THIS PAGE IS UNCLASSIFIED

DECLASSIFIED
EO 13652

PETROLEUM FACILITIES OF AUSTRIA

PETROLEUM FACILITIES OF AUSTRIA

Prepared by

The Enemy Oil Committee

for the

Division of Fuels and Lubricants
Office of The Quartermaster General

June, 1944

CONFIDENTIAL

Copy No. 156

P L A C E N A M E S

The names of cities, towns and other geographic features used in this report are those currently shown on official maps published in Austria. The following list shows place names referred to in the report that have different English designations.

München	Munich
Ober Österreich	Upper Austria
Schlesien	Silesia
Unter Österreich	Lower Austria
Wien	Vienna

R E V I S I O N

Arrangements for the preparation and distribution of supplementary information pertinent to this report are contemplated. Request is made that advices concerning corrections and useful addenda for the report be sent to the:

Director, Division of Fuels and Lubricants
Office of The Quartermaster General
Washington, D. C.

C O N T E N T S

		Page
1.0	INTRODUCTION . . . . . Crude Supplies; Imports; Refining; Distributing; Operating companies; Key personnel.	7
2.0	PRODUCING	15
.1	Strategic considerations	15
.2	Austrian basins	17
	Inner Wien Basin	19
	Outer Wien Basin	19
	Bavarian Basin	19
	Great Hungarian Basin in Austria	21
.3	General geography and geology of the Wien Basin	21
.4	History of oil exploration in the Wien Basin	27
.5	Crude oil production in the Wien Basin	29
	Zistersdorf field	29
	Neusiedl field (Steinberg-Naphta concession)	64
	Gaiselberg field	67
	St. Ulrich-Prinzendorf field	78
	Kreuzfeld field	84
	Summary of Production, Austrian Fields, to 1939, with Estimate for 1943, and Forecast for 1944	87
.6	Prospects located in the Wien Basin	89
.7	Pipe line facilities	95
.8	Austrian mining laws	100
.9	Holdings of petroleum lands in the Wien Basin	102
3.0	REFINING	105
.1	Introduction	105
.2	Strategic considerations	107
.3	Floridsdorf - Shell Floridsdorfer refinery	107
.4	Korneuburg - Creditul Minier refinery	110
.5	Kagran - Vacuum refinery	110
.6	Schwechat - "Nova" refinery	110
.7	Vösendorf - Fanto refinery	119
.8	Lobau - Elwerath-Wintershall refinery	119
.9	Evaluation of Austrian crudes	119
	Character of the (Wien Basin) crude oil	119
	Detailed analyses of Zistersdorf crude	121
4.0	DISTRIBUTING	129
.1	Introduction	129
	General remarks	129
	Strategic considerations	129
.2	Distributing companies	130
.3	Transportation.	130
.4	River terminals	132
.5	Inland storage facilities	133
.6	Retail marketing	133
.7	Products: imports and domestic manufacture	137
5.0	APPENDICES	155
	Appendix 1 - Conversion factors	155
	Appendix 2 - Documents and decrees, Austrian mining rights .	157
	Document 1: Exploration and exploitation	157
	2: General features, Mining law	157
	3: Petroleum regulations	160
	4: Petroleum regulations, Federal Law Decree for Austria	160
INDEX	. . . . .	178

LIST OF ILLUSTRATIONS

Maps and figures

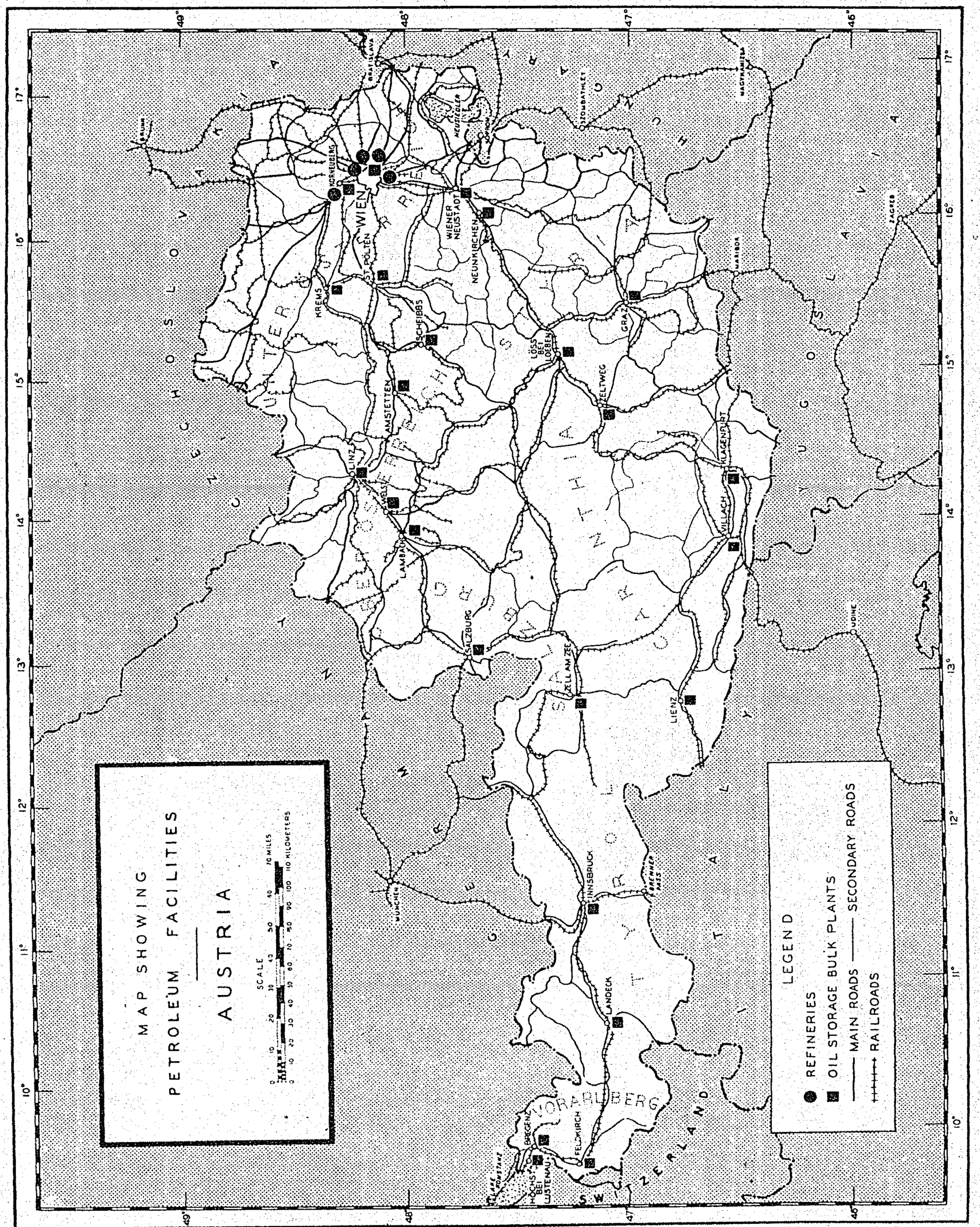
Page	
6	Petroleum facilities of Austria
16	Wien Basin, Unter Österreich, general map
18	Tertiary sedimentary basins having oil possibilities
20	Location sketches, wildcat wells, Ober Österreich
22	Geologic structure map of northwestern Ober Österreich
24	Geologic divisions penetrated by wells in the Wien basin
30	Oil fields of the Wien Basin
32	Geologic section through Steinberg semi-dome and Zistersdorf field
33	Graphic logs, Zistersdorf field
36	Cross-section through the Steinberg structure
39	Schlumberger electrical log and completion report of RAG 10
40	Schlumberger electrical log and completion report of Gosting 11
41	Graphic log, Well Gaiselberg 3
49	Oil bearing horizons of the Zistersdorf field
51	Cross-section through the eastern Steinberg fault
58	Graphic log, Well Gaiselberg 3a
60	Graphic log, Well RAG 2
69	Oil bearing horizons of the Gaiselberg field
72	Schlumberger electrical log and completion report of Gaiselberg 2
73	Schlumberger electrical log and completion report of Gaiselberg 3a
80	Schlumberger electrical log and completion report of St. Ulrich 1
88	Fault structure between Bernhardsthal and Gösting
96	Pipe line Gaiselberg to Zistersdorf R. R. station
98	Proposed pipe-line system, Zistersdorf to Floridsdorf
99	Profile of possible pipe-line route between Zistersdorf and Floridsdorf
104	Locations of petroleum installations, Austria
108	Shell-Floridsdorf refinery, layout plan
113	Korneuburg refinery, layout sketch
114	Kagran refinery (Vacuum Oil Company A. G.), layout plan
117	Nova refinery, layout sketch
118	Fanto refinery, rough sketch
120	Elwerath refinery (Lobau district), sketch plan
128	Oil transportation routes, Wien Basin to points of consumption
138	Feldkirch (VOC) inland bulk plant
139	Graz (VOC) inland bulk plant
140	Innsbruck (Shell) inland bulk plant
141	Innsbruck (VOC) inland bulk plant
142	Klagenfurt (VOC) inland bulk plant
143	Krems (VOC) inland bulk plant
144	Lambach (VOC) inland bulk plant
145	Linz (VOC) river terminal
146	Linz (VOC) bulk plant
147	St. Polten (VOC) inland bulk plant
148	Salzburg (VOC) inland bulk plant
149	Villach (VOC) inland bulk plant
150	Wien (VOC) bulk plant
151	Wien (Shell) river terminal
152	Wien (VOC) river terminal
153	Wiener Neustadt (VOC) bulk plant
154	Zeltweg (VOC) inland bulk plant

Tables

Page	
8	Crude oil production, Austria, 1932-1944
10	Imports of crude and products, Austria, 1937
11	Consumption of petroleum products in Austria, 1937
12	Identification of principal companies operating in Austria
28	Austrian stratigraphic classification
37	Development of Zistersdorf Sarmatian horizons, Gösting wells
38	Development of Zistersdorf Sarmatian horizons, RAG wells
52	Production status of Zistersdorf wells at end of 1939, 1943 and anticipated production for 1944
54	Available well completion data, Zistersdorf field, December 1939
56	Appraisal of the oil reserves of the Sarmatian sands of the Zistersdorf field as of December 1, 1938
62	Estimated production, Zistersdorf field, 1944
62	Known and estimated production to December 31, 1943, Zistersdorf field
63	Estimates of production, Zistersdorf field
67	Known and estimated production to December 31, 1943, Neusiedl field
70	Production status of Gaiselberg wells at end of 1939, 1943 and anticipated production for 1944
70	Available well completion data, Gaiselberg field, December 1939
74	Probable program of exploitation, Gaiselberg field, 1938 to 1943
75	Appraisal of the oil reserves of the Sarmatian sands of the Gaiselberg field as of December 31, 1939
76	Gaiselberg field
82	Probable potential monthly production rate of an average well, St. Ulrich-Prinzendorf field, 3 year period
83	Estimated number of wells drilled, St. Ulrich-Prinzendorf, 1942-1944
83	Estimated drilling program, 1939-1944
86	Wildcat wells
87	Estimated production, Kreuzfeld field, 1943-1944
87	Summary of production, Austrian fields to 1939, with estimate for 1943, and forecast for 1944
89	Estimated production, Austrian fields, 1943 and 1944
106	Statistical summary of data on refineries, 1943
122	Forecast showing anticipated production of crude oils
123	Summary of analyses of crude oil
126	Evaluation of Zistersdorf crude
127	True-boiling distillation of Zistersdorf crude
130	Main distributing companies
132	Tank cars
134	Statistical summary of storage facilities, Austria
136	Marketing position of various marketing companies in Austria, 1937
137	Imports and manufactured products in Austria, 1937

Photographs

65	Zistersdorf oil field viewed from the south, September 1937
111	Refinery of Korneuburger Mineralölraffinerie A. G.
115	"Kagran" refinery


MAP SHOWING
PETROLEUM FACILITIES
AUSTRIA
SCALE
0 10 20 30 40 50 60 70 MILES
0 10 20 30 40 50 60 70 80 90 100 110 KILOMETERS
LEGEND
REFINERIES
OIL STORAGE BULK PLANTS
MAIN ROADS
SECONDARY ROADS
RAILROADS
WIEN
KORNEUBURG
KREMS
ST. PÖLTEN
WIENER NEUSTADT
NEUNKIRCHEN
SCHEIBBS
AMSTETTEN
LINZ
LÖSS BEI LOEBEN
GRAZ
LEOBEN
KLAGENFURT
VILLACH
SALZBURG
ZELL AM ZEE
LIENZ
INNSBRUCK
BRENNER PASS
LANDECK
BREGENZ
FELDKIRCH
HOCHST BEI LUSTENAU
MÜNCHEN
UDINE
ZAGREB
MARIBOR
NIEDERÖSTERREICH
OBERÖSTERREICH
STEIERMARK
KÄRNTEN
SALZBURG
TIROL
VORARLBERG
BURGENLAND
SLOVAKIA
HUNGARY
YUGOSLAVIA
SWITZERLAND
ITALY
GERMANY

PETROLEUM FACILITIES OF AUSTRIA

1.0 INTRODUCTION

Scope.- This report is designed to describe briefly all significant aspects of the Austrian petroleum economy and facilities pertaining thereto.

1.1 CRUDE SUPPLIES

The only area in Austria demonstrated as capable of producing oil in commercial quantities is the Wien (Vienna) Basin, some 125 miles long and up to 40 miles wide, which extends from Central Moravia, in Czechoslovakia, to include a considerable area south of the Danube River and east of Wien, in Austria. Commercial production in this basin was first discovered in the Hodonin area in Czechoslovakia in 1924. The wells were small and development of the basin proved slow--commercial production not being found in Austria until 1934. This discovery, near the town of Zistersdorf and about 28 miles northeast of Wien, intensified the exploration program in the Wien Basin, and immediately prior to the present war numerous prospects had been mapped and rapid exploration of the Zistersdorf area had been begun. Since the outbreak of the war the Germans have successfully continued the active development of this area and it is estimated that the average daily production for the year 1943 was around 21,500 barrels (a) a day (b), some three times the normal (1937) domestic requirements and twice that of 1943. It is believed that crude produced in excess of the refining capacity of the country presently is being transported to Czechoslovakia by pipe line and by barges on the Danube River.

1.2 IMPORTS

The pre-war situation.- Austrian customs regulations were designed to favor the Austrian refining industry and at the same time avoid the entire elimination of the customs revenue arising from importations of finished products. The government issued working permits stipulating the exact yearly quantities that each refinery might run, and granted preferential duty rates on the necessary quantities of crude imported for this purpose. In effect it made it advantageous for the companies to refine in Austria up to the extent of the working permits of the refineries, which covered approximately 75 per cent of the requirements of the Austrian market, and to import the remainder, approximately 25 per cent, in finished products.

Imports of artificial crudes.- Prior to the recent development of adequate supplies of indigenous crude oil, this situation was met largely by aug-

---

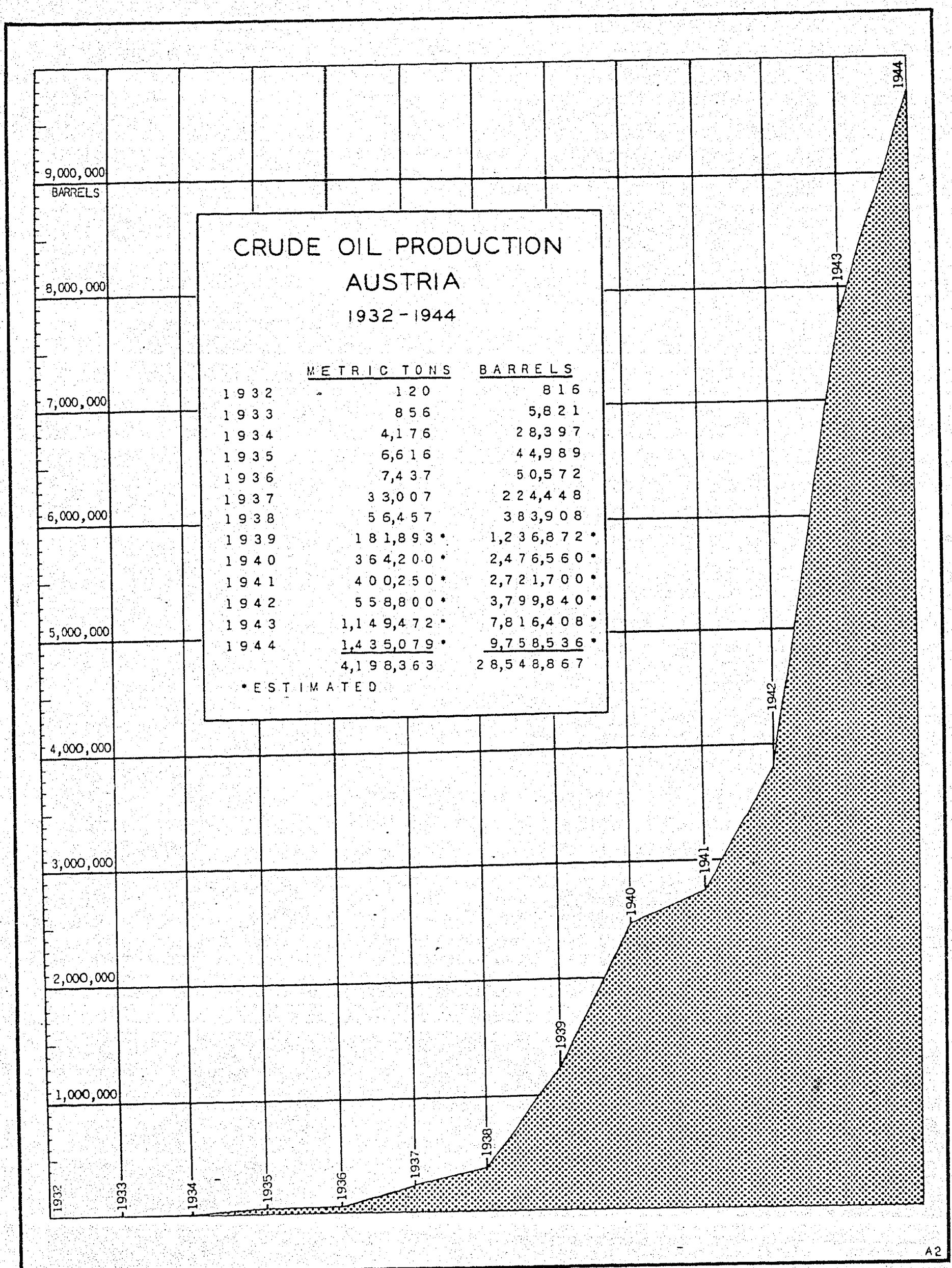
(a) The conversion factor of 6.8 barrels to the metric tons which is used throughout this report for Austrian crude oil is based on a specific gravity of 0.926, which is considered to be the approximate average for crude oil presently produced in Austria. However, since the specific gravity of Austrian crude oil varies from 0.840 to 0.941, all of the figures representing barrels in this report must be regarded as approximately correct only. Wherever the word "barrel" appears in this report a barrel of 42 U. S. gallons is meant.

(b) A table and graph showing the actual and estimated crude oil production of Austria appears on page 8.

CRUDE OIL PRODUCTION
AUSTRIA
1932 - 1944

	METRIC TONS	BARRELS
1932	120	816
1933	856	5,821
1934	4,176	28,397
1935	6,616	44,989
1936	7,437	50,572
1937	33,007	224,448
1938	56,457	383,908
1939	181,893 *	1,236,872 *
1940	364,200 *	2,476,560 *
1941	400,250 *	2,721,700 *
1942	558,800 *	3,799,840 *
1943	1,149,472 *	7,816,408 *
1944	1,435,079 *	9,758,536 *
	4,198,363	28,548,867

* ESTIMATED



A2

menting indigenous supplies of crude oil with artificial crude (a) imported from Rumania and re-refining it in the Austrian refineries (b). This artificial crude was moved from Rumania mainly by barges on the Danube River to Wien and discharged at the river terminals or refineries of the companies in the Wien area. It was the usual practice of most of the oil companies to unload the artificial crude from the barges into their river bulk terminals on the Praterspitz and to transfer it by railway tank cars to the refineries as needed. The refined products were delivered by tank trucks or railway tank cars from the refineries directly to bulk plants and wholesale customers. When arrivals exceeded the combined capacities of the river terminals and refinery storage, tankage in the river bulk plant of "Nova Öl und Brennstoffgesellschaft A. G. and of the Donau Öltank Lagergesellschaft m.b.h., a local storage company, was utilized by the various other companies. However, the Shell affiliate, the Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik, usually handled most of its own requirements in its own plants.

Imports of refined products.- In addition to products refined from indigenous and artificial crudes, some 25 per cent of Austrian requirements of refined products were imported in their finished state. Most of the import requirements of western and southwestern Austria were imported from Trieste and Fiume, but some came from Rumania, notably from the Shell affiliate, the Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik, which company transported considerable quanities of refined products from Rumania directly to their river terminal conveniently located on the Danube River at Linz. Comparative shipping costs between the various localities was usually the controlling factor.

The present situation.- With the large increase in crude oil production which began in 1939 and the increase in refinery facilities which have followed this production increase, the situation outlined above undoubtedly has considerably changed. It is believed that not only does Austria currently supply her own petroleum production requirements but exports as well.

Oil in transit.- Considerable quantities of refined products from Rumania also passed, and undoubtedly continue to pass, through Austria in transit to Germany. The bulk of this movement was from Rumania by barges via the Danube River, into Germany without handling or transshipment to Austria. However, some Austrian operators, notably Montan Union and Redeventza, purchased finished products in Rumania, imported and stored them in bond at their bulk plants on the Praterspitz, Wien, and, when the market was favorable, re-exported the products to Germany.

1.3 REFINING

There are six refineries in Austria, including one which is still under construction, all grouped close to Wien. They were all operated on Rumanian stock before the recent large increase in Austrian crude production. The individual capacities of the refineries range from 800 to 4,000 barrels a day, which is small as compared to 10,000 to 40,000 barrels per day capacity each for the twenty largest European refineries.

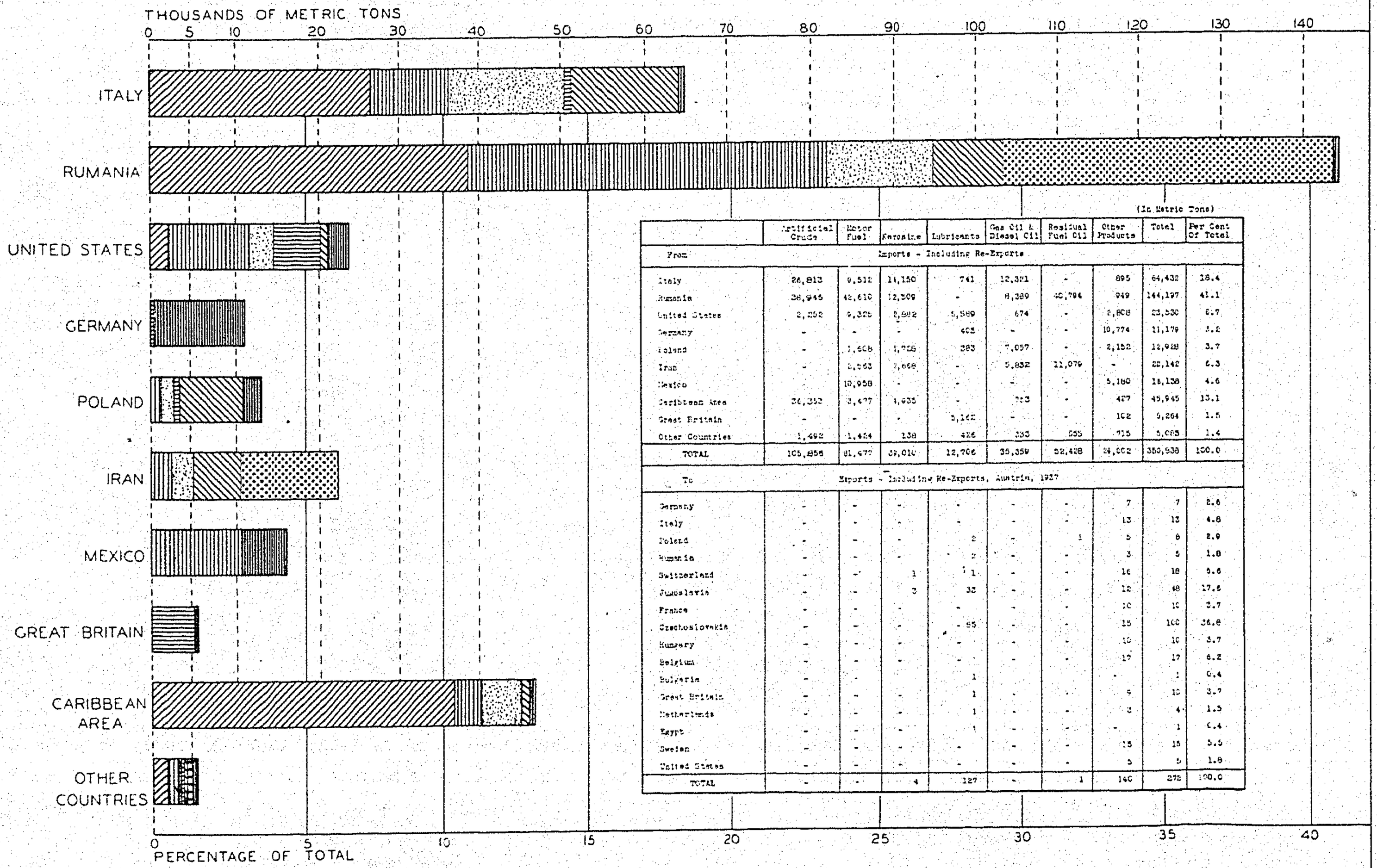
1.4 DISTRIBUTING

Oil marketing and distributing facilities are of the usual rather primitive European types.

(a) Either crude oils enriched with gasoline and kerosine, or mixtures of finished products, viz., gasoline, kerosine, gas oil and fuel oil. These mixtures were classified as crude oil under Austrian customs regulations. However, only simple distillation in the Austrian refineries was required to prepare them for the market.

(b) All located near Wien, as shown on the location map on page 104.

