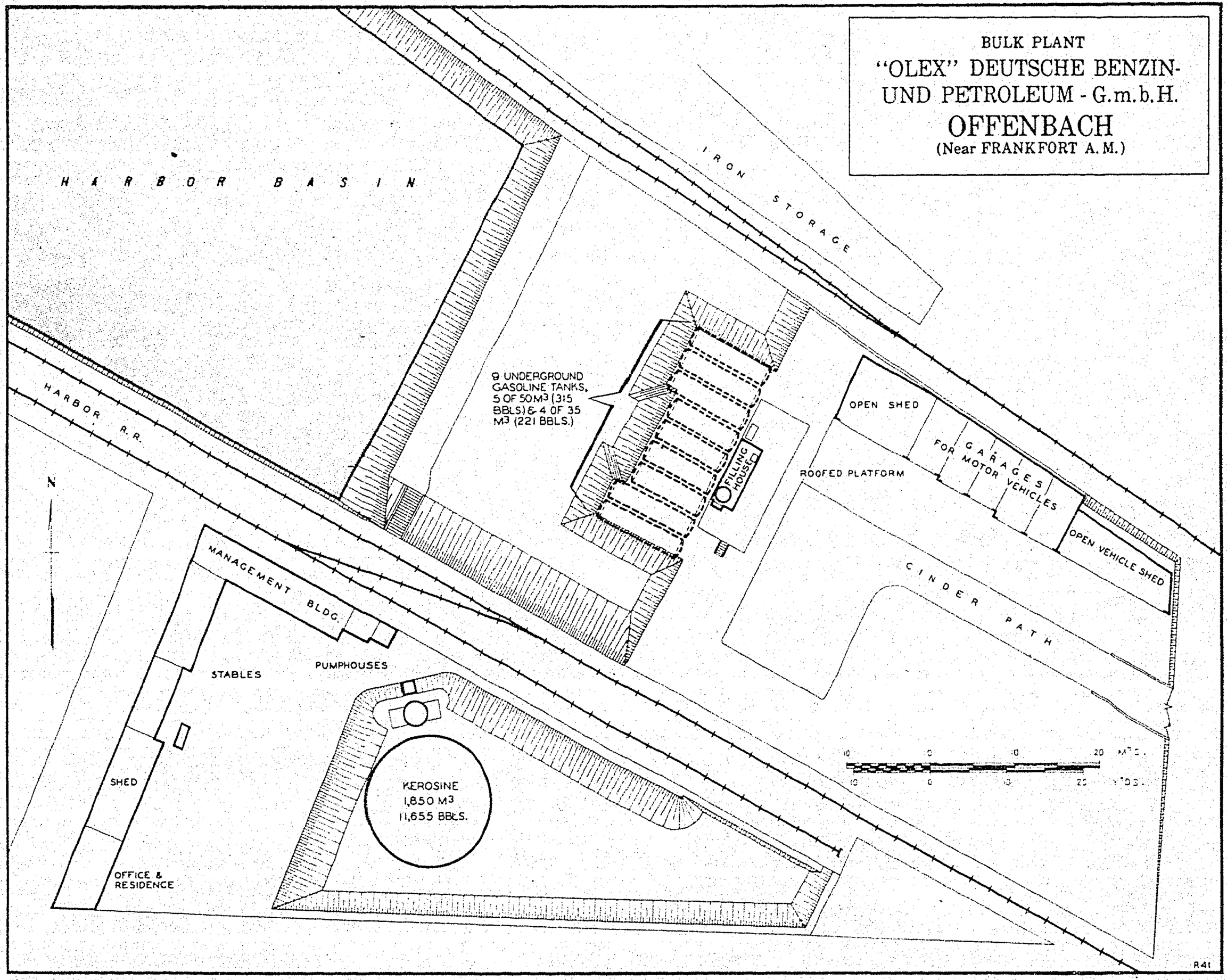
R4

BULK PLANT

"OLEX" DEUTSCHE BENZIN- UND PETROLEUM - G.m.b.H.

OFFENBACH

(Near FRANKFORT A. M.)



MAP SHOWING
PETROLEUM FACILITIES OF
REGENSBURG

KEY	CAPACITY	
	M3	BBLS
1–Steaua Romana Petroleum G.m.b.H.	30,400	191,520
2–Deutsche Erdöl A. G.	9,300	58,590
3–Deutsche-Amerikanische Petroleum-Gesellschaft	4,300	26,090
4–Deutsche-Petroleum A. G.	13,600	85,680
5–Rhenania-Ossag Mineralölwerke A. G., Refinery	16,423	103,465
6–Mineralolwerke Bayern Oil Storage Plant	13,700	86,310
TOTAL	87,723	551,655

A-B Shipyards of Chr. Ruthoff

APPROXIMATE SCALE

0 100 200 300 400 500 METERS

0 50 100 150 200 250 300 350 400 450 500 550 YARDS

TO SCHWANDORF

DONAU

RIVER

A

B

1

2

3

4

5

6

BUDANESTERSTRASSE (STREET)

LUITPOLDHAFEN

PETROLEUMHAFEN

WIENERSTRASSE (STREET)

R52

DISTRIBUTING - 345
Regensburg