IMPORTS OF CRUDE AND PRODUCTS, AUSTRIA, 1937



(In Metric Tons)

	Artificial Crude	Motor Fuel	Kerosine	Lubricants	Gas Oil & Diesel Oil	Residual Fuel Oil	Other Products	Total	Per Cent Of Total
From	Imports - Including Re-Exports								
Italy	26,813	9,512	14,150	741	12,391	-	895	64,432	18.4
Rumania	38,946	42,610	12,509	-	8,289	40,794	949	144,197	41.1
United States	2,252	9,335	8,992	5,589	674	-	2,808	23,530	6.7
Germany	-	-	-	405	-	-	10,774	11,179	3.2
Poland	-	1,606	1,755	383	7,057	-	2,152	12,928	3.7
Iran	-	2,563	2,668	-	5,852	11,079	-	22,142	6.3
Mexico		10,958	-	-	-	-	5,180	16,138	4.6
Caribbean Area	36,352	3,477	4,935	-	703	-	427	45,945	13.1
Great Britain	-	-	-	5,162	-	-	102	5,264	1.5
Other Countries	1,492	1,424	138	426	333	555	715	5,083	1.4
TOTAL	105,856	81,477	39,010	12,706	35,359	52,428	24,002	350,938	100.0
To	Exports - Including Re-Exports, Austria, 1937								
Germany	-	-	-	-	-	-	7	7	2.6
Italy	-	-	-	-	-	-	13	13	4.8
Poland	-	-	-	2	-	1	5	8	2.9
Rumania	-	-	-	2	-	-	3	5	1.8
Switzerland	-	-	1	1	-	-	16	18	6.6
Jugoslavia	-	-	3	32	-	-	12	48	17.6
France	-	-	-	-	-	-	10	10	3.7
Czechoslovakia	-	-	-	55	-	-	25	100	36.8
Hungary	-	-	-	-	-	-	10	10	3.7
Belgium	-	-	-	-	-	-	17	17	6.2
Bulgaria	-	-	-	1	-	-	-	1	0.4
Great Britain	-	-	-	1	-	-	9	10	3.7
Netherlands	-	-	-	1	-	-	3	4	1.5
Egypt	-	-	-	1	-	-	-	1	0.4
Sweden	-	-	-	-	-	-	15	15	5.5
United States	-	-	-	-	-	-	5	5	1.8
TOTAL	-	-	4	127	-	1	140	272	100.0

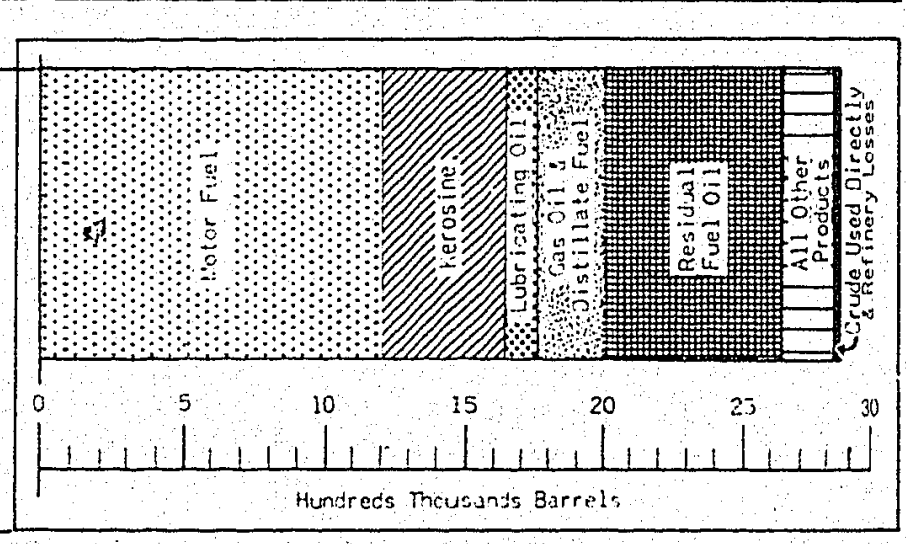
A3

The river terminals and inland bulk plants are adequate, the former being located in Wien and the latter being well distributed throughout the country. There are no modern service stations but the country is moderately well served by curb pumps. The largest area of consumption is the metropolitan district of Wien. Consumption of petroleum products in Austria in 1937 was as follows:

Consumption of Petroleum Products in Austria

Year 1937 (a)

Products	Barrels
Motor Fuel	1,207,000
Kerosine	437,000
Lubricating Oil	114,000
Gas Oil and Distillate Fuel	246,000
Residual Fuel Oil	630,000
All Other Products	189,000
Crude Used Directly and Refinery Losses	28,000
Total Crude and Products	2,851,000



1.5 COMPANIES OPERATING IN AUSTRIA

A table identifying the companies operating in Austria appears on page 1[illegible]. The main companies operating in Austria were the Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik, the affiliate of the Royal Dutch Shell group; Rohoel-Gewinnungs A.G., (a producing company owned jointly by the Shell affiliate and Socony-Vacuum interests); the Erdölproduktions Gesellschaft m. b.H., a producing company owned by Austrian interests with important holdings of petroleum concessions in the Zistersdorf area; the Creditul Minier Österreichisch-Rumänische Petroleum-Vertriebsgesellschaft, m.b.H., an affiliate of "Creditul Minier" S.A., (a Rumanian company owned by Rumanian and French interests); and the Vacuum Oil Company A.G., the affiliate of the Socony-Vacuum Oil Company, which holds the refinery and distributing interests of the Socony-Vacuum Oil Company in Austria as well as a half interest in the producing company, Rohoel-Gewinnungs A.G. The Gewerkschaft Elwerath and the Preussische Bergwerks und Hütten A.G. also jointly own petroleum concessions in the Zistersdorf area.

Detailed identification of the American and British companies including key personnel is given on pages 13 and 14 (b).

(a) Data furnished by the Standard Oil Company of New Jersey.

(b) In listing the individuals who have been associated with the various oil companies, it should be understood that these individuals may be looked to for information of possible value in their respective fields, but insofar as concerns the non-Americans no implication should be drawn as to their political sympathies or affiliations.

12 - INTRODUCTION
Companies

IDENTIFICATION OF PRINCIPAL COMPANIES OPERATING IN AUSTRIA

COMPANY			AFFILIATIONS OF COMPANY		
Name of Company	Common Name or Symbol	Address of Head Office of Company	Names of Owner Firms, Majority Interests or Control	Common Name or Symbol	Address of Owner Firms
Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik	Floridsdorfer	Wien	Royal Dutch Shell group	Shell	London
Benzin und Gel Industrie A.G. "Kagran" (a)	Kagran	Wien	Socony-Vacuum Oil Company	Socony	New York
Benzol-Vertrieb der Reichswerke "Hermann Göring"	--	Wien	Benzol-Vertrieb der Reichswerke "Hermann Göring"	--	Wien
Creditul Minier, Österreichisch-Rumänische Petroleum-Vertriebsgesellschaft, m.b.H.	"Creditul Minier"	Wien	Creditul Minier S.A.	"Creditul Minier"	Bucharest
Deutsche Petroleum-Aktien-Gesellschaft	D.P.A.G.	Berlin	Deutsche Erdöl-Aktiengesellschaft	--	Berlin
Erdölproduktions Gesellschaft m.b.H.	Erdöl	Wien	Erdölproduktions Gesellschaft m.b.H.	Erdöl	Wien
European Gas and Electric Company	Euregesco	Wien	Standard Oil Co. (N.J.)	S.O.N.J.	New York
Everth & Company A.G.	Everth	Wien	Phoenix Oil Products Company, Ltd.	Phoenix	London
I. G. Farbenindustrie A.G.	I. G. Farben	Frankfurt	I. G. Farbenindustrie A.G.	I. G. Farben	Frankfurt
"Gallia" Mineralölprodukte Vertriebs-gesellschaft A.-G., Vaduz	--	Wien	Maatschappij voor Beheer van Effecten (Fanto-Holding)	Fanto-Gallia	Amsterdam
"Galtol" Mineralöl-Handels A.G. (b)	Galtol	Wien	Olex Deutsche Benzin- und Petroleum G.m.b.H.	--	Berlin
Gewerkschaft Elwerath	Elwerath	Hannover	Gewerkschaft Elwerath	Elwerath	Hannover
Gewerkschaft Raky-Danubia	Raky	Wien	Gewerkschaft Raky-Danubia	Raky	Wien
Korneuburger Mineralölraffinerie A.G. (c)	Korneuburger	Wien	Korneuburger Mineralölraffinerie A.G.	Korneuburger	Wien
Mineralöl-Transport- und allgemeine Handels-Aktiengesellschaft	--	Wien	Mineralöl-Transport- und allgemeine Handels-Aktiengesellschaft	--	Wien
Montan-Union A.G.	Montan-Union	Wien	Montan-Union G.m.b.H. German (Stinnes) interests	Montan-Union	Bucharest and Hamburg
Musil & Co., Steinberg Rohöl Ges.m.b.H.	--	Wien	Musil & Co., Steinberg Rohöl Ges.m.b.H.	--	Wien
"Nova" Öl und Brennstoffgesellschaft A.G.	"Nova"	Wien	Société Française Industrielle et Commerciale des Pétroles	--	Paris
Österreichische Bohr- u. Schurf-Gesellschaft, Ges.m.b.H.	--	Wien	Österreichische Bohr- u. Schurf-Gesellschaft, Ges. m.b.H.	--	Wien
Österreichische Fanto A.G.	Fanto	Wien	Benzol-Verband G.m.b.H.	--	Bochum (Ruhr)
Preussische Bergwerks- und Hütten A.G.	Preussag	Hannover	Preussische Bergwerks- und Hütten A.G.	Preussag	Hannover
"Redeventza" Österreichisch-Rumänische Petroleum-Handels- und Industrie A.G.	"Redeventza"	Wien	"Redeventza"(d)	"Redeventza"	Bucharest
Rohoel-Gewinnungs A.G.	RAG	Wien	Socony-Vacuum Oil Co. & Royal Dutch Shell group, jointly.	Socony Shell	New York London
Standard Oil Trading Company	Oil Trading Co.	Wien	Standard Oil Company (N.J.)	S.O.N.J.	New York
"Steaua" Flüssige Brennstoffe A.G.	"Steaua"	Wien	Royal Dutch Shell group and French interests	Shell	London
Steinberg Naphtha A.G.	Naphtha	Wien	Steinberg Naphtha A.G. (e)	Naphtha	Wien
Vacuum Oil Co., A.G. (f)	Vacuum	Wien	Socony-Vacuum Oil Co.	Socony	New York
Wintershall Aktiengesellschaft in Berlin	Wintershall	Kassel	Wintershall Aktiengesellschaft in Berlin	Wintershall	Kassel

(a) This company merged with Vacuum Oil Company A.G. as of June 30, 1941
(b) Sales agent for Galizische Naphtha-Aktiengesellschaft "Galicia" of Poland
(c) Refinery of this company at Korneuburg reported sold or leased to Creditul Minier
(d) Rumanian interests
(e) British & Austrian interests
(f) After the invasion of Austria by Germany in 1938 all of the interests of the Vacuum Oil Co., A.G., the subsidiary of the Socony-Vacuum Oil Co., were taken over by the Deutsch Amerikanische Petroleum-Gesellschaft, the German affiliate of the Standard Oil Co. (N. J.)

Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik

Office Address: Wien I, Schubertring 14, Wien
Ownership: The Royal Dutch Shell group
Pre-war operations: Owns the Shell-Floridsdorfer refinery at Floridsdorf near Wien, distributing facilities throughout Austria and, jointly with Vacuum Oil Company A.G., the producing company Rohoel-Gewinnungs A.G.
Key pre-war personnel: The Board of Directors of this company, according to the "Handbuch der Internationalen Petroleum-Industrie, 1938-39", Finanz-Verlag G.m.b.H., Berlin, were as follows: (1) August Rath, Wien, President, (2) Basil A. Fenwick, London, (3) Dr. Erich von Hoefft, Wien, (4) Friedrich Wagenmann, Wien, (5) Hans Wunsch, Engineer, Wien, (6) Dr. Walter Kruspig, Hamburg.

The Royal Dutch Shell group has been asked for more specific information on the personnel of this company.

Socony-Vacuum Oil Company, Incorporated, Central Europe

Prior to the occupation of Austria by Germany in March 1938, a general supervision of Austria, Czechoslovakia, Hungary, Poland and Rumania was vested in a General Manager whose headquarters was at #18 Schwarzenbergplatz, Wien I.
Key pre-war personnel: (1) R. H. Evans, Socony-Vacuum Oil Co., Inc., Cairo, Egypt, General Manager, British. (2) C. V. Barry, General Manager in charge of manufacturing, warehousing and supplies, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, N. Y., American. (3) Paul Hohenberg, Assistant to Mr. Barry, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, N. Y., Austrian.

Vacuum Oil Company A.G.

Office address: Canovagasse 5, Wien I
Ownership: Socony-Vacuum Oil Company, Incorporated
Pre-war operations: Refining of finished petroleum products, ex-Austrian and Rumanian crudes. Distribution and marketing of high grade lubricating products. (a)
Key pre-war personnel: (1) Emil Fürst, General Executive, retired, 105 Edgwarebury Lane, Edgware, Middlesex, England; Austrian. (2) W. Feldmann, Sales Manager-Lube oils, last known to be in Austria; Austrian. (3) H. P. Rudinger, Sales Manager-Refined oil products, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, New York; American. (4) H. J. Colish, General Counsel, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, N. Y., Austrian. (5) Otto Griffa, Office Manager and Chief Accountant, Last known to be in Austria; Austrian. (6) Mr. Mayer, Superintendent, last known to be in Austria; Austrian. (7) Otto Groeger, Assistant Superintendent, Socony-Vacuum Oil Co., Inc., 580 Chelsea Street, East Boston, Mass.; Austrian.

Benzin und Oel Industrie A. G. "Kagran"

Office address: Breitenleerstrasse 363, Wien XXI
Ownership: Vacuum Oil Company A.G., Wien. The "Kagran" company was merged with Vacuum Oil Company A.G., Wien, as of June 30, 1941.
Pre-war operations: (a)

(a) The refinery was located at Breitenleerstrasse 363, Wien XXI, at the crossing of the northbound main railway line and Breitenleerstrasse about three miles NW from the Wien airport Aspern and about three miles east from the river Danube. The refinery was leased by Benzin und Oel Industrie, A.G., "Kagran" to Vacuum Oil Company A.G., Wien and operated by this latter company.

Rohoel-Gewinnungs A.G.

Office address: Schwarzenbergplatz 18, Wien I.
Ownership: Socony-Vacuum Oil Company, Incorporated and Shell Oil Company group jointly.
Pre-war operations: Crude producing and exploration in Austria. The two pre-war producing fields were located at "Zistersdorf" about two kilometers north of the town of this name and approximately 46 kilometers northeast of Wien, and at "Gaiselberg" about 2 1/2 kilometers WSW of Zistersdorf.
Key pre-war personnel: (1) W. G. Corwin, Chairman of the Board of Directors, Socony-Vacuum Oil Co., Inc., 26 Broadway, New York, N. Y.; American
(2) C. Hauswirth, Manager, last known to be in Austria; Austrian.

Other non-Austrian members of the organization of the Socony-Vacuum Oil Co. Inc., who have knowledge of Austrian petroleum operations are: American Geologists: A. E. Fath, E. Joblonski, F. von Estorff, B. H. Grove, and C. A. Moon, Petroleum Engineer, British.

2.0 PRODUCING

2.1 STRATEGIC CONSIDERATIONS

Importance in normal times.- As in other European countries, oil production in Austria is of great peacetime importance. Foreign exchange is saved by non-importation, as is transportation. In Austria, where a surplus of oil presumably is available for export there is even a prospective gain in foreign exchange, Austria is particularly fortunate in that the fields are close to Wien, the refineries, and the Danube River.

Wartime use.- The enemy is fortunate in that these fields, located 25 to 35 miles northeast of Wien, are strategically situated in the heart of one of its important defense systems, presently fairly remote from Allied controlled territory, and also in that the fields are close to the Danube River. The importance to the enemy of this production, which is very large for Europe, can hardly be exaggerated.

The St. Ulrich-Prinzendorf field is a rapidly expanding oil-producing area and its development presently is requiring a large expenditure of steel. It is estimated that during 1943 the field produced 12,556 barrels a day, or 58.2 per cent of the entire Austrian production. This proportion is expected to rise to 66.1 per cent during 1944, with the field averaging 17,698 barrels a day. Thus, of all the Austrian oil fields, the St. Ulrich-Prinzendorf field ranks first in importance.

The Gaiselberg field is of great importance to the enemy and prospectively of considerable value to Allies if captured. The field is completely developed, hence no further expenditure of steel would be required. All wells are flowing. The field is producing 31.3 per cent of the total estimated 1943 production of the country, or 6,774 barrels a day. It is expected that this total will decrease slightly in 1944, averaging 5,069 barrels a day.

The Kreuzfeld field likewise is a rapidly expanding field. While in 1943 it is estimated to have produced only 4.3 per cent of the total production of the country, or 945 barrels per day, it is expected that for the year 1944 this proportion will rise to 10.6 per cent or 2,845 barrels a day. This field ranks third in importance among the oil fields of Austria.

In the Zistersdorf field all wells are pumping and are producing quantities of water with the oil. Furthermore, the latter is of poor quality. Finally, the field currently (1943) is estimated to be producing only some 67,500 tons a year (1,258 barrels a day) which represents only 5.8 per cent of the total Austrian production. There is no possibility of further development of this field. Thus, the field is of no great importance to the enemy nor is its prospective value to the Allies greater.

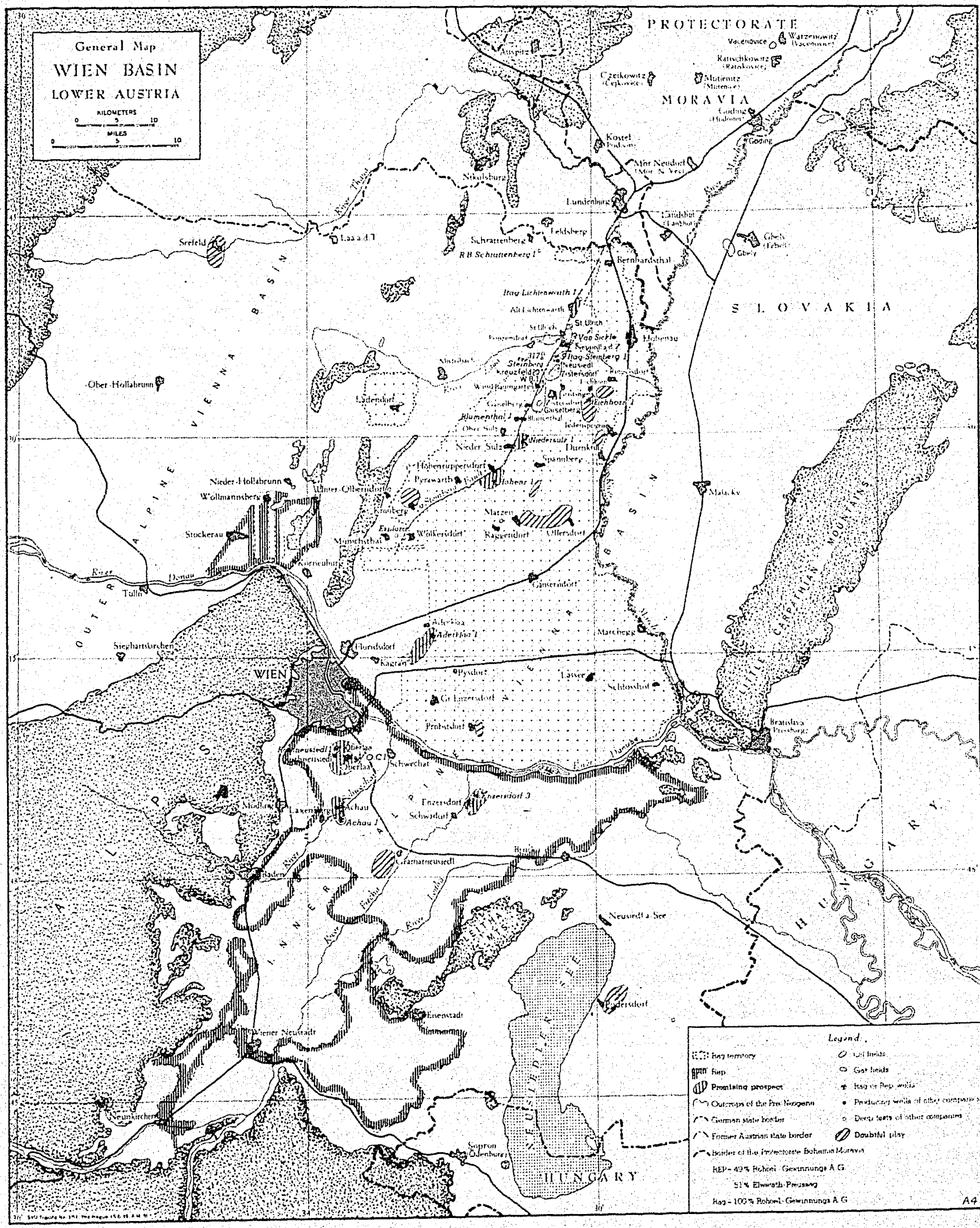
The Neusiedl field, producing an insignificant quantity of oil from three wells (1943: 65 barrels a day) totalling less than one half of one per cent of the total estimated 1943 production and with no hope of further development, is of little importance either to the enemy or to the Allies.

The estimated total production from these fields for the year 1944, 9,758,536 barrels, is shown in the tables on pages 87 and 89.

Enemy denial operations.- The effects of enemy denial operations against producing facilities may be considered under two general headings, i.e., first, pump stations, field storage and power stations, and second, oil wells.

As to the first class, pump stations, field storage and power stations, enemy denial operations may be expected to be complete.

16 - PRODUCING
Wien Basin



With regard to wells producing by natural flow and by air lift, of possible effective operations there are two worth discussing. First, the enemy might place a charge of explosives at the well head and by blasting the well head connections away cause the tubing to drop and the well to produce out of control. He would be expected to set the well on fire. In fields of the type here under consideration, sand conditions are such that it is expected that, owing to the excessive rate of flow, the tubing would fill with sand within 48 hours after the well head connections were blown away. Even if this should not occur, fires so started could easily be extinguished by experienced oil field operators within a few days(a). To place the well again on production would require an average of 30 to 40 days per well. Some of the wells probably could never be repaired. In many cases the drilling of new wells, rather than the repair operations, would be found advisable. The second course open to the enemy would be the forcing of cement down the tubing and into the annular space between the tubing and the casing. This operation would require perhaps an average of an hour per well and would effectively and permanently plug the well. Of the two courses open to the enemy, the second, i.e., the plugging of the hole with cement, would be the most effective as it would render impossible the future utilization of the hole, thus making it necessary to drill a new well in order to drain the area.

As regards wells being produced by pumping, enemy denial operations in this area would be limited to two operations, i.e., first, blasting the well head connections, and second, destroying the machinery used in pumping the well. The second operation might be expected to be substantially complete. Blasting the well head connections would cause the tubing to drop and make it impossible to produce the well until the tubing were removed and tubing and rods replaced. In this operation the removal of the rods and tubing from the well might be so difficult that in many cases the drilling of a new well would be faster than the repairs to the damaged well.

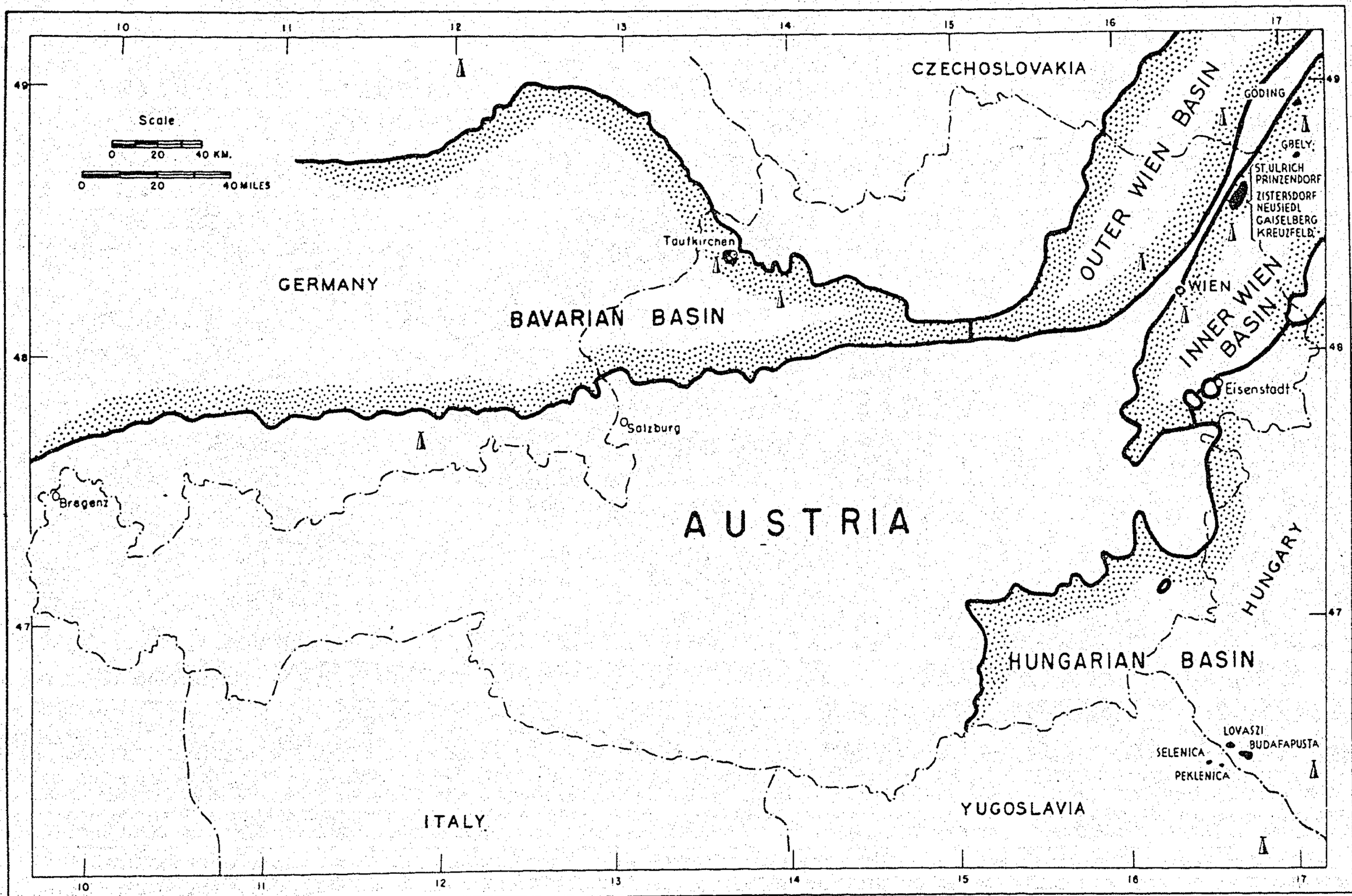
Aerial bombardment.- Field storage, pump stations and central power stations are susceptible to aerial bombardment, although the damage and delay to operations is not so great as is commonly supposed. While the nature of the producing operations in these fields precludes effective protection of the well head connections against bombing, each well would have to be destroyed individually i.e., the wholesale destruction of the fields could not be effected through the destruction of a few selected wells. Furthermore, only direct hits would be effective and wells are a poor target. Thus, the results to be expected from bombing wells in these fields would hardly be worth the effort involved.

Sabotage operations.- It is evident from the foregoing discussion of possible enemy denial operations that sabotage operations against the oil wells in this area would not be expected to be very fruitful.

2.2 AUSTRIAN BASINS

More than three-quarters of Austria is hilly or mountainous; less than one-quarter of the total area of the country is comprised of relatively broad flat-floored plains which are in striking contrast to the mountainous region surrounding them. The oil fields and oil prospects of Austria lie within these basin areas.

(a) It is herewith strongly recommended that immediate steps be taken to obtain equipment and to organize a small corps of specialists qualified for extinguishing oil well fires and controlling wild wells, to be attached to Mediterranean and Balkan invasion headquarters. Myron Kinley of Houston, Texas, is the world's foremost expert on fighting oil well fires and there are a number of companies specializing in the repairing of wells. Among these the following are well known: Brown Oil Tool Co., Allied Well Service Co., K.B. Knox Co., all of Houston, Texas. There are many more in Oklahoma. Among these Mr. Grady Chuppy, Oklahoma City, might be especially useful as he had years of experience both in Rumania and in Yugoslavia.



TERTIARY SEDIMENTARY BASINS HAVING OIL POSSIBILITIES

OIL FIELDS

WILDCAT AREAS

A5

The rugged topography which characterizes most of Austria was developed in rocks ranging in age from Pre-Cambrian to Oligocene. These varying formations were thrown into great mountain arcs during the Alpine movements from late Cretaceous to Oligocene. A period of erosion followed these great orogenic movements and subsequently tension or normal faulting of considerable magnitude developed in epi-Oligocene time. The distinct basins resulting from subsidence along such faults were invaded by the sea. Great thicknesses of Miocene marine and brackish water deposits and Pliocene fresh water sediments accumulated under these conditions. The main oil producing formations of Austria occur in the Miocene of the basins. A detailed description of the geology will be given later in connection with oil producing areas. First, however, it is desirable to outline briefly all of the basins which come within the boundaries of Austria.

Reference to the sketch map on page 18 will show the relative positions and extent of the basins, namely, (1) Inner Wien Basin, (2) Outer Wien Basin, (3) Bavarian Basin, and (4) Hungarian Basin.

2.2.1 Inner Wien Basin

The Inner Wien Basin contains all the commercially important oil and gas producing areas of Austria as well as most of the known oil prospects. They are indicated on an index map on page 16, and are described in considerable detail in the latter part of this report.

During the period between 1913 and the end of 1939, five oil fields and two gas fields were discovered in the Wien Basin of Austria and Czechoslovakia and since 1939 at least two more shows have been found in several wildcat wells which failed to produce oil in commercial quantities, and geological, as well as geophysical surveys, completed or in progress at the outbreak of the war have indicated numerous structural prospects worth further testing.

2.2.2 Outer Wien Basin

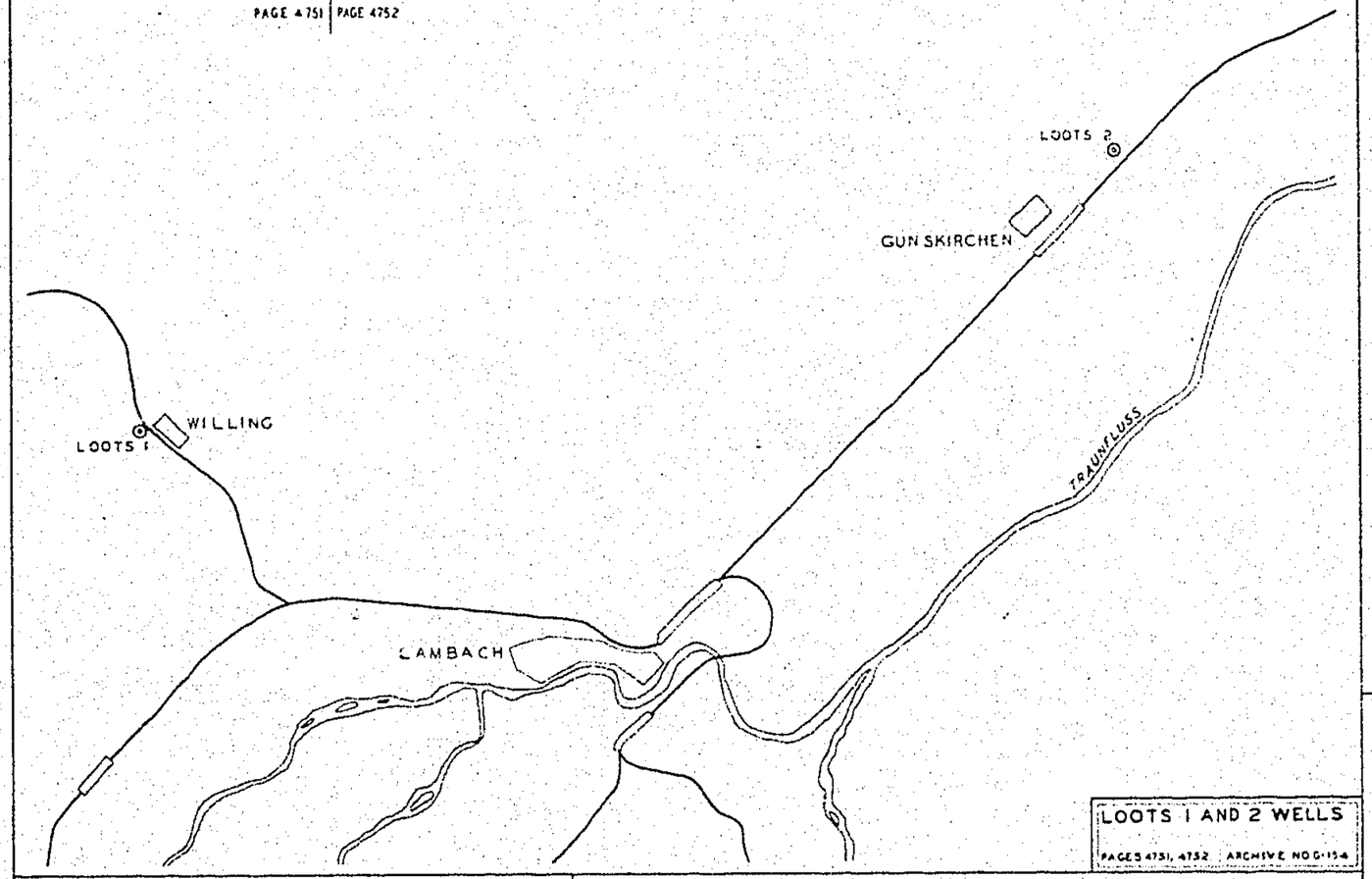
The Outer Wien Basin lies west and north of the inner basin from which it is separated by a narrow fold. An oil prospect in the outer basin located at the town of Seefeld, is indicated on the index map on page 16.

Most of the core-drilling, geological, and geophysical prospecting in search of oil has been confined to the Inner Wien Basin particularly in the vicinity of the proved fields and relatively little exploratory work has been undertaken in the outer basin. This is a natural sequence of development, particularly as the outer basin contains less organic marine deposits, the source beds of oil, than the inner basin. All the Pliocene and the upper and middle Miocene formations are absent in the Outer Wien Basin. However, favorable structures for oil accumulation probably will be found in the Outer Wien Basin and eventually tested. At Sokolnice, near Brno in Czechoslovakia, heavy oil was found in the lower Miocene Schlier formation in quantities estimated at more than 1,000,000 tons. Owing to the high viscosity of the oil and the artesian character of the higher water sands, attempts to mine the oil sand were unsuccessful, despite the absence of gas.

2.2.3 Bavarian Basin

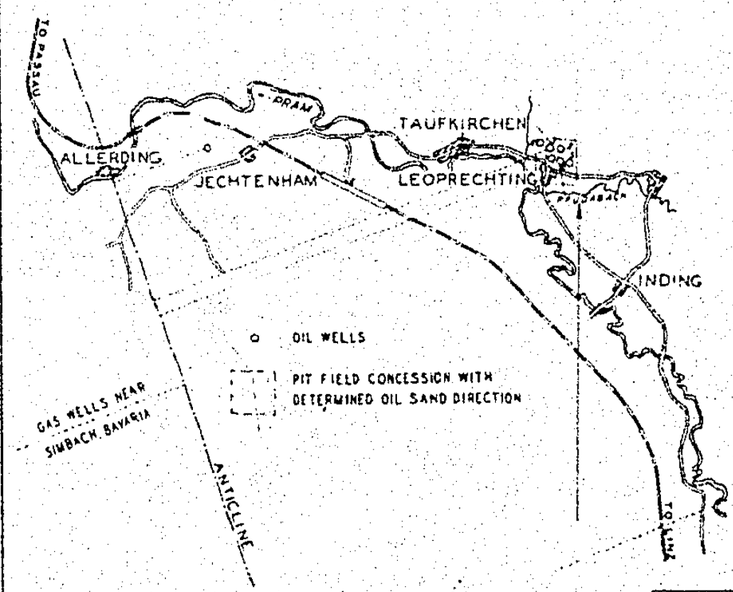
This area extends from a locality near Wien westward into Bavaria as indicated in the sketch map on page 18. A portion of this basin has been explored for oil and gas and structures mapped as shown on page 22. Plats showing locations of wildcat wells drilled in this region are shown on page 20.

The structure map referred to above shows several favorable areas for oil accumulation, particularly at Grieskirchen and Taiskirchen. In the Taufkirchen-Leoprechting area near Schärding oil was found in granite wash overlaid by the Schlier, the basal formation of the Miocene in this area. Nine wells were drilled from 1917 to 1919 and of these, seven encountered oil sands up to 7 meters thick. About 150 tons of heavy viscous oil were produced by bailing from a depth of 120 meters. The oil was under hydrostatic pressure. Although the oil was viscous in character, and contained no gas, the water relationships impose great difficulties to recovery of oil by mining methods. An attempt was made to mine sands which had an oil content of about 40 per cent by volume, but such efforts were abandoned.



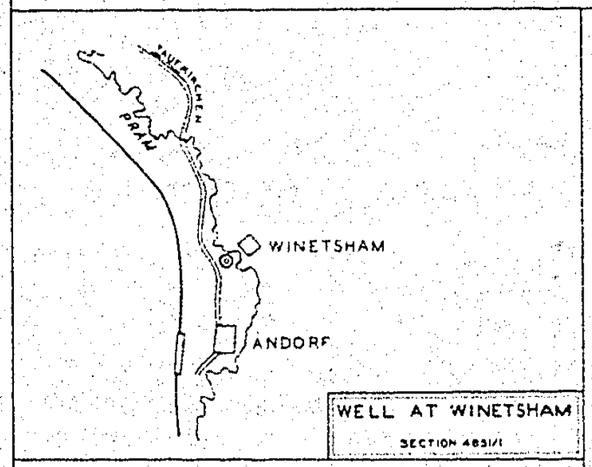
LOOTS 1 AND 2 WELLS

PAGES 4751, 4752 ARCHIVE NO G-154



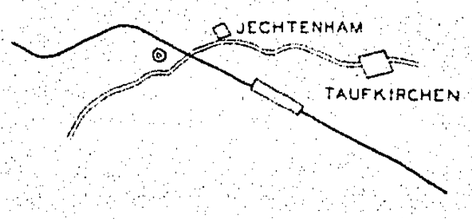
TAUFKIRCHEN
LEOPRECHTING

ARCHIVE NO G-180



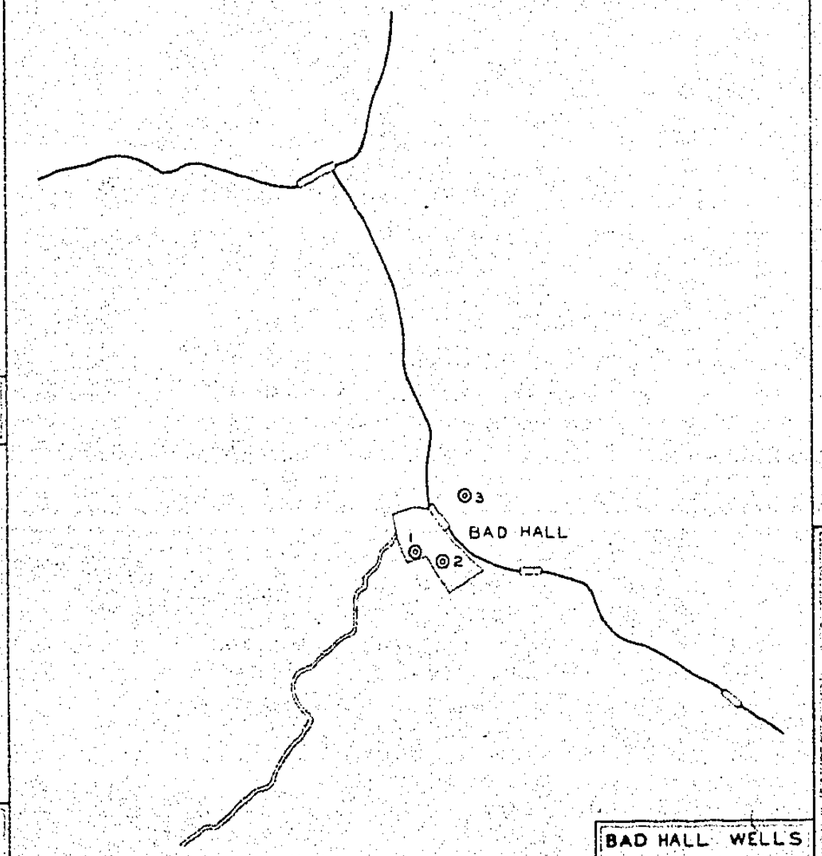
WELL AT WINETSHAM

SECTION 4851/1



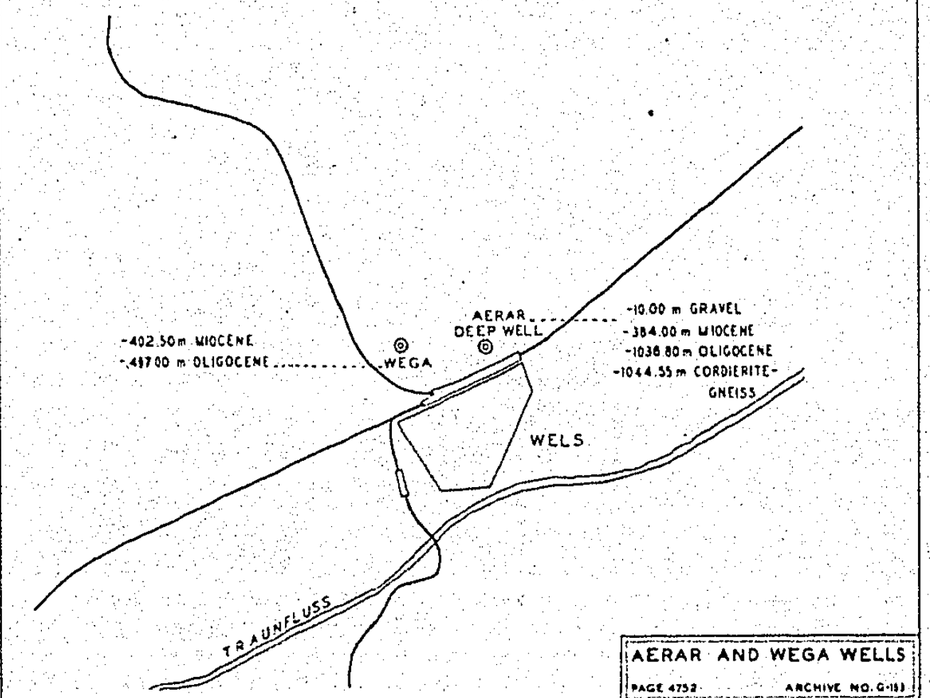
JECHTENHAM WELL AT TAUFKIRCHEN

SECTION 4851/1



BAD HALL WELLS

PAGE 4752 ARCHIVE NO G-152



AERAR AND WEGA WELLS

PAGE 4752 ARCHIVE NO. G-183

LOCATION SKETCHES
OF WILDCAT WELLS
OBER OSTERREICH
AUSTRIA

0 1 2 3 4 5 MILES

0 1 2 3 4 5 6 7 8 KILOMETERS

AUTHOR G.A.		DATE MARCH 20.1938
REPORT NO	SUPPLEMENT NO.	ARCHIVE NO.

16

The plats show some of the available information on other wells drilled in this basin. Additional data on these wells(a) may be summarized briefly as follows:

A hole drilled by the Government near Wels in 1902 encountered crystalline rock at 1,036 meters (3,398 feet). In 1891, while drilling for water in the city of Wels, gas was encountered. Since then natural gas was produced from more than 150 wells in and around the city, the maximum depth being about 350 meters (1,148 feet). The gas is reported to have occurred in lenticular sands with the production short lived. Several blow-outs of gas resulted in large losses. However, up to 1936 the Wels district was believed to have produced approximately 90,000,000 cubic meters or 3,178,440,000 cubic feet of gas which was used locally for fuel and illumination.

The European Gas and Electric Company drilled two deep wells in this basin in Austria, one located at Willing northwest of Lambach in 1932 to 1933 which reached 679 meters in depth (2,227 feet); the other, southwest of the city of Wels at Gunskirchen in 1933 to 1934 which reached 545.5 meters (1,789 feet) in depth. Both were dry holes.

In the Bad Hall area, water is found having iodine and bromide content associated with a seepage of natural gas. This small gas production is being utilized.

2.2.4 Great Hungarian Basin in Austria

The Hungarian Basin lies southeast of the Inner Wien Basin from which it is separated by the Little Carpathian mountains. The index map for the latter basin on page 16 shows an oil prospect in the Austrian portion of the Hungarian basin near Podersdorf on the east side of Neusiedl Lake (Neusiedler See). A well drilled on this structure in 1936 to a total depth of 378 meters (1,239 feet) encountered only traces of gas.

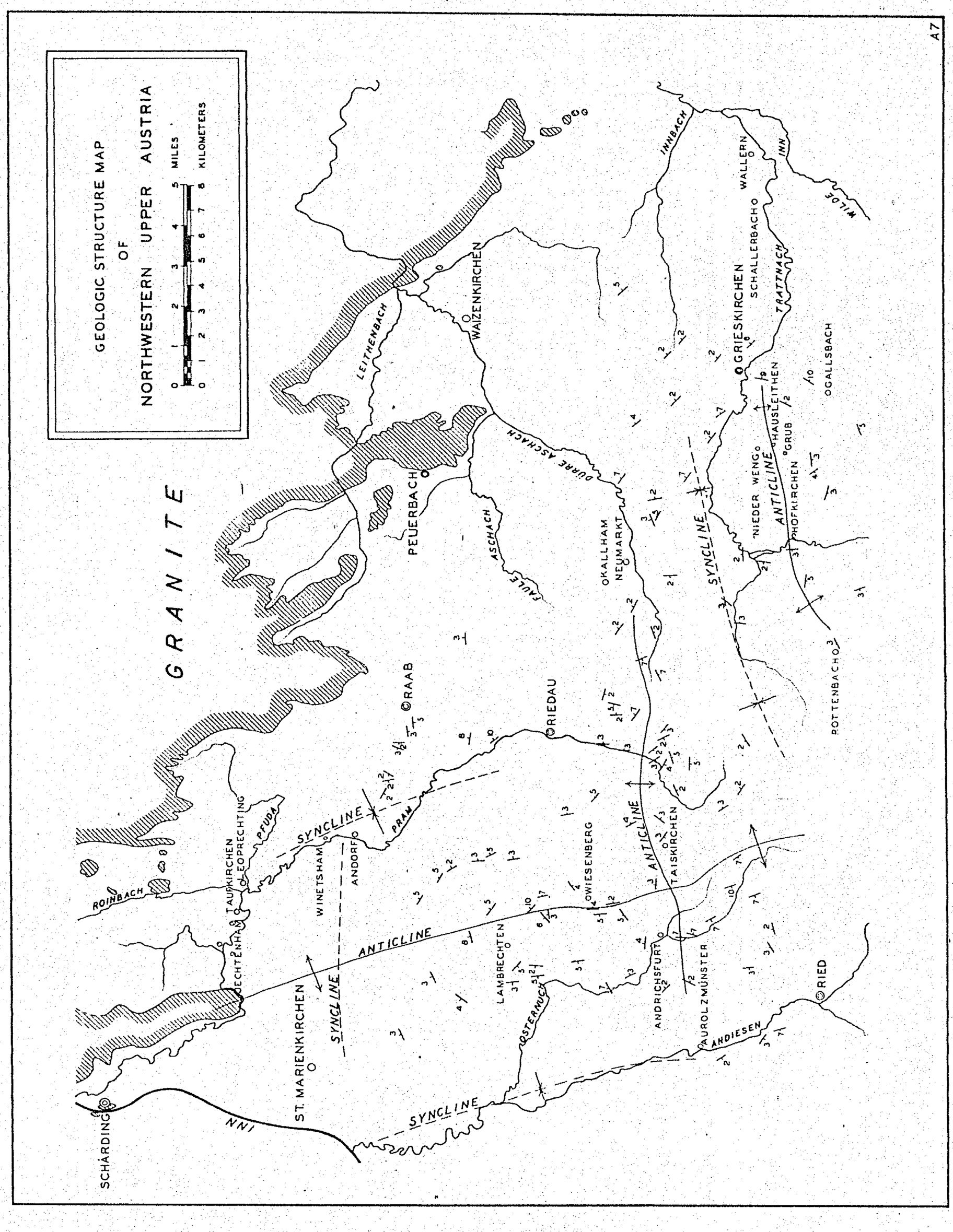
Two of the most important oil fields of Hungary, namely, Budafapuszta and Lovaszi are located in the Hungarian basin within 90 miles south of Podersdorf. However, a small part of the Hungarian basin projects into Austria and it is considered unlikely that this area contains favorable oil structure. This is due to the fact that the portion of the basin in Austria contains only relatively thin brackish or fresh-water formations resting on metamorphic or igneous rocks of the basin floor. The Miocene and lowermost Pliocene beds in which oil occurs elsewhere in the great Hungarian basin and in the Wien Basin appear to be missing in this area.

2.3 GENERAL GEOGRAPHY AND GEOLOGY OF THE WIEN BASIN

The Wien Basin, often called the "Inner Alpine Basin of Wien", is a geographical and topographical unit some 200 kilometers (124 miles) long and a maximum of 60 kilometers wide. It is elongated in a N/NE--SW direction through southeastern Austria and southwestern Moravia (Czechoslovakia). The basin is a graben or graben-like depression filled by Neogene sediments ranging in age from middle Miocene to Recent. Topographically, the basin is a pear-shaped area with undulatory to flat surface, depressed in relation to the surrounding low mountain folds of the Carpathians and the Austrian Alps.

The "Outer Alpine Basin of Wien", as distinguished from the "Inner" or Wien Basin proper, is a depression in the Alpine-Carpathian foreland, and lies to the north and west of the "Inner Basin", from which it is separated by a narrow Alpine fold. The expression "Wien Basin" as used herein in this report refers only to the "Inner" Basin.

(a) Some details as to wildcat wells in this area have been omitted as not pertinent to the present study.


GEOLOGIC STRUCTURE MAP
OF
NORTHWESTERN UPPER AUSTRIA
0 1 2 3 4 5 MILES
0 1 2 3 4 5 6 7 8 KILOMETERS
GRANITE
LEITHENBACH
WAIZENKIRCHEN
PEUERBACH
ASCHACH
AULE
DURRE ASCHACH
OKALLHAM
NEUMARKT
INNBACH
WALLERN
SCHALLERBACH
GRIESKIRCHEN
TRATTNACH
INN
MILOE
SYNCLINE
ANTICLINE
NIEDER WENG
HAUSLEITHEN
HOFKIRCHEN
GRUB
OGALLSBACH
POTTENBACH
RIEDAU
RAAB
PRAM
SYNCLINE
ANTICLINE
ROINBACH
TAUFKIRCHEN
PFUDA
ECHTENHAM
WINETSHAM
ANDORF
WIESENBERG
TAISKIRCHEN
SCHÄRDING
INN
ST. MARIENKIRCHEN
SYNCLINE
ANTICLINE
LAMBRECHTEN
OSTERMUCH
ANDRICHSFURT
PAUROLZMÜNSTER
ANDIESEN
RIED
SYNCLINE
A7

The basement rocks of the Wien Basin are comprised mainly of Mesozoic shales, sandstones and limestones. The youngest of these formations, the Flysch, extends in age from Upper Cretaceous to Oligocene both inclusive, and consists of thin-bedded alternations of sandstones and shales with occasional calcareous sandstones and thin limestones. All of the basement rocks have been strongly compressed, faulted and overthrust, with considerable metamorphism of the older formations during the Alpine orogenies.

At or near the end of the Oligocene, the compressive stresses of the Alpine movements were replaced by tension stresses which gave rise to marginal faulting, and gradual subsidence of the Wien Basin ensued. Judging from surface outcrops, the basement rocks in the northwestern half of the basin are intensely folded, broken, but unmetamorphosed Flysch formations; whereas, the basement in the southwestern half is composed of predominantly older metamorphosed rocks of the types which outcrop in the overthrusts of the Carpathian mountains. This generalization is of importance in that the Flysch is a conceivable source for the Wien Basin oil, whereas there is a general agreement that the regionally metamorphosed Carpathian facies can be excluded from consideration as source rocks for oil.

At its inception, the Wien Basin covered a much smaller area than at present and was occupied by a transgressive arm of the great Miocene sea that covered most of southeastern Europe during the Helvetian and possibly Burdigalian stages of the Miocene age. A transgressive conglomerate of variable development may therefore be expected as the oldest basin formation, deposited on an irregular floor of basement rocks. With the progress of the Miocene this was succeeded, in the older parts of the basin, by a formation of sandy clays, sub-stratified and characterized by a diagnostic fauna and by isolated large crystals of gypsum. This facies is known as the "Schlier" or, in the older terminology, the "Mediterranean" and includes more than one paleontologically defined stage, as is apparent from the stratigraphic table shown on page 28. The deeper part of the Wien Basin corresponds, to the best of our knowledge, with the central part of its northeastern half, (a) and while Schlie facies was being deposited in this deeper portion the basin was marginally extended by progressive subsidence with the formation of transgressive conglomerates in marginal areas. Thus, in the southwestern half of the basin, fresh-water, lignite-bearing formations are the counterpart of the marine Schlier laid down in the northeastern half of the basin during the lower middle Miocene epoch.

In the upper middle Miocene epoch it is probable that the basin attained substantially its maximum extent, and the formation of this epoch, the Tortonian, shows alternations of fine sands and clays with numerous intercalations of algal reef limestones (b) and some abundantly fossiliferous coquina-like deposits. The upper middle Miocene is a marine formation which reflects conditions of equilibrium in the basin and surrounding land area and there is every reason to assume that deposits of this age are entirely conformable on the Schlier in the northern half of the basin but are generally transgressive on basement rocks or on fresh-water lower Miocene beds in the southern parts of the basin.

The upper Miocene (Sarmatian) was a period of marine regression and the strata of this age carry an abundant brackish water fauna characterized chiefly by species of Potamides. Lithologically, the beds are alternations of fine-grained clays. Outcrop and well data indicate that the Sarmatian is conformable on the Tortonian, but the evidence is not so clear as to the relationship with the overlying Pliocene. By the end of the upper Miocene the Wien Basin had become a fresh water lake and the Pliocene formations of fossiliferous sands and clays attest to this environment. The Quaternary deposits are loess, dune sands of river origin and, particularly in the southern part of the basin, thick gravels laid down by the Danube River.

(a) See the index.
(b) Lithothamnium and Nullipora.

LOWER AUSTRIA
WIEN BASIN
OLDER WELLS

AUSTRIAN DRILLING AND PROSPECTING CO.

FEET	METERS	LANZENDORF 1 m	2 m	3 m	SOLLENAU A m	B m	LEOPOLDSDORF +188m
100							13.3
200							
300	100						
400							
500		PANNONIAN					
600					170 SHALE COAL BEDS		
700	200					211 SHALE WITH COAL BEDS	UPPER PANNONIAN
800			PANNONIAN	PANNONIAN	235	245.8	
900					251	GRAY SHALE	
1000	300						
1100						322.6	329
1200							
1300	400						MIDDLE PANNONIAN
1400							
1500							
1600	500	487					
1700							
1800							
1900							570
2000	600		600 GAS SHOWS. CASING PULLED	617 10000 M³GAS			LOWER PANNONIAN
2100							
2200							
2300	700						695
2400							
2500							
2600	800						SARMATIAN
2700							
2800							
2900	900						
3000							934
3100							
3200							
3300	1000						TORTONIAN (SCHLIER)
3400							
3500							
3600	1100						LANZENDORF FAUNA
3700							1113.24
3800							
3900	1200						
4000							

GEOLOGIC DIVISIONS
PENETRATED BY WELLS
IN THE WIEN BASIN

A8

LOWER AUSTRIA
WIEN BASIN
OLDER WELLS

FEET / METERS

BERNHARDSTAL ±165m
- UPPER PANNONIAN
- 181.6
- MIDDLE PANNONIAN
- 354.3
- LOWER PANNONIAN
- 452.80

RABENSBURG 1 ±185m
- PANNONIAN
- AT 207M VIVIPARA
- 350

HAUSKIRCHEN 2 ±165m
- PANNONIAN
- 211

HOHENAU ±181m ±150m
- TORTONIAN
- 38
- 411

ST.ULRICH ±200m
- UPPER PANNONIAN
- 331
- H_2S×
- TORTONIAN
- 635

STEFANIE ±228m
- 10
- UPPER PANNONIAN
- 176.3
- MIDDLE PANNONIAN
- 332.6

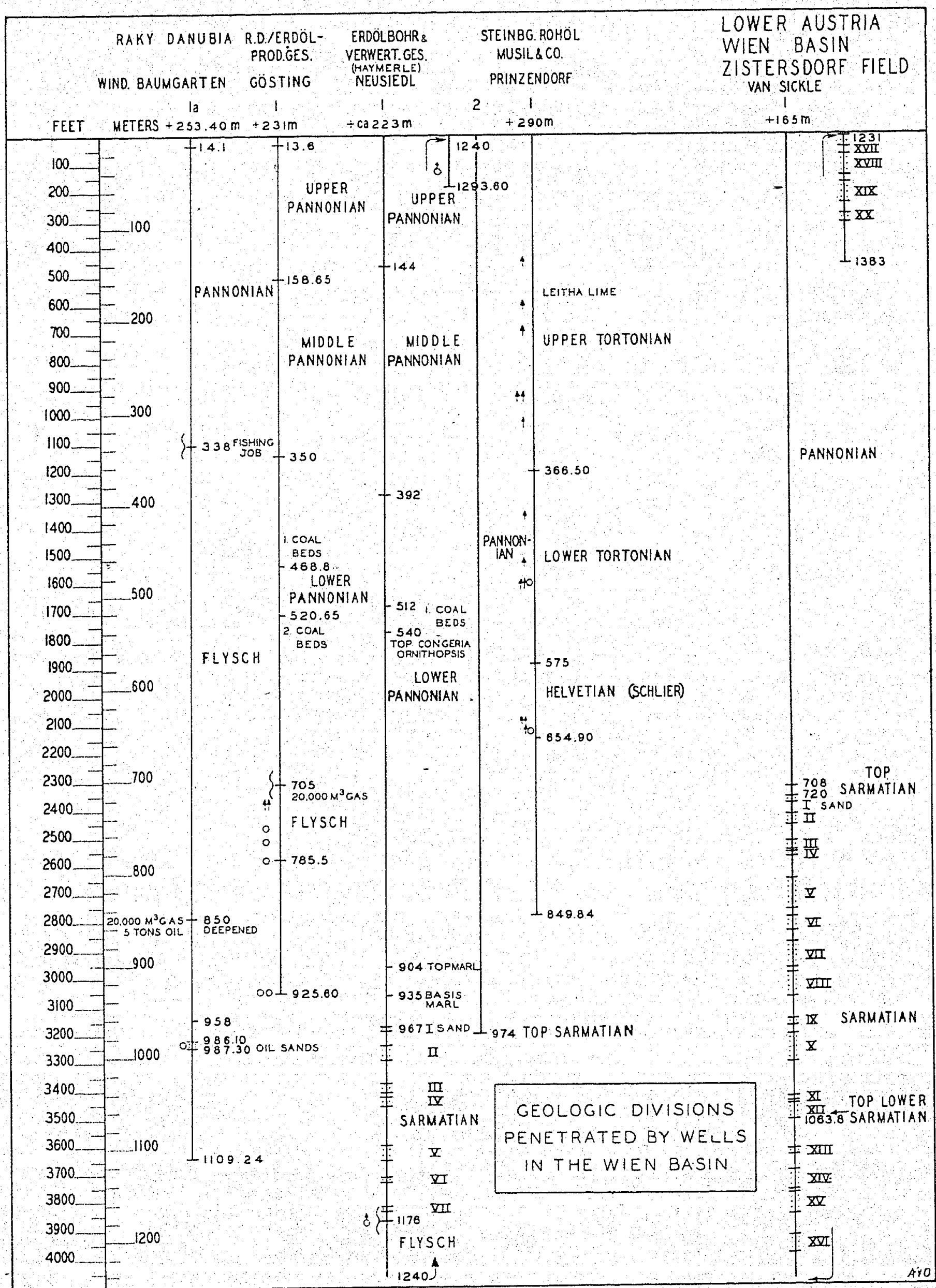
U.OLBERND'F ±230m
- SARMATIAN
- 78
- TORTONIAN
- 406.5
- FLYSCH
- 491

RAGGENDORF ±177m
- PANNONIAN
- 750
- SARMATIAN
- OIL SHOWS IN THE SARMATIAN
- 1060

GEOLOGIC DIVISIONS PENETRATED BY WELLS IN THE WIEN BASIN

A9

Graphic log


LOWER AUSTRIA
WIEN BASIN
ZISTERSDORF FIELD
RAKY DANUBIA
WIND. BAUMGARTEN
la
FEET
METERS +253.40m
R.D./ERDÖL-PROD.GES.
GÖSTING
1
+231m
ERDÖLBOHR & VERWERT. GES. (HAYMERLE)
NEUSIEDL
1
+ca223m
STEINBG. ROHÖL MUSIL & CO.
PRINZENDORF
2
1
+290m
VAN SICKLE
1
+165m
14.1
13.6
UPPER PANNONIAN
PANNONIAN
158.65
MIDDLE PANNONIAN
338 FISHING JOB
350
I. COAL BEDS
468.8
LOWER PANNONIAN
520.65
2 COAL BEDS
FLYSCH
705
20,000 M³ GAS
FLYSCH
785.5
20,000 M³ GAS
5 TONS OIL
850
DEEPENED
925.60
958
986.10
987.30 OIL SANDS
1109.24
1240
1293.60
UPPER PANNONIAN
144
MIDDLE PANNONIAN
392
512 I. COAL BEDS
540 TOP CONGERIA ORNITHOPSIS
LOWER PANNONIAN
904 TOPMARL
935 BASIS MARL
967 I SAND
II
III
IV
SARMATIAN
V
VI
VII
1176
FLYSCH
1240
LEITHA LIME
UPPER TORTONIAN
366.50
PANNON-IAN
LOWER TORTONIAN
575
HELVETIAN (SCHLIER)
654.90
849.84
974 TOP SARMATIAN
1231
XVII
XVIII
XIX
XX
1383
PANNONIAN
TOP SARMATIAN
708
720
I SAND
II
III
IV
V
VI
VII
VIII
IX
SARMATIAN
X
XI
XII
1063.8
TOP LOWER SARMATIAN
XIII
XIV
XV
XVI
GEOLOGIC DIVISIONS PENETRATED BY WELLS IN THE WIEN BASIN
A10

Some slight deformation of the sediments filling the Wien Basin was due to settling over the uneven floor of basement rocks. The tension stresses produced structures dominantly conditioned by differential subsidence along fault planes. The major faults are oriented north-northeast/south-southwest, roughly parallel to the long axis of the basin, with fault planes dipping east or southeast. The marginal faults of the basin are seldom discernible at the surface for more than small fractions of their length. However, three or four major faults (Steinberg fault, Schrattenberg fault, Hodonin-Gbely fault, etc.) within the basin proper have been traced for distances of from 20 to nearly 100 kilometers, (12 to 62 miles) largely by subsurface methods. The details of the subsurface revealed by wells in the Hodonin-Gbely oil fields show a multitude of smeller faults, both parallel and transverse, and it appears probable that the entire basin filling may be broken up into larger and smaller fault blocks of which only a very small fraction have as yet been defined.

Although dips ranging up to 10 degrees have been measured at numerous places in the basin, it is improbable that these reflect compression folds. The available evidence suggests rather that they are due to differential compaction over basement inequalities, cross-bedding, differential subsidence along fault planes and similar phenomena. In general, therefore, the structures trapping oil in the Wien Basin are expected to be those produced by fault blocks, lenticular sands or pinched-out beds, as well as truncation and overlapping resulting from local or possibly widespread unconformities.

2.4 HISTORY OF OIL EXPLORATION IN THE WIEN BASIN

Traces of oil and gas were discovered in 1901 near Hodonin, Moravia, in a water well at a depth of about 217 meters (711 feet). However, oil was not produced commercially in this area until 1924, following the drilling of five dry holes. In 1913, near Gbely, Slovakia, some 14 miles south of Hodonin, oil was found at a depth of 163.5 meters (536 feet). By 1939, the producing area at Gbely had developed into two adjacent fields in which were located more than 400 wells. In the northeastern end of the Wien Basin, a small gas field was discovered in 1929 at Vacenovice during the drilling of a well for water by a local sugar refinery. By the end of 1939 there were about 8 wells producing gas from depths less than 200 meters in this field. Brief descriptions of the Hodonin, Gbely, and Vacenovice fields will be given elsewhere in the present report.

At Hohenau and Rabensburg dry holes were drilled to depths of 411 and 350 meters respectively. Shortly after World War I, a well was drilled at Maria Lanzendorf, south of Wien, in search of coal; it encountered gas and a trace of oil at above 600 meters (1,968 feet).

In 1932, a structure at Oberlaa, several kilometers south of Wien was tested and the well yielded nearly pure methane gas at a depth of 266 meters (872 feet). A second hole, drilled in 1933, produced gas at 299 meters. In 1934, gas from this area was delivered by pipe line to the Municipal Electric plant of Wien and the field produced until 1935 when, after a total yield of over 2,000,000 cubic meters (7,060,000 cubic feet) of gas, the pressure decreased to a point where production was no longer profitable and the pipe line was removed. A well drilled in 1935 by the Socony-Vacuum Oil Company's interests to test the oil possibilities of the Oberlaa structure encountered basement rocks at a relatively shallow depth without important oil showings.

In 1934-5, at Enzersdorf, gas was found in two wells drilled to 700 and 1,544 meters (2,296 and 5,064 feet) respectively, but the gas could not be separated from the water with which it was associated and commercial production was not obtained. On the east side of Neusiedl Lake, near Podersdorf in Burgenland, another well was drilled to a depth of 386 meters but only small shows of gas were found. This well topped granite at 378 meters (1,240 feet).

As indications of commercial production in the Wien Basin became more conclusive, the search for structures favorable for oil and gas accumulation

AUSTRIAN STRATIGRAPHIC CLASSIFICATION
(WITH SPECIAL REFERENCE TO THE BROADER ENVIRONS OF VIENNA)

ERA	PERIOD		STAGE	INNER-ALPINE BASIN OF VIENNA	OUTER-ALPINE BASIN OF VIENNA	FACIES	THICKNESS
CENOZOIC	QUATERNARY	ALLUVIUM		CLAYS, SANDS AND GRAVELS	CLAYS, SANDS AND GRAVELS	CONTINENTAL	±10 M
		DILUVIUM		LOAM, SANDS, GRAVELS AND LOESS	LOAM, SANDS, GRAVELS AND LOESS	CONTINENTAL	±40 M
	TERTIARY	PLIOCENE	UPPER / MIDDLE	TERRASSENSCHOTTER (TERRACE GRAVELS)	TERRASSENSCHOTTER (TERRACE GRAVELS)	FLUVIATILE	±20 M
			LOWER — PANNONIAN — UPPER	(PALUDINA SAND) ZONE OF THE MARSH SAND FRESHWATER LIMESTONE		LIMNIC	±300 M
			LOWER — PANNONIAN — MIDDLE	ZONE OF THE CONGERIA BALATONICA ZONE OF THE CONGERIA SUBGLOBOSA			150-400 M
			LOWER — PANNONIAN — LOWER	ZONE OF THE CONGERIA ORNITHOPSIS AND PARTSCHI	HAUSRUCK-LIGNITE		100-500 M
				TRANSITION BEDS		BRACKISH	70-1000 M
		MIOCENE	UPPER — SARMATIAN	CERITHIUM BEDS; HERNALSER TEGEL (SHALE); DETRITAL LEITHA LIME			
			MIDDLE — VINDOBONIAN 2ND MEDITERRANEAN STAGE — TORTONIAN	BADENER TEGEL (SHALE); GAINFARNER MARL; ENZESFELDER SANDS; LEITHA LIME AND CONGLOMERATES; CLAY OF WALBERSDORF AND THEBEN-NEUDORF; LIGNITE OF MAUER AND RITZING	UNCONFORMITY	MARINE	300-600 M
			MIDDLE — VINDOBONIAN 2ND MEDITERRANEAN STAGE — HELVETIAN (SCHLIER)	SCHOTTER (BRENNBERGER BLOCKSTROM) (GRAVELS) (AUWALDSCHOTTER); LIGNITE OF PITTEN, ANTHRACITE OF LEOBEN, BRENNBERG ETC.	GRUNDER BEDS; ONCOPHORA BEDS	FLUVIATILE LIMNIC BRACKISH MARINE	300-500 M
			LOWER — BURDIGALIAN 1ST MEDITERRANEAN STAGE		EGGENBERG BEDS; LOIBERSDORF BEDS; GAUDERNDORF BEDS	MARINE	±500 M
		OLIGOCENE	CHATTIEN (AQUITANIEN)	UNCONFORMITY	PIELACH SHALE (? 50 M); MELKER SAND (? ± 200 M); MOLDER BEDS (? 100 M); CYRENE BEDS (? ± 200 M)	MARINE	POSSIBLE
			RUPELIAN				
			LATTDORFIAN	SUBBESKIDIC FLYSCH: AUSPITZER MARL; STEINITZER SANDSTONE (? ± 1000 M)			
		EOCENE		SUBBESKIDIC FLYSCH; BESKIDIC FLYSCH: GREIFENSTEIN SANDSTONE (? ± 500 M), GLAUKONITE SANDSTONE, LAABER SCHIST; SMALL EROSIONAL REMNANTS AT WIMPASSING, KRAPPFELD (? ± 100 M)	MARINE	ESTIMATE
		PALEOCENE		UNKNOWN AS YET IN THE FLYSCHZONE, OTHERWISE A FEW SMALL OCCURENCES ON THE ALP BORDERS. (KRESSENBURG)		MARINE	ACCURATE
MESOZOIC	CRETACEOUS	UPPER	DANIAN	LIMESTONE ALPS: KNOWN ONLY IN A FEW LOCALITIES	FLYSCHZONE: ORBITOIDAL CHALK	MARINE (FLUVIATILE, LIMNIC)	NO
			SENONIAN	GOSAU: ACTAEONELIAN LIMESTONE, CONGLOMERATES, ORBITOIDOL SANDSTONE, GRUNBACH COAL ±600 M	INOCERAMUS MARL (±500 M); SHALLOW WATER CHALK		
			TURONIAN		MAGURA SANDSTONE (PARTIAL)		
			CENOMANIAN	CAPRINE & ORBITOLINE, CONGLOMERATES ±50 M			
		LOWER	ALBIAN	ABSENT	NOT YET EVIDENCED		
			APTIAN				
			NEOCOMIAN	APTYCHEN LIME; FLECKEN MARL ? ± 100 M	APTYCHEN LIME SANDSTONE (± 200 M)		
	JURASSIC		MALM	APTYCHEN LIME; RADIOLARITE; OBERALM BEDS	STRAMBERGER LIME; APTYCHEN LIME	MARINE	±500 M
			DOGGER	ACANTHICUS BEDS; KLAUSS LIME BEDS; VILSER LIME BEDS	EXISTS ONLY IN FAULT OUTLIERS		
			LIAS	FLECKEN MARL, SILICEOUS LIME; ADNETER LIME, GRESTENER BEDS; HIERLATZ LIME			
	TRIASSIC	UPPER	RHAETIC STAGE	KOSSEN BEDS	EXISTS ONLY IN FAULT OUTLIERS	MARINE	±800 M
			NORIAN STAGE	MAIN DOLOMITE; SEEFELDER SCHIST; HALLSTAGTTER LIME; DACHSTEIN LIME			
			CARNIAN STAGE	OPPONITE LIME; LUNZER SANDSTONE; CARDITA BEDS; RAIBLER BEDS			
		MIDDLE	LADINIAN STAGE	WETTERSTEIN {DOLOMITE LIME}; RAMSAU DOLOMITE; REIFLING LIMESTONE; MUSCHEL LIME; GUTTENSTEIN LIMESTONE	ABSENT	MARINE	±500 M
			ANISIAN STAGE				
		LOWER	SCYTHIAN STAGE	WERFEN BEDS; HASEL MOUNTAINS, VERRUCANO		MARINE	100-500 M

A11

was intensified. In addition to detailed geological mapping and core-drilling, the seismograph, torsion balance and gravity meter were used. Immediately preceding World War II numerous prospects had been mapped. These will be discussed later in the present report.

2.5 CRUDE OIL PRODUCTION IN THE WIEN BASIN

Introduction.- All of the producing fields in Austria are located in the Wien Basin, and more specifically along the Steinberg fault, which passes from a point a few miles northeast of the city of Wien and extends in a north-northeast direction some 30 miles. A general map of the Wien Basin appears on page 16 of this report.

Commercial production, until the end of 1939, was confined to the Zistersdorf area, about 25 miles north of Wien. In the Zistersdorf area, Pannonian (Pliocene) is exposed on the eastern downthrown side of the Steinberg fault and Tortonian (upper middle Miocene) and Sarmatian (upper Miocene) is exposed on the western upthrown side. A second fault branches off from the main Steinberg fault just north of St. Ulrich and has been mapped southward as far as Wolkersdorf.

Although some production had been obtained from the Cretaceous on the upthrown side of the Steinberg fault, the major production secured prior to 1940 came from the Sarmatian on the downthrown, or eastern side of the Steinberg fault. Minor folds along this Steinberg fault provide for necessary closure. A structural and well map for both the Zistersdorf area and the newly opened fields of Kreuzfeld and St. Ulrich-Prinzendorf, the two latter being located on the upthrown or western side of the Steinberg fault, will be found on page 30. This map shows in detail the drilling and producing wells on both sides of the Steinberg fault as established by aerial photographs taken in August 1943.

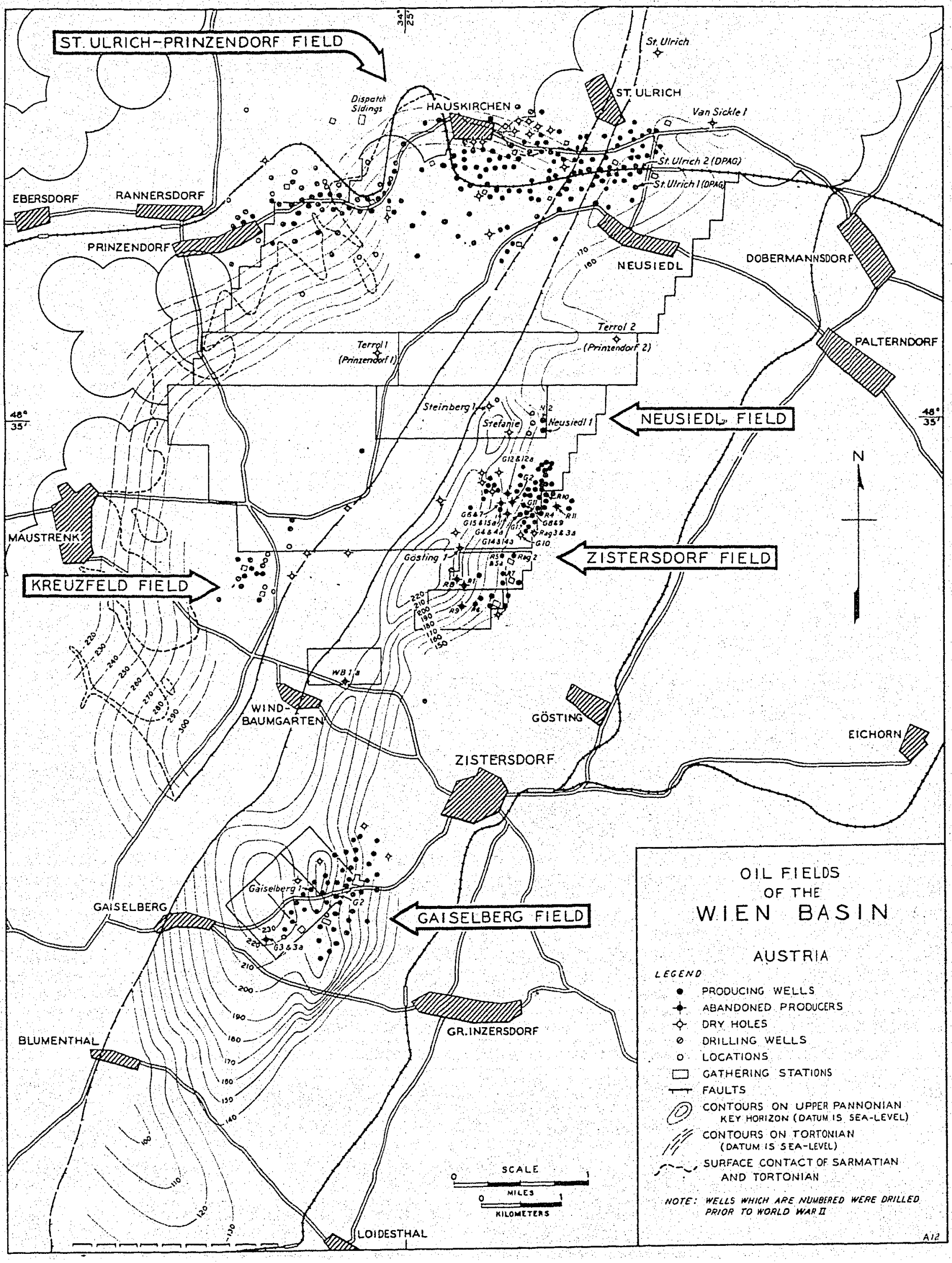
In the Zistersdorf area five different oil fields are being exploited. Three of these are on the downthrown, or eastern side, of the Steinberg fault, namely Neusiedl(a), about 4 kilometers north of the village of Zistersdorf, the Zistersdorf field, about 2 kilometers north of the village and the Gaiselberg field which lies two kilometers to the southwest of the village. The Zistersdorf field consists of a north and a south structure with a low narrow saddle between the two structures. They are known locally as the Gösting and RAG structures respectively, this division being principally an ownership division as between the Erdölproduktions Gesellschaft m.b.H. and the Rohoel-Gewinnungs A. G. However, the concession of the Rohoel-Gewinnungs A. G. commonly known as the RAG concession, covers a small portion of the Gösting structure and a few of the RAG wells were drilled on and are producing from that structure. Two new fields namely St. Ulrich-Prinzendorf and Kreuzfeld presently are being developed on the upthrown or westward side of the Steinberg fault, a few kilometers to the west and northwest of Zistersdorf. A complete description of the geology, location and importance of these fields, together with estimates as to the drilling programs being followed and the probable production rates for both fields is given under an appropriate section of this report.

2.5.1 Zistersdorf Field

Early exploration.- The Austrian portion of the Wien Basin was recognized prior to 1930 as prospective oil and gas territory. A small quantity or oil was being produced in the northern part of the basin in the Gbely field of Moravia. In the search for oil and gas production for Austria, many test wells were drilled.

In 1930, two miles north of the town of Zistersdorf and thirty-five miles northeast of Wien, a German firm, Raky-Danubia struck oil in the Flysch of the Upper Cretaceous, at a depth of 729 meters (2,391 feet). This well "Windisch-Baumgarten 1a" produced only 5,000 kilograms of heavy oil and was significant only as establishing the presence of oil in this area.

(a) On the surface. Production, however, comes from the Flysch on the upthrown side of the fault.


ST. ULRICH-PRINZENDORF FIELD
NEUSIEDL FIELD
ZISTERSDORF FIELD
KREUZFELD FIELD
GAISELBERG FIELD
St. Ulrich
ST. ULRICH
Dispatch Sidings
HAUSKIRCHEN
Van Sickle 1
St. Ulrich 2 (DPAG)
St. Ulrich 1 (DPAG)
EBERSDORF
RANNERSDORF
PRINZENDORF
NEUSIEDL
DOBERMANNSDORF
PALTERNDORF
Terrol 2
(Prinzendorf 2)
Terrol 1
(Prinzendorf 1)
Steinberg 1
Stefanie
Neusiedl 1
MAUSTRENK
Gösting 1
WB 1a
WIND-BAUMGARTEN
GÖSTING
EICHORN
ZISTERSDORF
Gaiselberg 1
GAISELBERG
BLUMENTHAL
GR. INZERSDORF
LOIDESTHAL
34°/25'
48°/35'
N
SCALE
MILES
KILOMETERS
OIL FIELDS
OF THE
WIEN BASIN
AUSTRIA
LEGEND
PRODUCING WELLS
ABANDONED PRODUCERS
DRY HOLES
DRILLING WELLS
LOCATIONS
GATHERING STATIONS
FAULTS
CONTOURS ON UPPER PANNONIAN KEY HORIZON (DATUM IS SEA-LEVEL)
CONTOURS ON TORTONIAN (DATUM IS SEA-LEVEL)
SURFACE CONTACT OF SARMATIAN AND TORTONIAN
NOTE: WELLS WHICH ARE NUMBERED WERE DRILLED PRIOR TO WORLD WAR II
A12

A second well, Gösting 1, drilled jointly by the Raky-Danubia and the Erdölproduktions Gesellschaft m.b.h., a firm established with Swiss capital, established production in the Flysch at a total depth of 925 meters (3,034 feet). This well produced a total of 1,700 metric tons (11,560 barrels) of oil during the period of November 1932 to 1936, when it was abandoned.

Gösting 2, owned entirely by the Erdölproduktions Gesellschaft m.b.H. and located to the northeast of Gösting 1 encountered oil in three levels of the Sarmatian, this being the first evidence of crude oil in that formation in the Zistersdorf area. The Sarmatian horizon has proved to be the main production source for both the Zistersdorf and Gaiselberg fields. In 1934, Gösting 2 produced 4,300 metric tons (33,524 barrels) of crude oil with a specific gravity of 0.942. In 1935, the total Austrian crude oil production was 6,616 per day. Gösting 4a was brought into production in the Sarmatian at a total depth of 1,054 meters (3,457 feet) on June 28, 1936. The Erdölproduktions Gesellschaft m.b.H. continued drilling on their concession in the Zistersdorf field known as the Gösting section of the field.

In 1936 the Rohoel-Gewinnungs A. G., a company owned jointly by the Socony-Vacuum Oil Company interest and the Royal Dutch Shell Group, completed their first well in their concession in the south end of the Zistersdorf structure. This well, known as RAG No. 1, was drilled near the southern border of the proved area of the Steinberg dome and produced approximately twenty metric tons (136 barrels) in 48 hours, after which, due to mechanical difficulties production ceased. However, with this well production in the Sarmatian was proved and active exploitation of the RAG concession was under way.

Location and Topography.- The Zistersdorf oil field covers an area of little more than 90 acres and is located about 45 kilometers (28 miles) northeast of Wien and about 3 kilometers north of the town of Zistersdorf. It is situated in an area of gently rolling topography. Most of the surface is covered by alluvium with the Pannonian formation of lower Pliocene age outcropping to the south. Drainage in the field is towards the east. Elevations of the wells range between 215 and 234 meters (705 and 767 feet) above sea level. West of the field there is an outcrop of the Tortonian formation of upper middle Miocene age which produces an area of greater relief with elevations of over 300 meters (984 feet) above sea level. In the latter area the drainage is towards the west.

Geology.- The geologic history of the Wien Basin previously described provides a background for considering the local geology of the Zistersdorf area, summarized below.

A cross-section through the Zistersdorf oil field and the area west of it is shown on page 32. The two faults indicated in the cross-section are normal or tension faults and probably developed concurrently with the tension faulting which caused subsidence of the basin. The two faults referred to extend in a southwest-northeast direction as indicated in the surface map of the area on page 30. They have been called the west and east Steinberg faults.

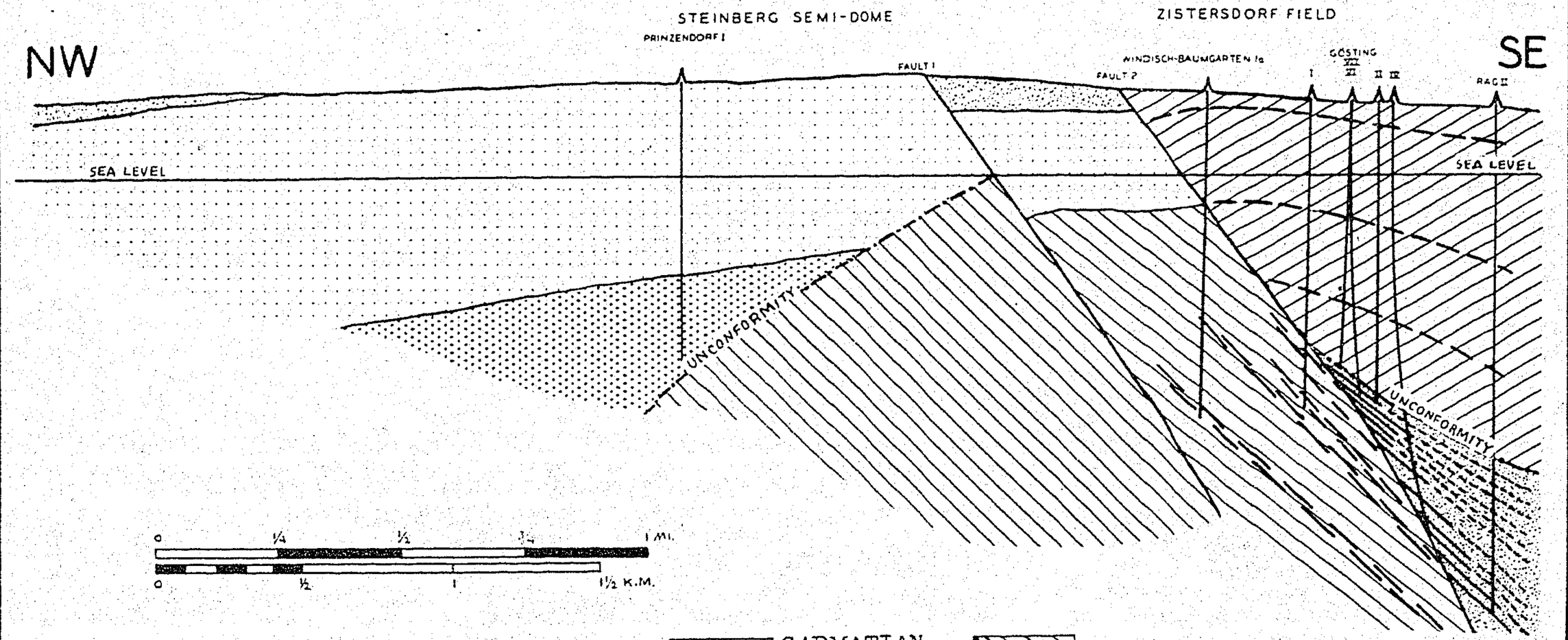
Along the west fault there is relatively little displacement whereas the east or major fault has a throw of several thousand feet. The downthrown side of both faults is towards the east and the block caught between them is long and narrow.

West of the west Steinberg fault the structure is in the form of a semi-dome. This is not apparent from the cross-section on page 32, but is readily seen by reference to the geologic map on page 30 which indicates more than 80 meters (or 263 feet) of closure against the west Steinberg fault. The contours representing this closure are based mainly upon surface dips. Tortonian is exposed on the crest of this arch with the overlying Sarmatian outcropping some distance down dip on the flanks of the structure. The Prinzendorf No. 1 (Terrol No. 1) well shown in the cross-section on page 32, was the only well

GEOLOGIC SECTION THROUGH

STEINBERG SEMI-DOME AND ZISTERSDORF FIELD

WIEN BASIN, AUSTRIA



A/3

ERDÖLPROD. GESELLSCHAFT

LOWER AUSTRIA
WIEN BASIN
ZISTERSDORF FIELD

GÖSTING

FEET / METERS

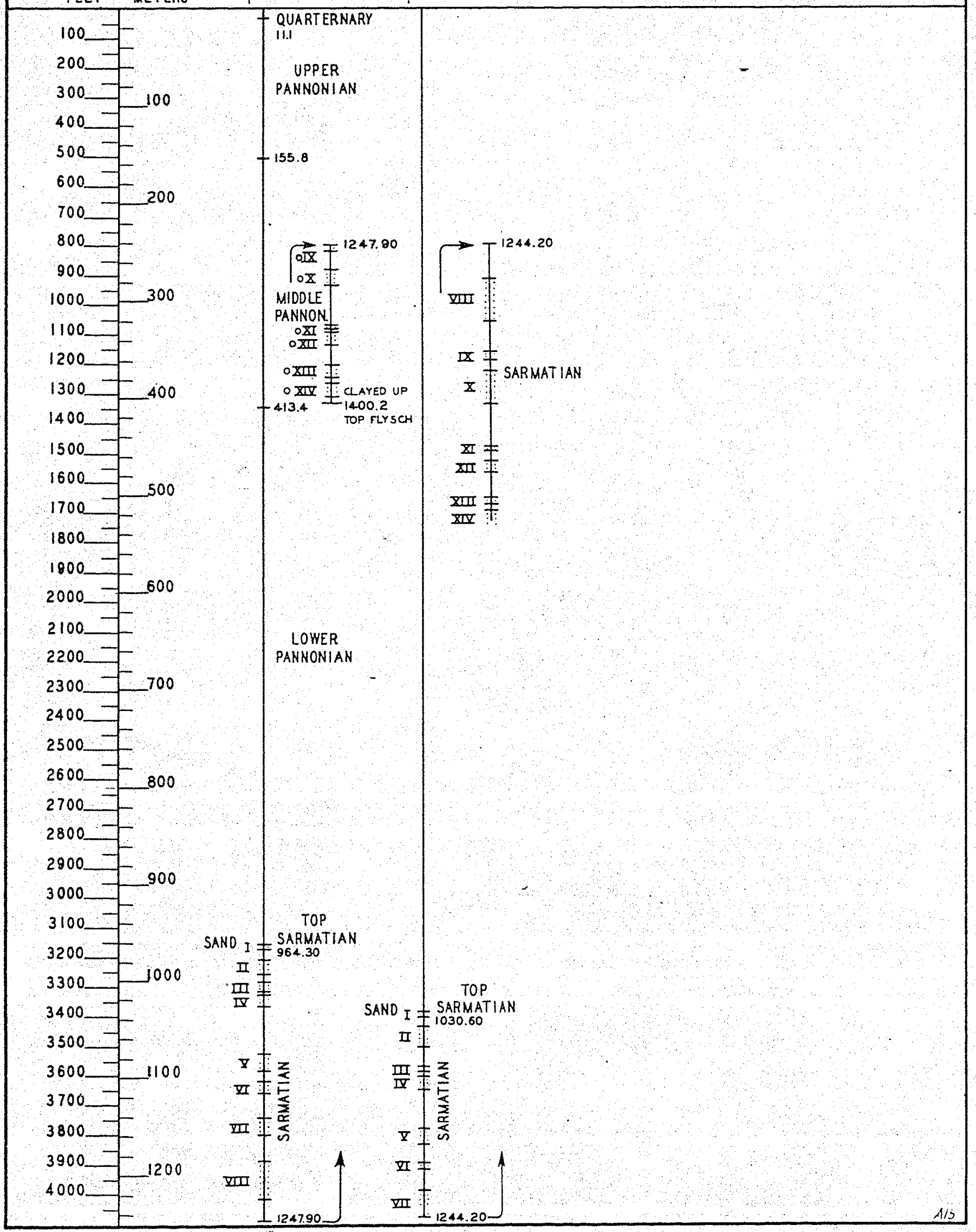
2	4	4a	6	7	8	9
+228.20m	+228.60m	+228.60m	+232.90m	+332.90m	+226	226
UPPER PANNONIAN	UPPER PANNONIAN	UPPER PANNONIAN	UPPER PANNONIAN		UPPER PANNONIAN	
	143	142.50	124		152.3	
185.60			MIDDLE PANNONIAN			
MIDDLE PANNONIAN	MIDDLE PANNONIAN	MIDDLE PANNONIAN			MIDDLE PANNONIAN	
374.60	383	380.30	358.80		399	
488 1 COAL BEDS	496.5 1 COAL	520.50 1 COAL	471.4 1 COAL		514 1 COAL	524 1 COAL
537.9 2 COAL			LOWER PANNONIAN			
LOWER PANNONIAN	LOWER PANNONIAN	LOWER PANNONIAN			LOWER PANNONIAN	745.50
	SOLID MARL		773.7 SOLID MARL 791.2	802.80 SOLID MARL 822.10		
872.30 I SAND II SARMATIAN III 926.00	918.50 I SAND II	872.70 892.20 I SAND II III SARMATIAN IV	812.8 I II SARMATIAN 842.3 850.0 FLYSCH DEVIATION 46 m TOWARD N 5°E	852.30 I 858.00 865.10 II 871.00 III IV SARMATIAN 891.10 910.00 920.30 DEVIATION 3° TOWARD SW	918.20 1 2 978.30 3 988.30 4 5 6 1090.40 7 1104.10 8 9 1181.20 1187 10 SARMATIAN	
	1151.6 III SARMATIAN IV					
	5723.7 V VI VII 1050.00 1054.20 FLYSCH					
	VI SARMATIAN VII					
	VIII 1240					

A14

Graphic log

ERDÖLPROD. GESELLSCHAFT

LOWER AUSTRIA
WIEN BASIN
ZISTERSDORF FIELD

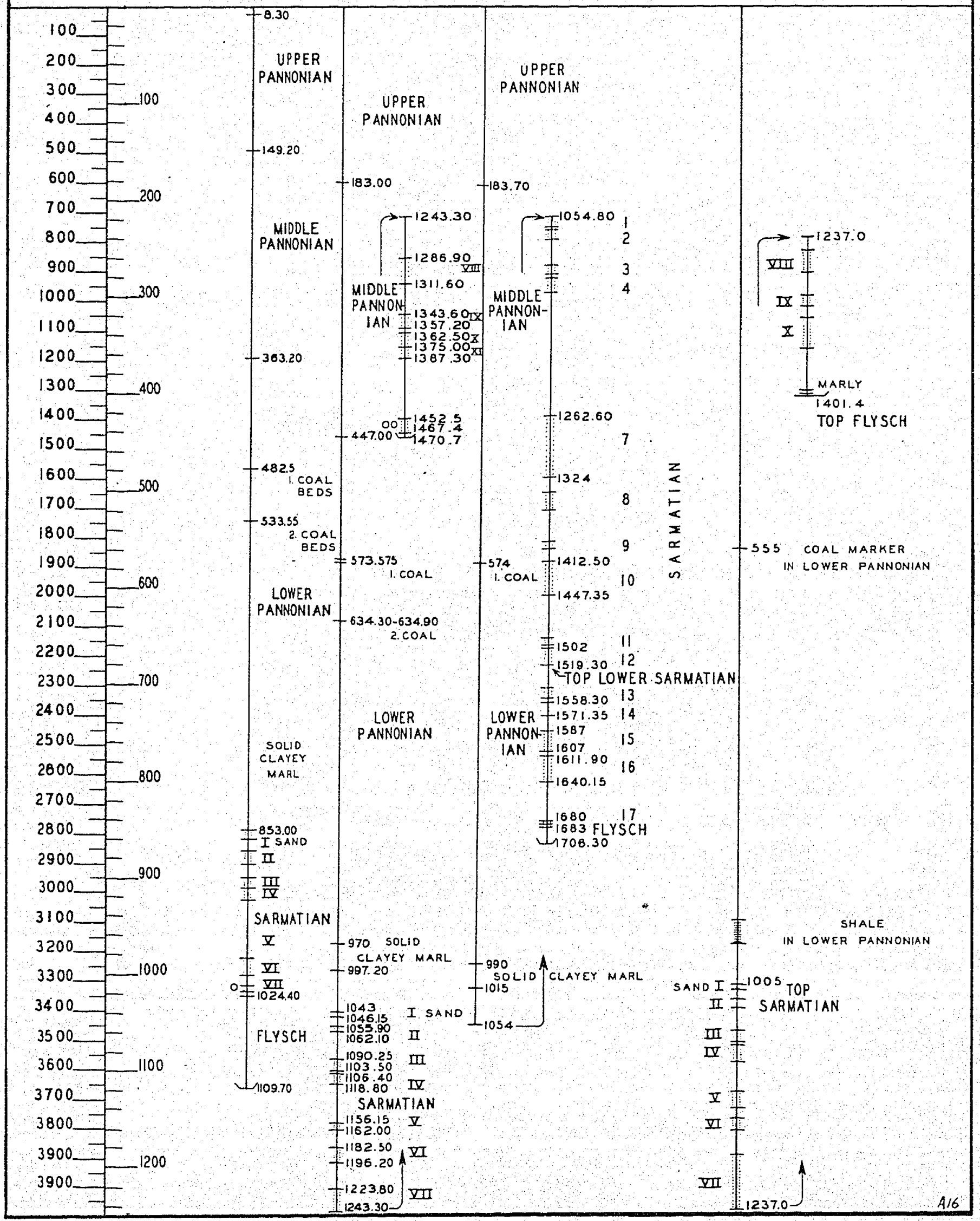


A15

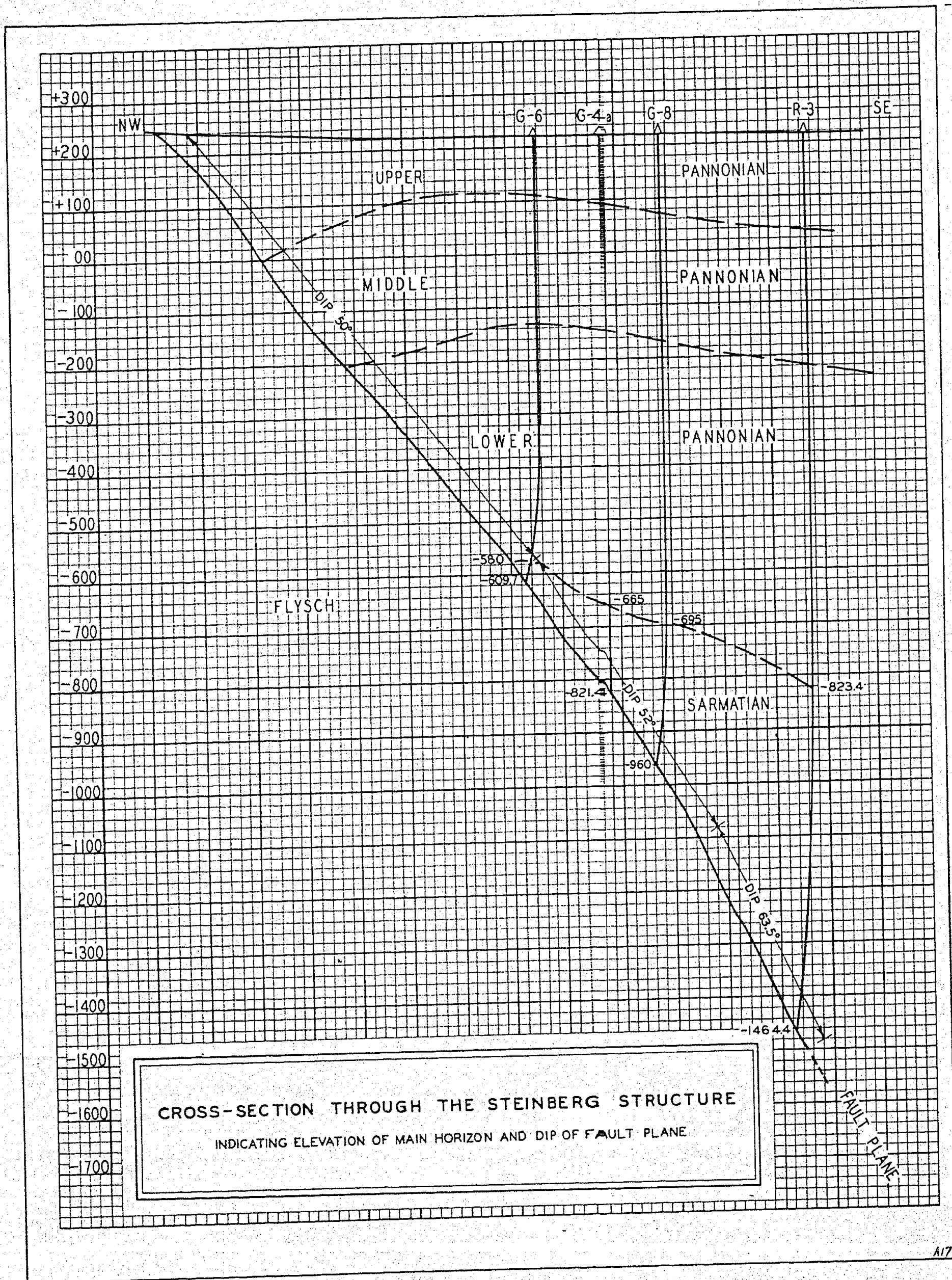
ROHOEL-GEWINNUNGS A.G. AUSTRIA GRAPHICAL WELL LOGS

LOWER AUSTRIA
WIEN BASIN
ZISTERSDORF FIELD

FEET	METERS	RAG 1	RAG 2	RAG 3	RAG 4
		+215.60m	+218.70 m	+218.06	+221.5



A16



CROSS-SECTION THROUGH THE STEINBERG STRUCTURE

INDICATING ELEVATION OF MAIN HORIZON AND DIP OF FAULT PLANE

A17

DEVELOPMENT OF ZISTERSDORF SARMATIAN HORIZONS

Gösting Wells, 1939

Depths shown in meters.

	1 From-To	2 From-To	3 From-To	4 From-To	5 From-To	6 From-To	7 From-To	8 From-To	9 From-To	10 From-To	11 From-To	12 From-To	13 From-To	14 From-To	15 From-To
Gösting No. 2 Elevation 228 +	⌀ 872-876	⌀ 888-900	⌀ 918-925	T.D. 926											
Gösting No. 4 Elevation 228 +	918-923	933-946	962-971	980-987	1024-1029	1058-1065	⌀ 1093-1106	1152	1239	● 1266	T.D. 1289				
Gösting No. 4a Elevation 228 +	892-895	911-922	⌀ 938-947	951-964	990-1001	1014-1021	⌀ 1045-1047	T.F. 1050 T.D. 1054							
Gösting No. 6 Elevation 232 +	● 812-818	⌀ 826-829	T.F.842 T.D.850												
Gösting No. 7 Elevation 232 +	○ 852-857	○ 864-871	○ 890-897	● 899-911	T.D. 920										
Gösting No. 8 Elevation 226 +	918-921	938-947	966-974	978-988	1021-1034	1043-1054	1090-1104	○ 1131-1147	○ 1164-1174	● 1181-1190	T.D. 1197 T.F. 1190				
Gösting No. 10 Elevation 221 +	1030-1036	1046-1066	1087-1092	1097-1112	1150-1168	1177-1194	1217-1244	1279-1322	1353-1362	1374-1408	1452-1456	1467-1478	1504-1510	1516-1516	T.D. 1516
Gösting No. 11 Elevation 224 +	964 shaly 970	979-996	1015-1025	1028-1042	1077-1094	1102-1115	1140-1156	1185-1223	○ 1247-1253	○ 1261-1288	1328 shaly 1330	○ 1334-1345	● 1366-1379	1383 shaly 1396	T.F. 1400 T.D. 1410
Gösting No. 12 Elevation 233 +	○ 833-839	○ 849-855	● 879-888	● 889-898	T.F. 910 T.D. 923										
Gösting No. 12a Elevation 233 +	○ 839-844	○ 855-860	● 885-893	● 894-902	T.F. 924 T.D. 946										
Gösting No. 14 Elevation +	949-956	965-983	999-1010	1014-1028	1059-1074	1082-1094	1121-1138	1164-1195	○ 1216-1226	● 1234-1254	○ 1292-1299	● 1306-1310	T.F.1312 T.D.1324		
Gösting No. 14a Elevation +	972-977	985-1008	1027-1034	1037-1050	1085-1102	1111-1123	1147-1168	1195-1232	○ 1255-1267	○ 1273-1296	○ 1330-1334	○ 1342-1346	● 1364-1378	T.F. 1381 T.D. 1403	
Gösting No. 15 Elevation +	● 836-839	● 848-852	T.F.865 T.D.880												
Gösting No. 15a Elevation +	848-849	857-861	● 887-894	T.F.896 T.D.898											
Gösting No. 16 Elevation +	978-983 M	995-1015	1031-1041	1046-1058	1095-1114	1121-1133	1159-1182	1212-1248	○ 1273-1283	○ 1289-1316	1348-1353 M	○ 1356-1368	● 1383-1387	T.F. 1387 T.D. 1401	
Gösting No. 16a Elevation +	1004						1230								
Gösting No. 17 Elevation +	967-972	983-1003	1020-1026	1030-1045	1077-1095	1102-1113	1134-1157	1181-1214	○ 1236-1247	○ 1253-1275	○ PARTLY M 1311-1319	● 1321-1329	T.F. 1333 T.D. 1355		

● = Producing oil sand

○ = Oil sand cased off

⌀ = Oil sand depleted or technically unproducible

M = Shale (Marl)

T.F. = Top Flysch

T.D. = Total Depth

DEVELOPMENT OF ZISTERSDORF SARMATIAN HORIZONS

RAG Wells, To December 31, 1939

Depths shown in meters.

Horizon	Rag 1 Elev. 215+	Rag 2 Elev. 218+	Rag 3 Elev. 218+	Rag 3a Elev. 218+	Rag 5 Elev. 221+	Rag 5a Elev. 221+	Rag 6 Elev. 227+	Rag 8 Elev. 219+	Rag 9 Elev. 228+	Rag 10 Elev.+	Rag 11 Elev.+
	From-To	From-To	From-To	From-To	From-To	From-To	From-To	From-To	From-To	From-To	From-To
1	853-860	1043-1046	1054-1064		1005-1012		966-979	811-820	944-960	980-990	1057-1065
2	874-886	1055-1062	1067-1077		1017-1025		982-999	824-850	961-982	992-1011	1069-1092
3	901-909	1090-1103	1107-1115		1051-1061		1007-1024	856-866	991-1010	1028-1038	1101-1116
4	909-924	1105-1118	1119-1135		1065-1081		1027-1044	● 870-878	1013-1031	1042-1056	1123-1144
5	M	1156-1162	M		1114-1136		1076-1098	T.F. 879 T.D. 910	1063-1079	M	M
6	985-1004	1182	M		1140-1151		1103-1133		1100-1137	M	M
7	◉ 1014-1019	1223-1282	1262-1324		1178-1235		○ 1158-1220		1158-1210	1174-1226	1249-1327
8	T.F. 1024 T.D. 1108	1287-1315	1340-1359		1249-1273		1222-1260		1212-1252	1249-1268	1342-1363
9		1343-1357	1392-1397		1296-1308		○ 1284-1298		○ 1270-1282	1302-1310	1397-1406
10		1362-1392	1412-1447		1318-1352		1309-1356		T.F. 1293 T.D. 1295	1321-1354	1417-1476
11		○ 1437-1440	1490-1497			○ 1403-1406	○ 1409-1412			○ 1401-1406	1500-1506
12		● 1447-1467	1502-1519		T.F. 1401 T.D. 1429	○ 1413-1431	○ 1420-1444			○ 1417-1430	1520-1534
13		T.D. 1472	1544-1553			● 1454-1459	● 1461-1482			○ 1452-1459	1560-1569
14			1558-1571			T.F. 1463 T.D. 1476	1483-1502 ○			○ 1465-1481	1576-1591
15			1587-1607				1504-1526			○ 1497-1513	1609-1626
16			1611-1640				T.F. 1540 T.D. 1543			○ 1520-1541	1629-1644
17			1680-1683							○ 1604-1608	1721-1724
18			T.F. 1684 T.D. 1706							○ 1621-1629	1732-1746
19										◉ 1640-1643	1748-1770
20				1764-1775						T.F. 1643 T.D. 1651	1774-1794
21				T.F. 1844 T.D. 1844							1804-1850
22											● 2134-2141 5th Tortonian
											T.F. 2190 T.D. 2287

● Producing oil sand
○ Oil sand cased off
◉ Oil sand depleted or technically unproducible

M Shale (Marl)
T.F. Top Flysch
T.D. Total Depth

RAG 10

SCHLUMBERGER ELECTRICAL LOG AND COMPLETION REPORT

ZISTERSDORF, JULY 21,1939

FIELD: ZISTERSDORF

WELL NO: RAG NO 10

SUMMARY SHEET:

Elevation at rotary table	•
Total depth	1651 m.
Date commenced drilling	Dec.14/38
Date completed drilling	July 21/39
Date in production	•
Method of bringing in	Swabbing
Initial production	74 metric tons 503 barrels
Initial G.O.R.	230 Cu.Ft.per Bbl.
Initial pressure	Tubing 20 atm. Casing 42 atm.
Initial bean	6 mm.
Initial gravity	0.890
Initial B. S. & W.	19 per cent
Zone open to production	19th Sarmatian

CASING RECORD:

13 7/8" cemented at 91 meters
9 5/8" cemented at 1015 meters
6 5/8" cemented at 1653 meters

PERFORATIONS:

6 5/8" casing perforated

1640-1642 meters
1637-1638 meters
1634-1635 meters

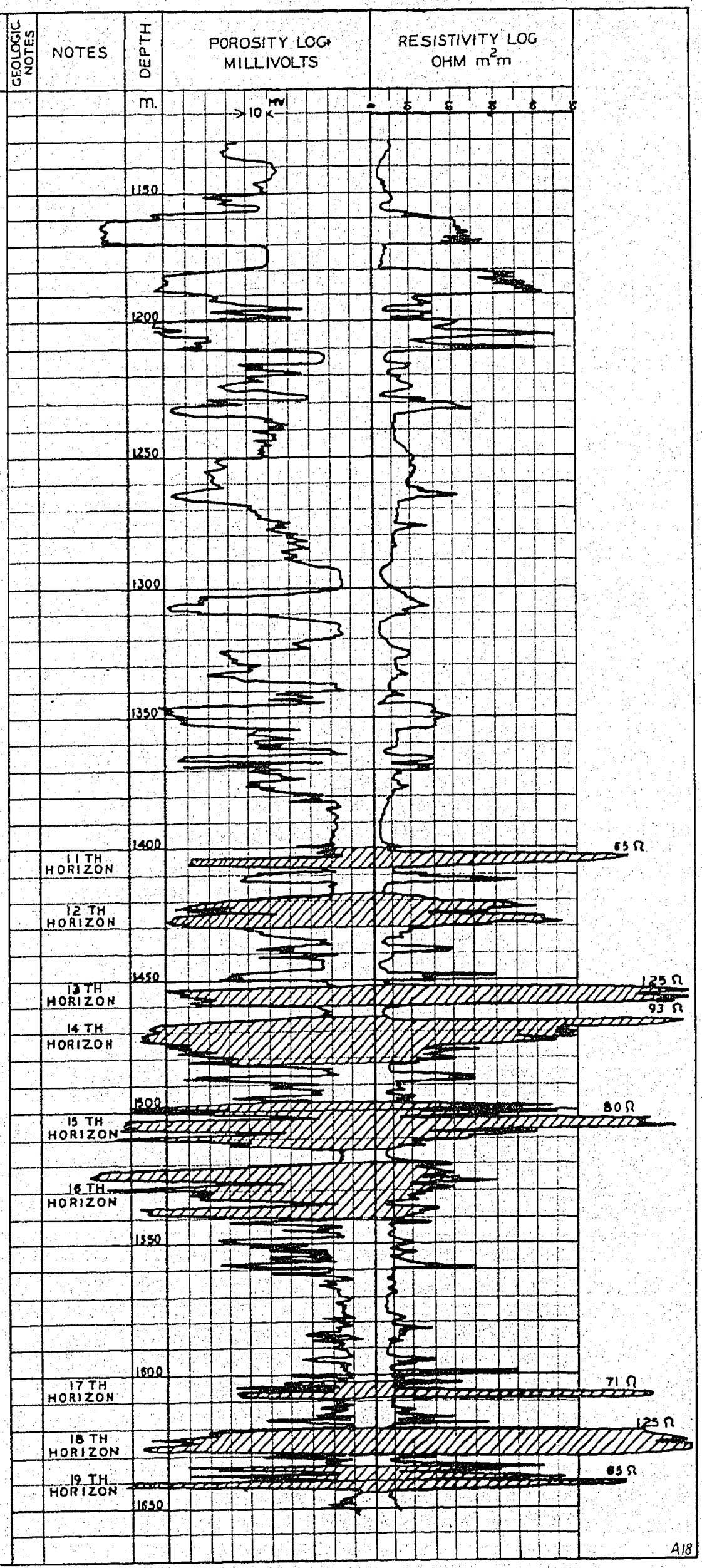
TUBING RECORD:

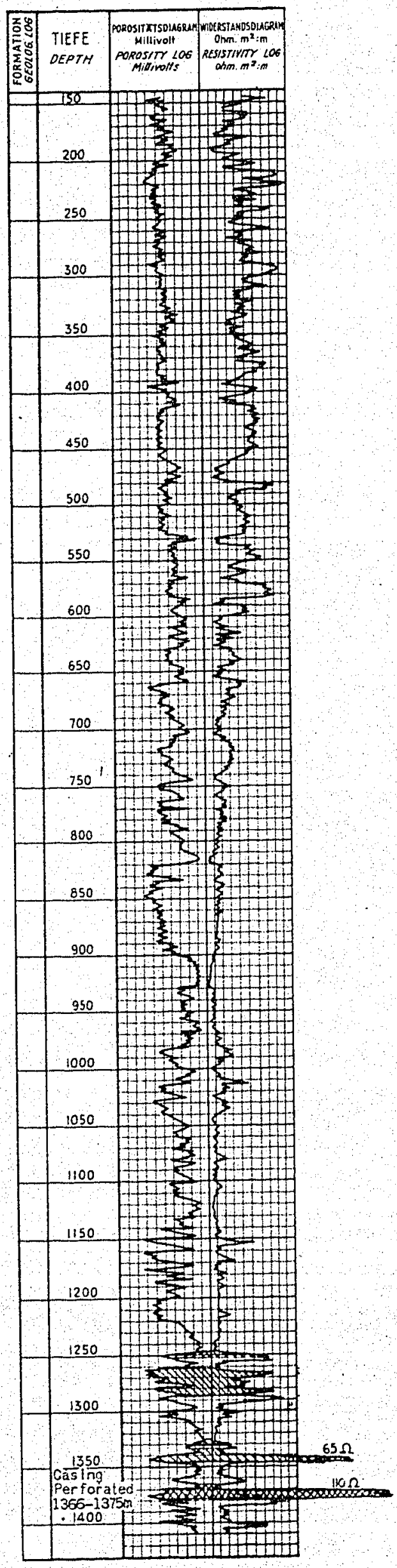
2 1/2" tubing run to 1620 meters

PRODUCING HORIZONS:

19th Sarmatian 1634-1643 meters

• - no information





GÖSTING 11

SCHLUMBERGER ELECTRICAL LOG AND COMPLETION REPORT

ZISTERSDORF, JANUARY 10, 1938

FIELD: ZISTERSDORF

WELL: GOSTING NO.11

SUMMARY SHEET:

Elevation at rotary table	221 m.
Total depth	1410 m.
Date commenced drilling	October 9, 1937
Date completed drilling	December 31, 1937
Date in production	January 6th, 1938
Method of bringing in	Swabbing
Initial production	64 metric tons 435 barrels
Initial G.O.R.	198 cu.ft.per bbl.
Initial pressure	Tubing 45 atm. Casing 85 atm.
Initial bean	8 mm.
Initial gravity	0.890
Initial B.S.& W.	0
Zone open to production	13th Sarmatian

CASING RECORD:

14" casing cemented at 145 meters

6 1/2" casing cemented at 1409 meters

PERFORATIONS:

6 5/8" casing perforated 1366-1375 m.

TUBING RECORD:

2" and 3" combination tubing to 1360 m.

PRODUCING HORIZON:

13th Sarmatian 1366- 1379 m.

COMPANY: ROHOEL-GEWINNUNGS A.G.

FIELD: ZISTERSDORF

WELL NO: GA 3

POLITICAL DISTRICT: GÄNSERNDORF

COMMUNITY: GAISELBERG

SECTION: 4557/4

PARCEL: 1361

DRILLED BY: ROHOEL-GEWINNUNGS A.G.

ELEVATION OF IMPORTANT FORMATIONS WITH RESPECT TO SEA LEVEL:
TOP SARMATIAN 490.70 m
TOP FLYSCH 800.70 m

DRILLING SYSTEM: ROTARY-DIESEL

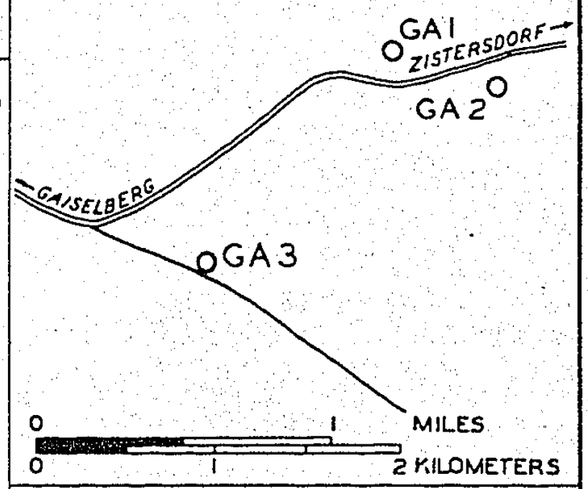
BEGUN: OCT. 10, 1938 | COMPLETED: NOV. 3, 1938

SCALE: | FINAL DEPTH: 1190.20 m

GROUND ELEVATION ABOVE SEA LEVEL: 269.30 m

ELEVATION OF DERRICK FLOOR ABOVE SEA LEVEL: 272.10 m

LOCATION SKETCH:



FILE NO: G 1047

DATE	METERS	MICROFAUNA	MACROFAUNA AND FLORA	CORE DETAILS CASING DEVIATION	CORE	FORMATIONS PENETRATED	METERS	OIL, GAS, WATER	DRILLING AND PRODUCTION DATA	LITHOLOGIC DESCRIPTION	GEOLOGICAL FORMATION
10-10-38										13.20 LOESS	QUARTERNARY 13.20
			13.20								
	50		CONGERIA BALATONICA ZONE				50		45.10 FIRST UPPER PANNONIAN KEY BEDS	30.80 COARSE SAND WITH SOME CLAY-SHALE LAYERS. 31.80 YELLOW-GREEN PARTLY SANDY DRY-SHALE WITH NUMEROUS LIMEY CONCRETIONS. 32.80 FINE, YELLOW, CLAYEY SAND. 34.00 GRAY-GREEN TO GRAY-YELLOW, RATHER SANDY CLAY. 35.00 GRAYISH FINE SAND. 36.40 LIGHT GREENISH-GRAY OR YELLOWISH CLAY-SHALE. 37.20 YELLOW BROWN, FINE, CLAYEY SAND WITH CALCAREOUS SANDSTONE INTERCALATIONS. 38.10 GREENISH-GRAY, LOCALLY YELLOW-FLECKED CLAY-SHALE. 40.00 YELLOW-BROWN SANDY CLAY-SHALE. 42.80 GRAY-GREEN IN PART YELLOW-BROWN FLECKED CLAY-SHALE. 44.10 YELLOW, SANDY CLAY-SHALE WITH CALCAREOUS SANDSTONE CONCRETIONS. 44.75 GRAY TO BLACK CLAY. 45.10 GRAYISH-GREEN CLAY. 46.40 YELLOW CLAY-SHALE. 49.00 GRAY-GREEN AND GRAY, IN PART BROWN-SPECKLED CLAY-SHALE AND CLAY. 52.30 LIGHT GRAY TO GRAY-GREEN, FINE, CLAYEY SAND WITH SANDSTONE CONCRETIONS. 59.40 GRAY-GREEN TO GRAY, IN PART BROWN-SPECKLED CLAY-SHALE.	
									69.00 SECOND UPPER PANNONIAN KEY BEDS	64.20 GRAY-GREEN TO GRAY-YELLOW, FINE, CLAYEY SAND WITH SANDSTONE CONCRETIONS. 65.70 DARK GRAY-GREEN CLAY. 68.00 LIGHT GRAY TO GRAY-GREEN SAND WITH SANDSTONE CONCRETIONS. 69.00 GREEN CLAY-SHALE. 71.80 BLUE-GRAY AND GRAY-GREEN CLAY. 72.40 GREEN, FINE COMPACT CLAYEY SAND. 75.60 YELLOW-GREEN CLAY-SHALE. 76.30 BLUE-GRAY CLAY-SHALE.	

A20-1

PRODUCING
Gaiselberg 3

42 - PRODUCING
Galselberg 3

UPPER PANNIONIAN

127.20 BLUE-GRAY, IN PART SANDY CLAY-SHALE WITH OCCASIONED SAND LAYERS.

132.20 BLUE, PARTIALLY INDURATED CLAY-SHALE.

144.20 GRAY BLUE QUICKSAND

152.20 QUICKSAND WITH GRAVEL BEDS AND INTERCALATIONS OF CONCRETIONARY CALCAREOUS SAND-STONE
155.20 LIGNITE

165.70

165.39 COARSE SAND WITH GRAVEL BEDS
165.70 LIGNITE

171.20 COARSE SAND WITH GRAVEL BEDS

177.20 CLAY-SHALE WITH SAND LAYERS.

182.22 COARSE SAND WITH GRAVEL LAYERS
183.50 CALCAREOUS SANDSTONE CONCRETIONS
184.50 COMPACT GRAVEL.

195.20 COMPACT GRAVEL IN PART CONGLOMERATIC WITH SAND INTERCALATIONS.

198.20 GRAVEL

205.20 SANDY CLAY-SHALE.

208.20 CLAY-SHALE.
209.00 CLAYEY SAND
210.50 DRY SHALE.

224.50 GRAY-YELLOW RATHER CLAYEY SAND.

243.20 GRAY-YELLOW QUICKSAND WITH OCCASIONAL CLAYEY BEDS.
244.20 BLACK LIGNITE.
246.00 CLAY-SHALE.
248.00 SANDY CLAY-SHALE

256.00 GRAY COARSE SAND WITH LAYERS OF FINE GRAVEL

265.00 GRAY CLAYEY SAND ALTERNATING WITH SANDY CLAY SHALE.

100 150 200 250

11¾"
208.70

CONGERIA BALATONICA ZONE

165.70

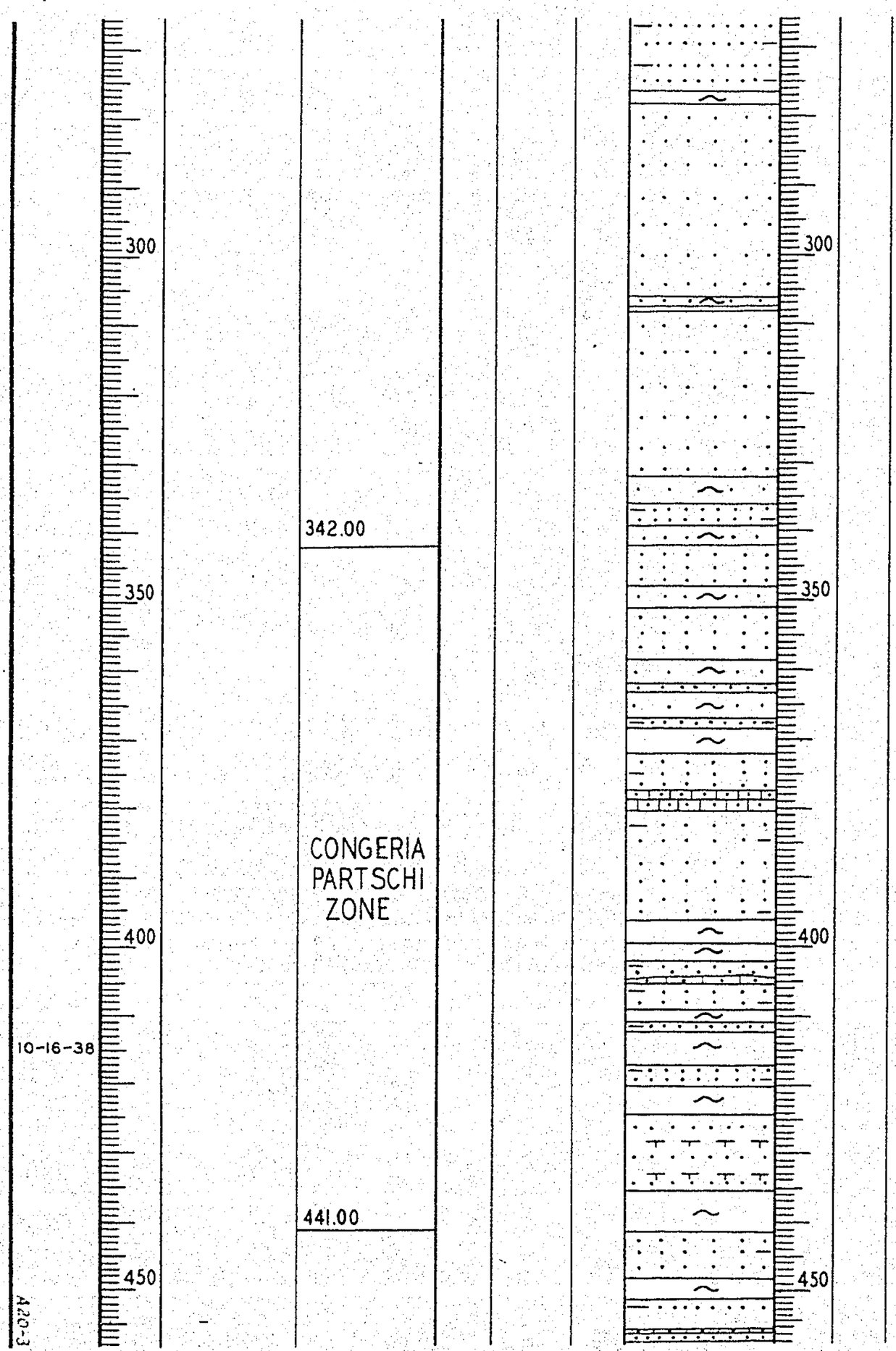
CONGERIA SUBGLOBOSA ZONE

100 150 200 250

10-11-38

10-15-38

A20-2



276.00 CLAYEY SAND.
278.00 CLAY SHALE.

306.00 SAND.
328.00 SANDY CLAY-SHALE WITH SEAMS OF BLACK LIGNITE.

332.00 SAND.
336.00 SANDY CLAY-SHALE.
339.00 CLAYEY SAND.
342.00 SANDY CLAY-SHALE.

348.00 SAND.
351.00 SANDY CLAY-SHALE.

358.00 SAND.

361.00 SANDY CLAY-SHALE.
363.00 SAND.

367.00 SANDY CLAY-SHALE.
368.00 SAND.

372.00 CLAY-SHALE.

377.20 SAND WITH OCCASIONAL CLAYEY INTERCALATIONS.

381.70 SOFT, CALCAREOUS SANDSTONE.

396.00 SAND WITH OCCASIONAL CLAYEY INTERCALATIONS.
399.20 CLAY-SHALE.
402.00 INDURATED, CONCRETIONARY CLAY-SHALE.
408.00 CLAYEY SAND WITH INTERBEDDING OF CALCAREOUS SANDSTONE.

409.00 CLAYEY SAND.
410.50 CLAY-SHALE.
412.00 CLAYEY SAND.

417.00 CLAY-SHALE.

420.00 PARTIALLY INDURATED CLAYEY SAND.

424.00 GREENISH-GRAY CLAY-SHALE.

435.00 SAND WITH SANDSTONE LENSES

441.00 GREENISH-GRAY CLAY-SHALE WITH INDURATED BEDS, ESPECIALLY AT 439.00 METERS.

448.00 SAND WITH OCCASIONAL SOMEWHAT CLAYEY BEDS.

452.00 CLAY-SHALE.

454.20 CLAYEY SAND WITH SOFT, SANDSTONE BEDS.
454.90 CALCAREOUS SANDSTONE.
458.00 SAND.

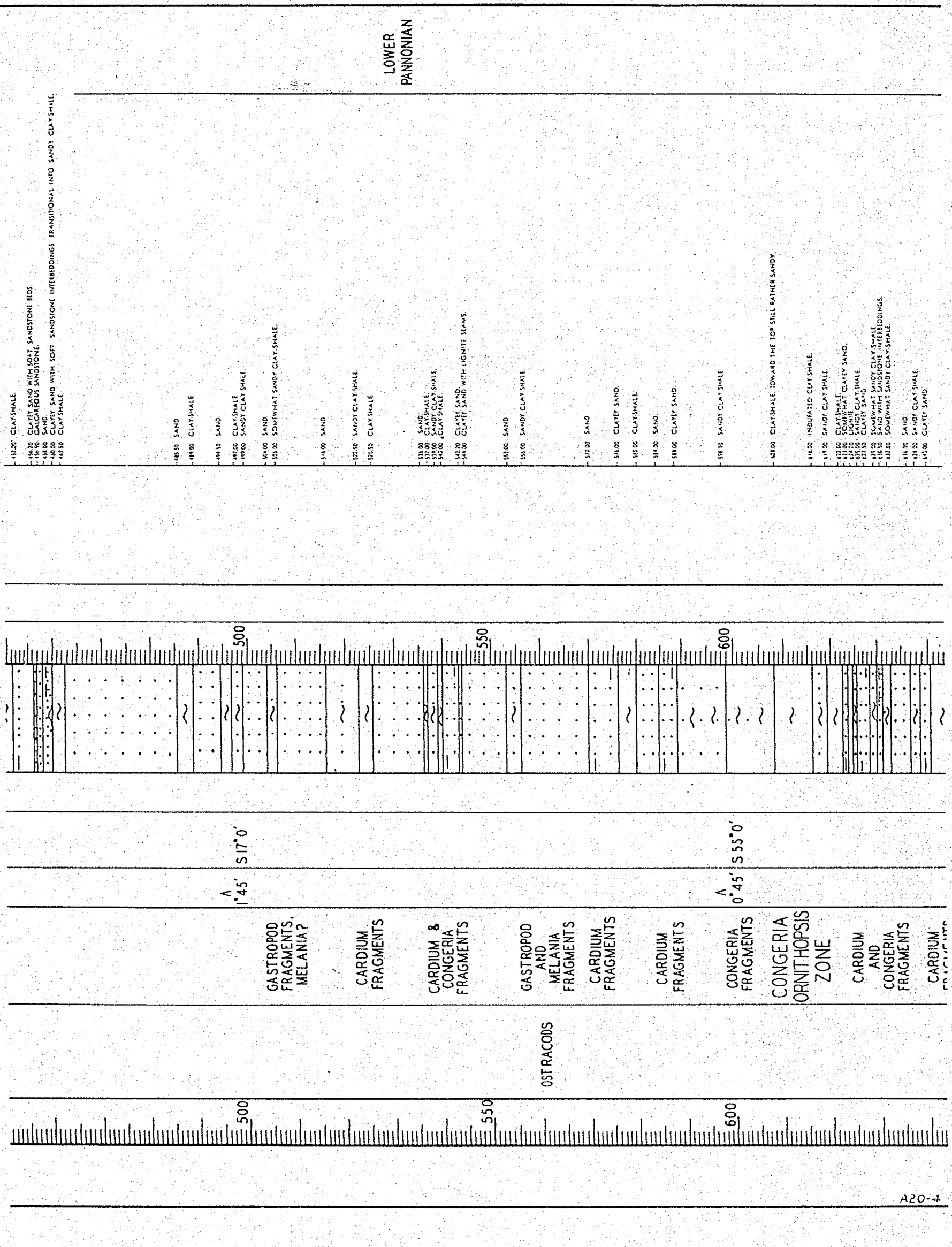
MIDDLE
PANNONIAN

342.00

44 - PRODUCING
Gaiselberg 3

LOWER PANNONIAN

451.20	CLAY SHALE.
456.20	CLAYEY SAND WITH SOFT SANDSTONE BDS.
456.90	CALCAREOUS SANDSTONE.
458.00	SAND.
460.00	CLAYEY SAND WITH SOFT SANDSTONE INTERBEDDINGS TRANSITIONAL INTO SANDY CLAY SHALE.
462.50	CLAY SHALE.
485.50	SAND
489.50	CLAY SHALE
494.50	SAND.
497.20	CLAY SHALE
499.00	SANDY CLAY SHALE.
504.00	SAND.
506.00	SOMEWHAT SANDY CLAY SHALE.
516.00	SAND.
527.50	SANDY CLAY SHALE.
529.50	CLAY SHALE.
536.00	SAND.
537.00	CLAY SHALE.
539.00	SANDY CLAY SHALE.
540.00	CLAY SHALE.
542.20	CLAYEY SAND.
544.00	CLAYEY SAND WITH LIGNITE SEAMS.
553.00	SAND.
556.00	SANDY CLAY SHALE.
570.00	SAND.
576.00	CLAYEY SAND.
580.00	CLAY SHALE.
584.00	SAND.
588.00	CLAYEY SAND.
598.00	SANDY CLAY SHALE.
608.00	CLAY SHALE. TOWARD THE TOP STILL RATHER SANDY.
616.00	INDURATED CLAY SHALE.
619.00	SANDY CLAY SHALE.
627.00	CLAY SHALE.
631.00	SOMEWHAT CLAYEY SAND.
634.20	LIGNITE.
635.00	SANDY CLAY SHALE.
637.50	CLAYEY SAND.
639.50	SOMEWHAT SANDY CLAY SHALE.
645.50	SAND WITH SANDSTONE INTERBEDDINGS.
657.00	SOMEWHAT SANDY CLAY SHALE.
664.20	SAND.
669.50	SANDY CLAY SHALE.
672.00	CLAYEY SAND



A20-1

10-18-38

650

700

750

10-20-38

800

A20-5'

CARDIUM FRAGMENTS

SMALL CARDIUM FRAGMENTS

SMALL BIVALVES (CARDIUM)

MANY OSTRACODS

744.00

OSTRACODS

MELANOPSIS IMPRESSA

760.00

OSTRACODS

MODIOLA FRAGMENTS

795.90

^ 1°0' S 16°0'

^ 3° S 57°0'

^ 1°30' N 83°0'

12°

650

700

750

800

760.00 - 775.00
1-SARMATIAN HORIZON
776.50 - 784.00
2-SARMATIAN HORIZON
787.00 - 796.50
3-SARMATIAN HORIZON
798.00 - 813.50
4-SARMATIAN HORIZON

638.00 SANDY CLAY-SHALE.
640.00 CLAYEY SAND.

644.50 CLAY-SHALE.

650.20 SAND.
651.20 CALCAREOUS SANDSTONE.

656.00 CLAYEY SAND.
658.70 GRAYISH, RATHER SANDY CLAY-SHALE WITH LIGHT GRAY, FINE, BANDS OF SAND, I. E. PART INTERSPERSED WITH COAL SEAMS AND PLANT REMAINS

665.20 GRAY FIRM, IN PART SANDY CLAY-SHALE, WITH NUMEROUS COAL BEDS AND PLANT REMAINS BETWEEN 659.70—660.20 SOME LIGHT-GRAY SAND LAYERS, FROM 662.20.

684.20 ALTERNATING SANDY CLAY SHALE.
686.20 VERY SANDY CLAY-SHALE WITH OCCASIONAL INDURATED LAYERS.

691.20 GRAY TO GREENISH GRAY LIGHT SANDY CLAY SHALE. 689.80. 690.20 VERY SANDY CLAY-SHALE 690.60 - 691.20 WITH THICK SAND INTERCALATIONS.

714.20 GRAY-GREEN SOLID IN PART SHINY CLAY-SHALE, PARTLY INTERBEDDED WITH GREASY CLAY SOMEWHAT BITUMINOUS, AND OCCASIONAL GRAY, THIN SAND LAYERS.

720.00 SAND WITH SANDSTONE INTERBEDDINGS.
722.00 HARD CLAY-SHALE.
724.00 HARD SANDY CLAY-SHALE.

728.00 CLAY-SHALE.

732.00 SANDY CLAY-SHALE.
734.00 CLAY-SHALE.
734.50 SOMEWHAT SANDY CLAY-SHALE.

738.70 GREEN, RATHER HARD CLAY-SHALE.
739.50 LIGHT-GREEN, VERY SANDY CLAY-SHALE.
741.30 LIGHT GREEN SANDY SHALEY-CLAY WITH THICK, GRAY, SOMEWHAT IRREGULAR SAND LAYERS.
742.10 LIGHT-GREEN VERY SANDY CLAY-SHALE GRADING INTO CLAY SANDSTONE WITH A FEW SANDY
744.20 LIGHT-GREENISH GRAY QUICKSAND CLAY-SHALE LAYERS.

751.00 ALTERNATING CLAYEY SAND WITH SOME VERY SANDY CLAY-SHALE LAYERS.
754.00 CLAY-SHALE, IN PART VERY HARD.

758.00 SOMEWHAT SANDY CLAY-SHALE.
760.00 HARD CLAY SHALE

760.00

763.00 SAND.
764.20 GRAY, SLIGHTLY SANDY CLAY-SHALE.
764.70 GRAY, RATHER SOLID CLAY-SHALE WITH SOME LIGNITE INTERLAYERS
766.00 GRAY SLIGHTLY SANDY CLAY SHALE WITH SOME SAND LAYERS AT 765.20 METERS, VERY SANDY.
768.00 CLAY SHALE.
770.00 SANDY CLAY-SHALE.

773.00 SOMEWHAT CLAYEY SAND WITH INTERBEDDINGS OF SANDY CLAY-SHALE.
774.00 SANDY CLAY SHALE
775.00 CLAYEY SAND.
776.50 CLAY-SHALE.

780.00 SAND

784.00 CLAYEY SAND.
784.80 CLAY-SHALE.
786.00 SANDY CLAY-SHALE TO CLAYEY SAND.
787.00 CLAY-SHALE.
789.00 SAND

791.20 GRAY CLAY-SHALE WITH ABUNDANT LIGNITE INTERLAYERS, AND A FEW VERY FINE, SANDY LAYERS.
791.50 GRAY, FINE SAND.
792.20 GREENISH-GRAY, FINE, SANDY CLAY-SHALE, WITH SOME THICK SAND LAYERS.
792.40 GRAY, FINE, CLAYEY SAND, LOCALLY VERY SANDY.
792.80 DIRTY GREEN-GRAY TO GRAY GREEN CLAY-SHALE.
793.00 LIGHT GRAY-GREEN, VERY SANDY CLAY-SHALE.
793.25 GRAY, FINE SAND.
793.40 LIGHT GRAY-GREEN, VERY SANDY CLAY-SHALE AT 793.40, ABUNDANT LIGNITE.
795.70 GRAY, FINE SAND, WITH SOME CLAYEY BEDS.
796.50 LIGHT GRAYISH GREEN VERY SANDY CLAY-SHALE WITH THICK INTERBEDDINGS OF GRAY SAND.
798.00 CLAY-SHALE.
799.20 SOMEWHAT CLAYEY SAND.
800.20 CALCAREOUS SANDSTONE.
801.20 PLASTIC CALCAREOUS SANDSTONE AND SAND.
801.70 CALCAREOUS SANDSTONE.
804.70 VERY SANDY CLAY-SHALE, WITH HARD SANDSTONE INTERBEDDINGS.
806.00 SAND WITH HARD SANDSTONE INTERLAYERS
807.00 CLAYEY SAND WITH HARD SANDSTONE INTERLAYERS.
811.50 ALTERNATING SANDY CLAY-SHALE WITH MORE CLAYEY LAYERS.
815.50 CLAY SHALE.
817.00 SOMEWHAT SANDY CLAY-SHALE
818.00 CLAY-SHALE.
819.50 SANDY CLAY SHALE.
821.00 CLAY-SHALE.

10-22-38

850

e NON GRANOSUM — MODIOLA FRAGMENTS — 1°30′ 0°

900

10-25-38

OSTRACODS — CERITH. PICT. U. DISJUNCT. CARD. PLICAT. BYTHNIUM — 2° S17°0′

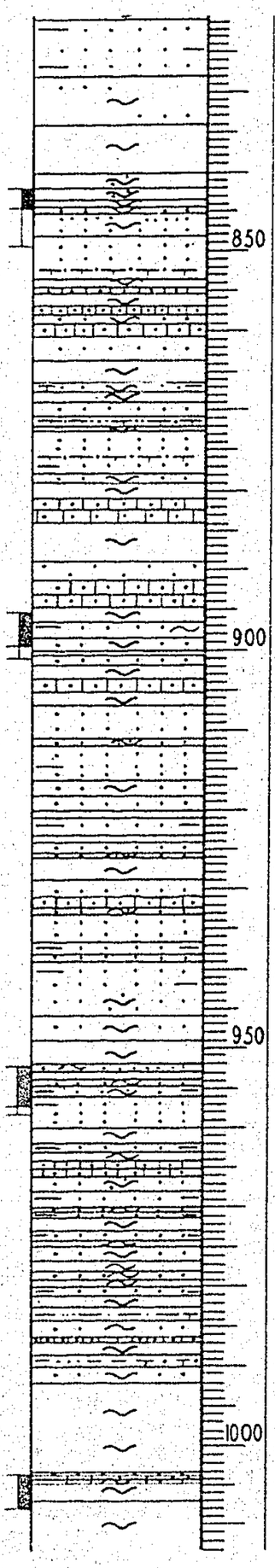
950

POORLY PRESERVED FORAMINIFERA — TAP. GREGAR., MACTRA POD., BULLA LAJONK CARD. SP. — 2°45′ S60°0′

1000

10-27-38

MODIOLA MARGIN CARD. PLICAT. — 2°30′ S71°0′



848.00 - 863.50
5-SARMATIAN HORIZON

869.00 - 894.50
6-SARMATIAN HORIZON

900.70 - 949.00
7-SARMATIAN HORIZON

952.00 - 990.00
8-SARMATIAN HORIZON

1013.50 - 1026.00

821.00 CLAY-SHALE.

829.00 SOMEWHAT CLAYEY SAND.

934.00 CLAY SHALE WITH OCCASIONAL SANDY LAYERS.

840.00 HARD CLAY-SHALE.
842.00 SOMEWHAT SANDY CLAY-SHALE.
843.20 GRAY SLIGHTLY SANDY CLAY SHALE WITH SOME INTERBEDDINGS OF LIGHT GRAY, FINE GRAINED SANDSTONE.
844.10 GRAY, SLIGHTLY SANDY CLAY SHALE.
845.20 GRAY TO GRAYISH GREEN CLAY SHALE WITH INTERBEDDINGS OF LIGHT GRAY, FINE GRAINED SANDSTONE.
848.00 GRAY CLAY-SHALE WITH LIGHT GRAY SANDSTONE INTERBEDDINGS.

853.50 SAND WITH INTERLAYERS OF PLASTIC SANDSTONE.
854.70 CLAY-SHALE.
855.20 CALCAREOUS SANDSTONE.
857.00 HARD CLAY-SHALE.
858.00 CALCAREOUS SANDSTONE.
859.20 HARD CLAY-SHALE WITH SANDY LAYERS.
862.70 CALCAREOUS SANDSTONE.
863.50 SAND.

866.50 CLAY-SHALE.
867.50 SANDY CLAY-SHALE GRADING INTO GRAY SAND WITH INTERBEDDINGS OF PLASTIC SANDSTONE.
869.00 HARD CLAY-SHALE.
870.70 SAND.
872.00 SANDSTONE.
872.60 HARD CLAY-SHALE.

878.00 SOMEWHAT CLAYEY SAND WITH LAYERS OF PLASTIC SANDSTONE.
879.00 SANDY CLAY SHALE WITH HARD INTERBEDDINGS.
[illegible].00 HARD CLAY SHALE.
884.00 PLASTIC CALCAREOUS SANDSTONE.

889.00 CLAY SHALE.
891.20 SAND.
894.50 PLASTIC CALCAREOUS SANDSTONE.
895.60 GREEN TO LIGHT GREEN CLAY SHALE.
898.50 GRAY, FINE, SOMEWHAT CLAYEY SAND WITH STRONGLY SANDY CLAY SHALE INTERBEDDINGS.
900.30 GRAY CLAY SHALE WITH SOME LAYERS OF FINE SAND, COAL FRAGMENTS, LEAF REMAINS.
900.70 GRAYISH-GREEN CLAY SHALE.
902.50 SAND.
903.70 CLAY-SHALE.
905.70 CALCAREOUS SANDSTONE.
907.00 CLAY-SHALE.

911.00 SAND.
912.00 STRONGLY SANDY CLAY SHALE.

916.00 SAND WITH SOME CLAYEY LAYERS AT 914.50.
918.00 SANDY CLAY SHALE.

920.00 SAND.
921.00 STRONGLY SANDY CLAY SHALE.

923.00 CLAYEY SAND.
924.00 VERY SANDY CLAY SHALE.
925.20 SAND.
926.00 CALCAREOUS SANDSTONE.
929.00 HARD CLAY SHALE.

932.20 SAND WITH INTERBEDDINGS OF CALCAREOUS SANDSTONE.
933.50 VERY SANDY CLAY SHALE.

936.50 SAND.

938.00 CLAYEY SAND.
939.00 SAND.

946.00 CLAYEY SAND ALTERNATING WITH LAYERS OF VERY SANDY CLAY SHALE.

949.00 SANDY CLAY SHALE.

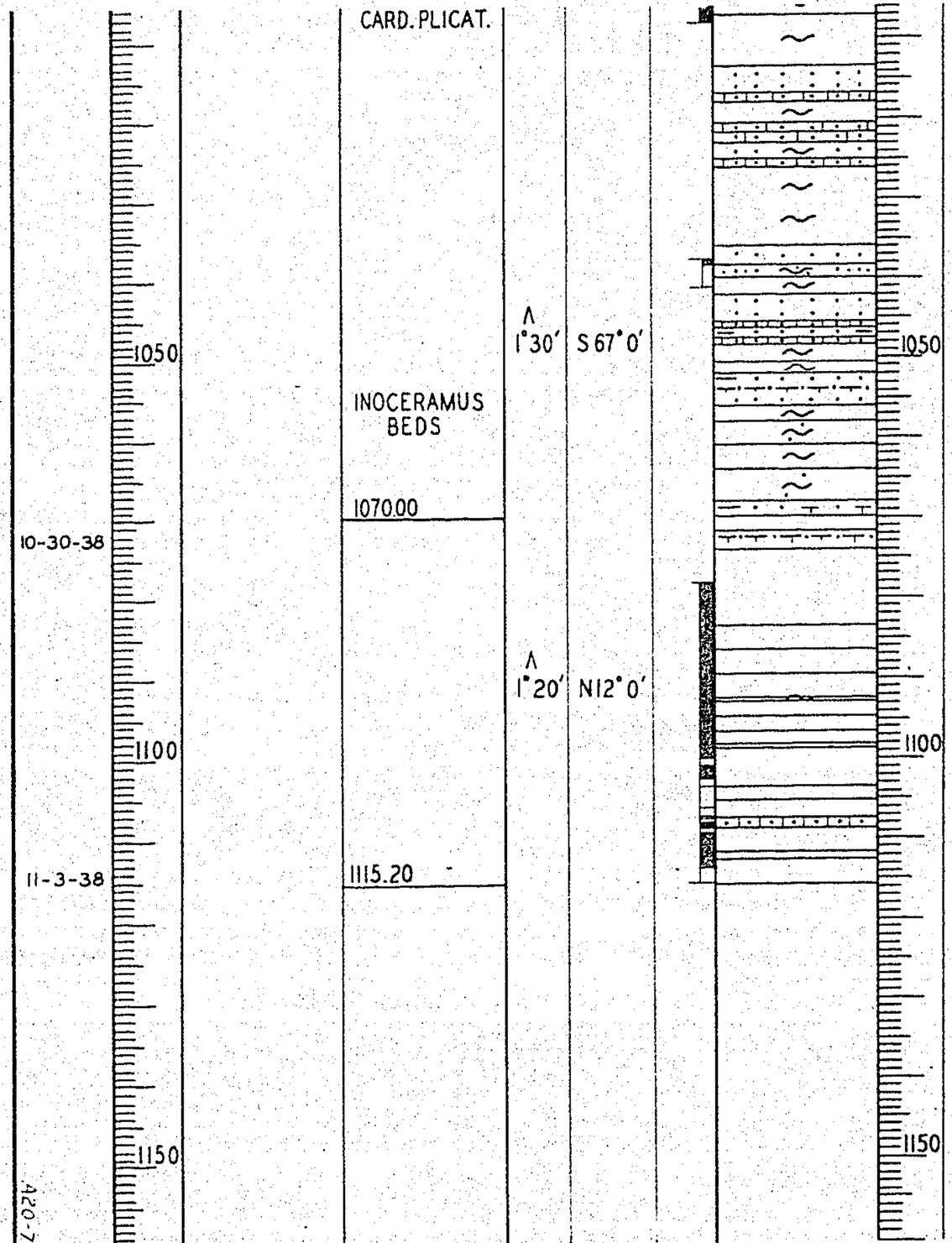
952.00 CLAY-SHALE.
953.00 GRAY SANDY CLAY SHALE WITH LAYERS OF LIGHT GRAY FINE SAND.
963.20 GRAY TO DARK GRAY, VERY SANDY GRAY SHALE WITH INTERBEDDINGS OF CLAYEY SAND.
963.80 GRAY SANDY CLAY SHALE WITH THICK ALTERNATIONS OF VERY SANDY CLAY OR CLAYEY SAND.
965.70 GRAY SAND WITH SOME INTERBEDDINGS OF LIGHT GRAY SANDY CLAY.
966.00 GRAY VERY SANDY CLAY SHALE GRADING INTO VERY CLAYEY SAND.
968.00 GRAY, FINE GRAINED SOMEWHAT CLAYEY SAND.
968.50 CLAY-SHALE.
969.00 CLAYEY SAND.
969.20 CLAY SHALE.
969.00 PLASTIC CALCAREOUS SANDSTONE.
969.00 VERY SANDY CLAY SHALE.
970.00 CLAYEY SAND.
970.50 VERY SANDY CLAY SHALE.
971.50 VERY CLAYEY SAND.
972.00 CLAY SHALE.
974.00 VERY CLAYEY SAND.
975.00 CLAY SHALE.
976.50 SANDY CLAY SHALE.
978.00 CLAY SHALE.
979.00 SANDY CLAY SHALE WITH SANDSTONE INTERBEDDINGS.
980.00 SOMEWHAT HARDER CLAY SHALE.
981.00 CLAYEY SAND.
981.50 HARD CLAY SHALE.
984.00 CLAYEY SAND WITH SANDSTONE INTERBEDDINGS.

987.00 SANDY CLAY SHALE WITH INTERCALATIONS OF CALCAREOUS SANDSTONE.
985.50 HARD CLAY SHALE WITH INTERCALATIONS OF CALCAREOUS SANDSTONE.
990.00 CLAYEY SAND WITH SANDSTONE INTERBEDDINGS.
992.00 SANDY CLAY SHALE.

1001.70 GRAY GREEN HARD CLAY SHALE.
1003.10 GRAY TO DARK GRAY SANDSTONE.
1004.70 GRAY, FINE GRAINED SOMEWHAT CLAYEY SAND.
1004.70 LIGHT GRAYISH GREEN, LOCALLY BLACK, SANDY CLAY SHALE WITH SOME LAYERS OF FINE SAND.
1007.50 GRAYISH-GREEN CLAY SHALE WITH LOCALLY WELL DEVELOPED BEDDING.

1013.50 GRAY TO DARK GRAY FAIRLY HARD CLAY SHALE.

SARMATIAN



1013.50 - 1026.00
9 - SARMATIAN HORIZON

1036.00 - 1055.00
9a - SARMATIAN HORIZON

1007.00 GRAYISH-GREEN CLAY SHALE WITH LOCALLY WELL DEVELOPED BEDDING.

1013.50 GRAY TO DARK GRAY FAIRLY HARD CLAY SHALE.

1017.00 SAND.
1018.00 PLASTIC CALCAREOUS SANDSTONE.
1020.50 CLAY-SHALE.
1023.00 PLASTIC CALCAREOUS SANDSTONE.
1025.00 SANDY CLAY-SHALE.
1026.00 PLASTIC CALCAREOUS SANDSTONE.

1036.00 SOMEWHAT INDURATED CLAY-SHALE.
1038.50 SAND.
1040.00 GRAY TO GREENISH-GRAY, VERY SANDY CLAY-SHALE WITH LAYERS OF FINE-GRAINED SAND
1042.00 CLAY-SHALE.
1045.00 COMPACT SAND.
1046.20 CALCAREOUS SANDSTONE.
1048.20 CLAYEY SAND INTERBEDDED WITH CALCAREOUS SANDSTONE.
1050.50 ALTERNATIONS OF SANDY CLAY-SHALE WITH HARDER BEDS.
1052.00 CLAY-SHALE.

1056.00 SOMEWHAT CLAYEY SAND WITH SANDSTONE INTERBEDDINGS BELOW 1053.70.
1058.00 CLAY-SHALE.
1061.00 SOMEWHAT SANDY CLAY-SHALE.
1064.00 CLAY-SHALE.
1068.00 SOMEWHAT SANDY CLAY-SHALE.
1070.00 CLAYEY SAND WITH SANDSTONE INTERBEDDINGS.
1071.70 BROKEN GRAY CLAY-SHALE.
1074.00 SANDSTONE.

1070.00

FLYSCH

1083.20 GRAYISH-GREEN, BROKEN AND DISTURBED, CLAY-SHALE, LOCALLY VARIEGATED (VIOLET AND DARK GRAY).
1086.20 BLACK, BROKEN CLAY-SHALE WITH LOCAL THICK VERDIGRIS GREEN ZONES AND SOME CALCITE VEINS.
1089.20 BLACK, FAIRLY SOFT, LESS BADLY BROKEN CLAY-SHALE.
1092.60 DARK GRAY TO BLACK, BROKEN CLAY-SHALE WITH ZONES OF VERDIGRIS GREEN.
1092.80 DARK GRAY, VERY HARD, SOMEWHAT SCHISTOSE CLAY-SHALE.
1094.70 DARK GRAY TO BLACK, BROKEN CLAY-SHALE WITH VERDIGRIS GREEN BANDS.
1096.80 GREEN, SOMEWHAT BROKEN, FAIRLY SOFT CLAY-SHALE WITH BLACK INTERBEDDINGS.
1098.20 DEEP BLACK, BROKEN CLAY-SHALE WITH SOME SMALL VERDIGRIS GREEN LAYERS.
1099.30 BLACK HARD CALCAREOUS SHALE WITH CALCIDE VEINS OF A FINGERS BREADTH.

1103.70 VERY BLACK, BROKEN CLAY-SHALE WITH VERDIGRIS GREEN LAYERS.
1105.10 SOFT BROKEN VERDIGRIS GREEN CLAY-SHALE.
1107.70 SOFT BROKEN BLACK CLAY-SHALE.
1108.80 DARK GRAY, VERY HARD COMPACT CALCAREOUS SANDSTONE.
1111.50 DARK GRAY TO BLACK BROKEN CLAY-SHALE, LOCALLY GREENISH AND WITH NUMEROUS VERY
1112.50 FAIRLY SOFT GREEN AND BLACK BANDED CLAY-SHALE. HARD SHALE INTERBEDDINGS.

1115.20 FAIRLY SOFT REDDISH-BROWN CLAY-SHALE WITH VARICOLORED FLUX (PREDOMINANTLY VERDIGRIS GREEN).

1115.20

A20.7

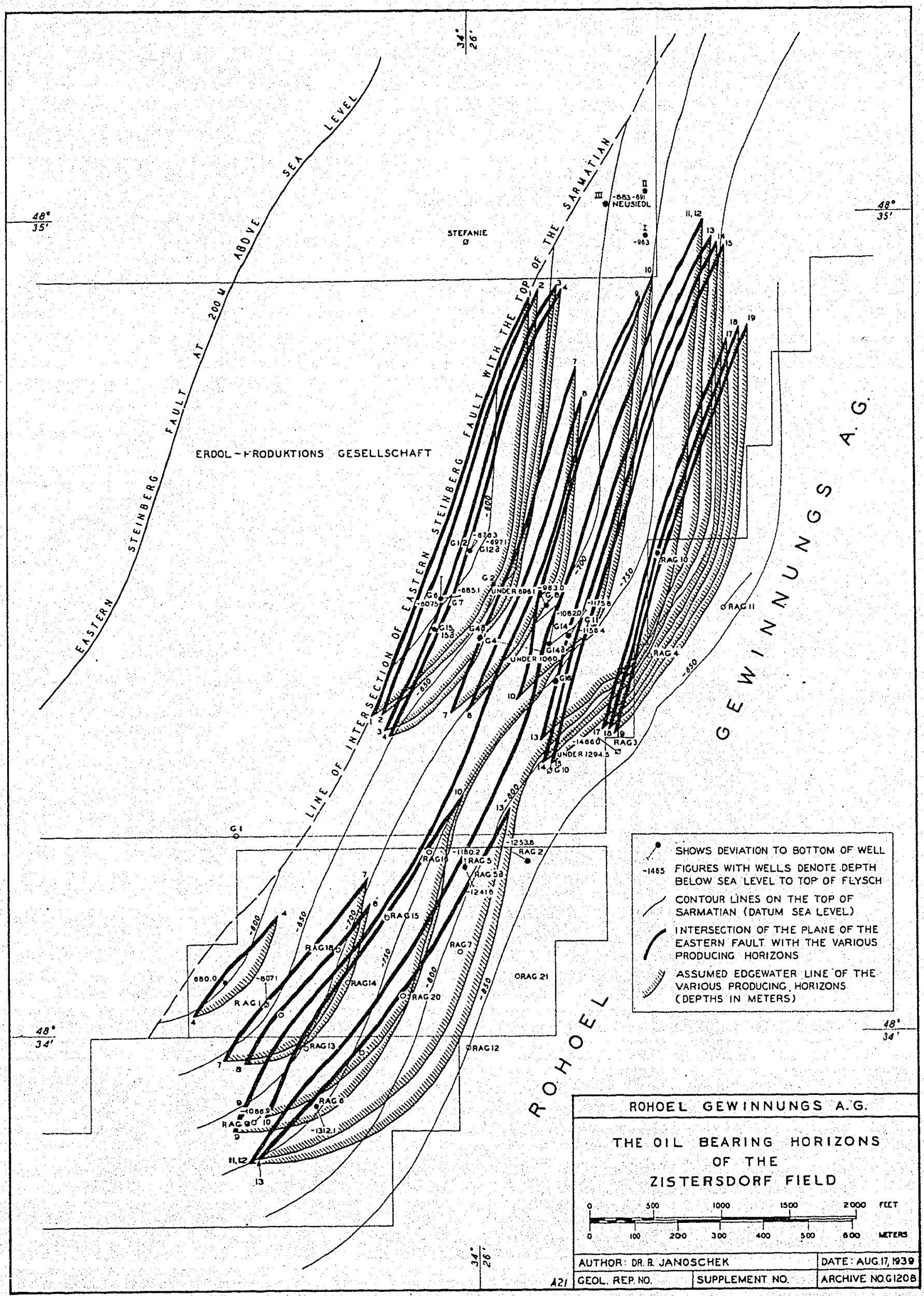
drilled on this arch before the war. It started in Tortonian which it penetrated and entered the Schlier formation in which the hole was abandoned, at a total depth of 850 meters (2,788 feet) after having had several oil shows. Near the bottom of this hole some reworked Flysch microfossils are reported to have been found, which suggests that the bottom of the well is not far above the unconformity between Schlier and Flysch formations. From the foregoing it is evident that the Sarmatian, Tortonian and Schlier formations overlie the rocks of the basement complex (Flysch) in the arched segment west of the west Steinberg Fault.

In the narrow block between the two faults west of the Zistersdorf field shown in the sketch on page 32, the lower Sarmatian outcrops at the surface. It is shown to be underlaid by a relatively thin section of Tortonian resting on Flysch of the basement complex. This is inferred by the log of the Windisch-Baumgarten No. 1A, a well located east of the eastern Steinberg fault. After penetrating 338 meters (1,108 feet) of Pannonian this well cut the eastern Steinberg fault and entered the Flysch formation in which the well was completed at a total depth of 850 meters (12,788 feet), having encountered oil production in fracture zones in the Flysch. As the Flysch is present at a depth of 338 meters in a narrow block between the two faults, the formation underlying the Sarmatian of the surface, namely, the Tortonian, must be relatively very thin and must rest directly upon the Flysch.

It will be noted in the sketch on page 32 that the eastern or major Steinberg Fault has considerable displacement, probably just east of this fault on the downthrown side. The Pannonian formation outcrops at the surface immediately east of the fault and has a thickness of about 800 meters (2,624 feet) in the Zistersdorf field. The Pannonian rests unconformably upon the Sarmatian, which is approximately 1,000 meters (3,280 feet) thick. The Sarmatian in turn overlies the Tortonian, the thickness of which has not been ascertained, as no well is known to have passed completely through the Tortonian on the downthrown side of the east Steinberg fault.

The reservoir rocks in which oil is found in the Zistersdorf field are sands and sandstones of the Sarmatian and upper Tortonian formations. These strata are intercalated with more or less impervious shales and the oil is trapped in the upturned ends of the reservoir sands and sandstones, where they abut against relatively impervious Flysch formation which lies on the upthrown side of the fault. Although the surface area of the Zistersdorf field is approximately 90 acres, prior to the war there were 17 known oil sands in the Sarmatian and one sand in the Tortonian all of variable extent and thickness underlying this area. There seems no doubt that additional oil sands have been opened up in the field since the beginning of the war in 1939, the date of the last available records.

Drilling and correlation of the sands in the Zistersdorf Field.- Twenty-one separate sands in the Sarmatian had been drilled through and correlated in the Gösting and RAG concessions by December, 1939. Only the sands penetrated within a limited distance from the Steinberg fault were found productive. Individual sands vary in thickness about 12 feet to 120 feet. The coring program carried out in drilling was very limited. Correlation between wells, as well as between sands for both the Gösting section and the RAG section, was made from Schlumberger electrical records of the wells. Due to the scarcity of cores from the wells and the dependence on electrical records alone for correlation purposes, frequent changes were made in the early interpretation and evaluation of the sands being exploited. A listing of the sands encountered in the wells drilled on both the RAG and Gösting concessions, together with notations as to their productive possibilities are shown in the charts on pages 37, 38. Schlumberger logs of a typical RAG well and of a typical Gösting well, showing the thickness and productive possibilities of the Sarmatian sands which are present in these wells, appear on pages 39 and 40. Two wells were sometimes drilled from the same location for the sake of economy, using directional drilling. Gösting 14, for instance, produced from the 11th horizon but did not reach the 13th horizon in which Gösting 14A, drilled from the same rig foundation, was completed. The surface projection of the probable producing area of the various producing horizons.



ROHOEL GEWINNUNGS A.G.

THE OIL BEARING HORIZONS OF THE ZISTERSDORF FIELD

0 500 1000 1500 2000 FEET
0 100 200 300 400 500 600 METERS

AUTHOR: DR. R. JANOSCHEK		DATE: AUG. 17, 1939
GEOL. REP. NO.	SUPPLEMENT NO.	ARCHIVE NO. G1208

A21

known up to August 17, 1939, is shown on the map on page 49. This map also shows the location of all RAG and Gösting wells drilled and proposed well locations made up to that time. A cross-section of the Eastern Steinberg fault showing the position of four of the early wells in this area is shown on page 51. This cross-section clearly shows the position of the Sarmatian sands and their contact with the Steinberg fault. It also shows the relationship between producing formations on both the eastern or downthrown side of the Steinberg fault and the formations on the western or upthrown side of the Steinberg fault. The wells which were drilled at a greater distance from the Steinberg fault than Gösting No. 2 found deeper Sarmatian sands before striking the Steinberg fault. These sands were found to be productive.

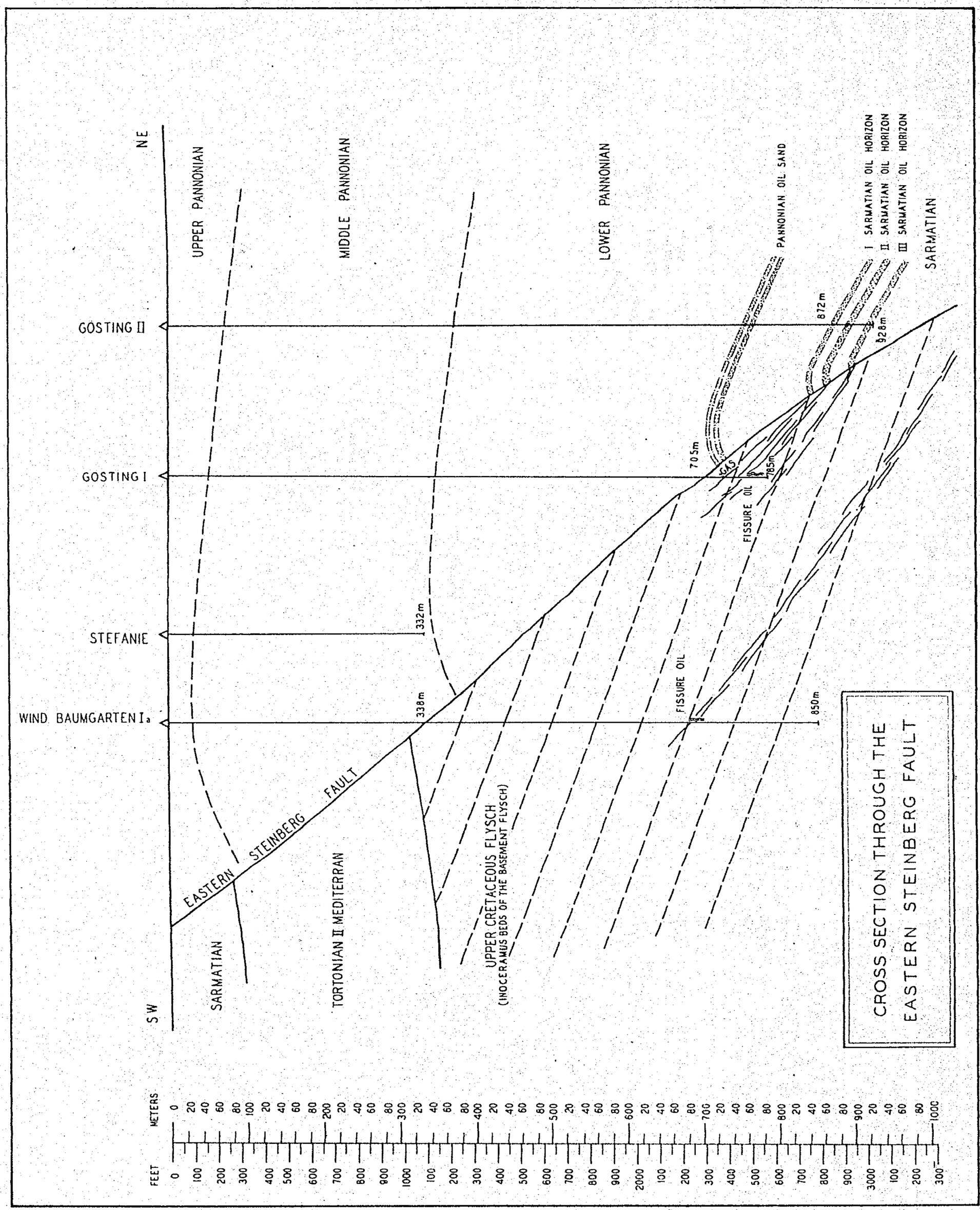
Active drilling continued on both the Gösting and RAG concessions and factual information on the wells completed and producing by December 1939 is given in the tables "Production Status of Zistersdorf Wells 1939, Estimated Status 1943", on pages 52 and 53. These tables also set forth an estimate as to the productive importance and condition of these wells as of December 1943 and their prospective value during 1944. The individual completion records of the wells drilled on both concessions before the end of 1939 is shown on the chart on pages 54, 55. It will be noted that the time consumed in the drilling of the wells completed during 1938 and 1939 was about one-third that of the time required for the drilling of the earlier wells, and the casing program of the later wells consumed much less steel than that of the earlier wells--both of which denote an increase in the general knowledge of the fields and better drilling equipment and technique in exploiting the fields.

RAG concession.- With the completion of the well RAG No. 1 in the southern portion of the Zistersdorf field, production was assured on the RAG concession and an immediate drilling program was begun. Well RAG No. 2 was drilled to a total depth of 1,472 meters (4,828 feet) and established production in the 11th and 12th Sarmatian sands. The well was completed in the 12th Sarmatian sand on May 7, 1937, the casing being perforated for production at 1,441-1,470 meters (4,726-4,822 feet), with an initial production of 120 metric tons (816 barrels) per day, flowing through an 8 mm. bean. The specific gravity of the oil was 0.915 and, a very important fact, was distinctly of a paraffin base as contrasted with the asphalt base oil as found in RAG No. 1.

Drilling continued on this concession and eleven wells had been drilled by the RAG Company by the end of 1939, of which 7 wells were producers, 6 of these being in the Sarmatian. The 7th, RAG No. 11, had been drilled through all 21 Sarmatian horizons, and after finding water in all Sarmatian sands, was completed as a producer in the 5th Tortonian below the Sarmatian sands.

The first ten sands of the Sarmatian horizon produce an asphaltic type of oil while the lower sands produce a paraffin base oil. The specific gravity of the oil decreases with increasing depth and the gasoline content of the lighter paraffin oils is greater than that of the asphalt base oils. None of the sands exploited have had free gas caps. The gas oil ratios of all producing wells have averaged from 200 to 300 cubic feet of gas per barrel of oil produced, this being the gas contained in solution in the oil.

According to recent information obtained from aerial photographs and other sources of information, there were 14 wells producing in the RAG portion of the Zistersdorf field as of August 1, 1943. Since it has been estimated, as shown by the chart "Estimated Production Status, 1943" presented on pages 52, 53, that of the group of 7 which were producing in 1939, only four wells would be producing in 1943, then it would appear probable that an additional 10 wells were drilled on this concession during the period, end of 1939 to August 1, 1943 and are producing today. Judging from the behavior of the wells drilled prior to 1940 it is believed probable that most of the wells presently are producing large quantities of water with the oil. It likewise is believed likely that all are being produced artifically, either by pumping or air lift.


NE
UPPER PANNONIAN
MIDDLE PANNONIAN
LOWER PANNONIAN
PANNONIAN OIL SAND
I SARMATIAN OIL HORIZON
II SARMATIAN OIL HORIZON
III SARMATIAN OIL HORIZON
SARMATIAN
GOSTING II
872m
928m
GOSTING I
705m
GAS
785m
FISSURE OIL
STEFANIE
332m
WIND BAUMGARTEN Ia
338m
FISSURE OIL
850m
EASTERN STEINBERG FAULT
SW
SARMATIAN
TORTONIAN II MEDITERRAN
UPPER CRETACEOUS FLYSCH
(INOCERAMUS BEDS OF THE BASEMENT FLYSCH)
CROSS SECTION THROUGH THE
EASTERN STEINBERG FAULT
METERS
FEET

Production status

Production Status of Zistersdorf Wells at End of 1939

As of December 31, 1939.

Line No.	Well Name & Number	Total Depth (Meters)	Producing Sand December 1939	Rate, Tons Per Day Net Oil (Metric Tons)	Specific Gravity of Oil	Percent Water	Producing Method	Sands Cased Off 1939	Remarks
1	RAG 1	1,108	Abandoned	--	--	--	--	--	Abandoned in 7th Sarmatian Sand.
2	RAG 2	1,472	12th Sarmatian	8	.915	70	Flowing	11th Sarmatian	Started producing some water May 1937.
3	RAG 3	1,706	Abandoned	--	--	--	--	--	No production.
4	RAG 3a	1,845	Abandoned	--	--	--	--	--	No production.
5	RAG 5	1,430	Abandoned	--	--	--	--	--	No production.
6	RAG 5a	1,476	13th Sarmatian	10	.920	30	Flowing	11th and 12th Sarmatian	Started producing some water April 1938.
7	RAG 6	1,544	13th Sarmatian	5	.920	20	Flowing	7th,9th,11th, 12th and 14th Sarmatian	Made 10% water from beginning.
8	RAG 8	911	4th Sarmatian	2	.941	18	Airlift	None	Producing irregularly by airlift.
9	RAG 9	1,295	Abandoned	--	--	--	--	--	Abandoned in 9th Sarmatian, Fall of 1939.
10	RAG 10	1,654	18th and 19th Sarmatian	50	.890	5	Flowing	11th,12th,13th, 14th,15th,16th, 17th Sarmatian	Directionally drilled.
11	RAG 11	2,287	5th Tortonian	55	.840	16	Flowing	None	Completed late in 1939.
12	Gösting 1	925	Abandoned	--	--	--	--	--	Produced 1700 metric tons 1932-1936.
13	Gösting 2	926	Abandoned	20	.942	--	--	--	Prbduced from 1934 to 1936; depleted in 1st, 2nd, 3rd Sarmatian.
14	Gösting 4	1,290	9th Sarmatian	60	.938	None	Flowing	None	Abandoned in 10th, plugged back to 9th Sarmatian April 1939.
15	Gösting 4a	1,054	Abandoned	--	--	--	--	--	Depleted early in 1939 in 3rd Sarmatian.
16	Gösting 6	850	1st Sarmatian	5	.941	None	Pumping	None	Water-free oil in 1st Sarmatian, Salt Water 2nd Sarmatian.
17	Gösting 7	920	3rd and 4th Sarmatian	2	.941	90	Airlift	1st and 2nd Sarmatian	Would be plugged back early in 1940.
18	Gösting 8	1,197	10th Sarmatian	10	.896	None	Pumping	8th and 9th Sarmatian	Irregular production due to paraffin deposits.
19	Gösting 10	1,517	Abandoned	--	--	--	--	--	
20	Gösting 11	1,410	13th Sarmatian	20	.890	None	Flowing	9th, 10th, and 12th Sarmatian	Producing water-free oil, same sand since 1/1/38.
21	Gösting 12	924	3rd and 4th Sarmatian	20	.941	50	Pumping	1st and 2nd Sarmatian	Bottomed 10 meters from 12a in producing sands.
22	Gösting 12a	946	Abandoned	--	--	--	--	--	See remark above.
23	Gösting 14	1,319	10th Sarmatian	40	.897	6	Airlift	9th and 11th Sarmatian	
24	Gösting 14a	1,403	13th Sarmatian	40	.890	None	Flowing	9th,10th,11th, 12th Sarmatian	Expect water in 9th, 10th, 11th and 12th before plug back.
25	Gösting 15	881	1st and 2nd Sarmatian	20	.941	None	Airlift	None	Considerable trouble from well sanding up.
26	Gösting 15a	899	3rd Sarmatian	10	.941	None	Flowing	None	Production erratic due to sanding up.
27	Gösting 16	1,401	13th Sarmatian	20	.895	None	Pumping	9th and 12th Sarmatian	Production erratic due to sanding-up.
28	Gösting 17	1,355	12th Sarmatian	40	.915	None	Pumping	9th, 10th and 11th Sarmatian	Production erratic due to paraffin deposits.

X = Data Unknown.

Estimated Production Status of Zistersdorf Wells at End of 1943 and Anticipated Production for 1944

Estimated as of December 31, 1943.

Status of Well	Producing Sand December 1943	Rate, Tons Per Day Net Oil Metric Tons	Specific Gravity of Oil	Estimated Percent Water	Producing Method	Sands Still Cased Off End of 1943	Anticipated Production 1944 Metric Tons	Remarks	Line No.
Abandoned									1
Producing	11th Sarmatian	2	.915	None	Pumping or Airlift	None	525	Depleted in 12th Sarmatian.	2
Abandoned									3
Abandoned									4
Abandoned									5
Producing	12th Sarmatian	4	.915	None	Pumping or Airlift	11th Sarmatian	1,000	Abandoned in 13th Sarmatian in 1943.	6
Producing	12th Sarmatian	3	.915	None	Pumping or Airlift	7th, 9th, 11th, and 14th Sarmatian	700	Abandoned in 13th Sarmatian in 1942.	7
Depleted & Abandoned									8
Abandoned									9
Producing	18th and 19th Sarmatian	2	.890	50	Pumping	11th, 12th, 13th, 14th, 15th, 16th, 17th Sarmatian.	535	Possibly plugged back to 17th Sand and producing at increased rate.	10
Abandoned									11
Abandoned									12
Abandoned									13
Depleted & Abandoned	--	--	--	--	--	--	--	Probably abandoned in 1942 or 1943.	14
Abandoned									15
Producing	1st Sarmatian	2	.941	80	Pumping	None	400	Will probably be abandoned in 1944.	16
Depleted & Abandoned	--	--	--	--	--	--	--	Depleted and abandoned in all sands.	17
Producing	10th Sarmatian	3	.896	70	Pumping	8th and 9th Sarmatian	675	May be on Airlift.	18
Abandoned									19
Producing	13th Sarmatian	4	.890	60	Pumping or Airlift	9th, 10th and 12th Sarmatian	900	Cased-off sands will be depleted by time ready to plug back to them.	20
Depleted & Abandoned	--	--	--	--	--	--	--	Depleted in all sands because low structurally.	21
Depleted & Abandoned									22
Producing	9th Sarmatian	4	.938	50	Pumping or Airlift	None	900	Expect well to be abandoned in 1945.	23
Producing	13th Sarmatian	6	.890	50	Airlift	None	1,350	Sands cased off would have been depleted by other wells.	24
Producing	1st and 2nd Sarmatian	2	.941	75	Airlift	None	400	Will be depleted in 1944.	25
Producing	3rd Sarmatian	3	.941	75	Pump or Airlift	None	675	Will be depleted by end of 1944.	26
Producing	13th Sarmatian	4	.890	60	Pump or Airlift	None	900	Should be abandoned in 1945. Same remark as 14a.	27
Producing	12th Sarmatian	6	.915	50	Pumping	11th Sarmatian	1,350	10th Sarmatian would have gone to water; also prob-9th Sarmatian Sand.	28

Available Well Completion Data, Zistersdorf Field

December 1939

Line No.	Well Name & Number	Drilling Commenced	Drilling Completed	Total Depth (Meters)	Producing Zone (Meters)	Initial Daily Production (Metric Tons)	Initial Sand Under Exploitation	Effective Sand Thickness (Meters)	Size of Choke (Mms.)	Tubing Pressure (Atm)
1	RAG 1	1/14/36	7/8/36	1,100	1,016-1,018	--	7th Sarmatian	5	--	--
2	RAG 2	9/3/36	5/7/37	1,472	1,441-1,470	120	12th Sarmatian	15	8	30
3	RAG 3	X	X	1,702	-- --	--	--	--	--	--
4	RAG 5a	12/27/37	2/12/38	1,478	1,454-1,459	72	13th Sarmatian	12	6	40
5	RAG 6	3/23/38	4/27/38	1,544	1,462-1,469 1,471-1,478	40	13th Sarmatian	12	7	8
6	RAG 8	7/11/38	8/5/38	911	871-874	2	4th Sarmatian	3	--	--
7	RAG 9	9/21/38	11/4/38	1,295	1,272-1,280	X	9th Sarmatian	10	X	X
8	RAG 10	12/14/38	7/21/39	1,651	1,640-1,642 1,637-1,638 1,634-1,635	74	19th Sarmatian	5	6	20
9	RAG 11	5/24/39	10/1/39	2,287	2,134-2,141	55	5th Tortonian	7	6	20
10	Gösting 1	5/27/31	6/22/35	925	-- --	--	Flysch	--	(Pumping)	--
11	Gösting 2	7/29/33	8/19/34	926	? -925	60	2nd and 3rd Sarmatian	12	(Pumping)	--
12	Gösting 4	4/25/35	5/22/36	1,290	1,267-1,290	--	10th Sarmatian	10	(Pumping)	--
13	Gösting 4a	10/14/35	6/28/36	1,054	1,022-1,052	--	--	--	--	--
14	Gösting 6	9/10/36	9/28/36	850	814-818	--	1st Sarmatian	5	(Pumping)	--
15	Gösting 7	11/26/36	1/5/37	920	894-906	150	3rd and 4th Sarmatian	12	(Airlift)	--
16	Gösting 8	5/3/37	8/29/37	1,197	1,181-1,185	25	10th Sarmatian	8	8	24
17	Gösting 11	10/9/37	12/31/37	1,410	1,366-1,375	64	13th Sarmatian	10	8	49
18	Gösting 12	3/10/38	4/7/38	924	880-896	15	3rd and 4th Sarmatian	12	(Pumping)	--
19	Gösting 12a	4/25/38	5/20/38	946	885-902	7	3rd and 4th Sarmatian	12	(Airlift)	--
20	Gösting 14	6/2/38	7/28/38	1,319	1,234-1,254	10	10th Sarmatian	10	(Airlift)	--
21	Gösting 14a	8/8/38	10/12/38	1,403	1,364-1,378	34	13th Sarmatian	9	6	X
22	Gösting 16	11/8/38	1/5/39	1,401	1,383-1,388	30	13th Sarmatian	9	15	X
23	Gösting 17	2/21/39	4/26/39	1,355	1,322-1,332	70	12th Sarmatian	8	10	X

X = Data Unknown

Available Well Completion Data, Zistersdorf Field

December 1939

Casing Pressure (Atm)	Gas-Oil Ratio (M^3/M^3)	Water Content (Percent)	Surface Casing (Diameter, Inches)	Surface Casing (Depth Meters)	Oil String (Diameter, Inches)	Oil String (Depth Meters)	Tubing (Diameter, Inches)	Tubing (Depth Meters)	Remarks	Line No.
--	--	X	16	89	11 3/4 8 5/8	1,013 1,075			This well tested water in sands penetrated and was abandoned.	1
35	60	8	16	137	6 5/8	1,446			Started producing water in May 1937 - Output from same sand in 1939.	2
--	--	--	13 3/8	182	--	--			Dry hole - abandoned.	3
100	50	0	13 7/8	93	6 5/8	1,466	2 1/2	1,448	Produced 10,600 tons to December 8, 1939.	4
30	60	7	13 7/8	96	6 5/8	1,539	2 1/2	1,448	Made 10% water from beginning.	5
--	--	18	13 3/8	80	6 5/8	885			Well tested little oil, much salt water in Sarmatian.	6
X	X	X	13 3/8	104	6 5/8	1,311			Produced irregularly by flowing.	7
42	52	19	13 7/8	91	9 5/8 6 5/8	1,016 1,653	2 1/2	1,620	Directionally drilled.	8
100	50	16	13 7/8	119	9 5/8 6 5/8	1,496 2,130	2 1/2	2,130	Too far offstructure for Sarmatian production.	9
--	--	--	--	X	3	862	2	924	Produced a total of 1700 metric tons 1932-1936.	10
--	--	--	9	755	7	918	3	900	Produced 1934-1936. Abandoned.	11
--	--	--	8 5/8	955	6 5/8	1,092			Producing since 1934. In 1939 output from 9th Sarmatian.	12
--	--	--	--	--	6 5/8	1,044	2	1,025	7th, 4th and 3rd sands tested some oil but each went to water. Abandoned in 3rd Sarmatian in 1939.	13
--	--	--	--	--	8 5/8	849			Tested salt water in 2nd sand. Plugged back to 1st Sarmatian.	14
--	--	--	14	73	6 5/8	918			Flowed by heads in open casing; after it ceased flowing, tubing was run and well was airlifted.	15
48	X	--	14	131	8 5/8 6 1/2	882 1,196	2 & 3	1,169	Flowed 3 months after which it began heading and was put on pump.	16
85	X	0	14	145	6 1/2	1,407	2 & 3	1,350	In 1939 producing from same sand water-free oil.	17
--	--	--	14	110	7	923			Produced by pumping. No flowing life to the well.	18
--	--	--	14	118	6 1/2	946	3	891	Produced by airlift from same zone as G-12 and these two wells bottomed 10 meters apart.	19
--	--	4	14	128	6 1/2	1,319			Well produced first by pumping, then placed on airlift.	20
X	X	X	14	95	6 1/2	1,403	3	1,359	Flowed for short period and pump installed.	21
X	X	X	14	127	6 1/2	1,401	2 & 3	1,377	Well ceased flowing and was put on pump.	22
X	X	X	14	128	6 1/2	1,355	2	1,324	Produced by irregular flow.	23

APPRAISAL OF THE OIL RESERVES OF THE SARMATIAN SANDS OF THE ZISTERSDORF FIELD, AUSTRIA

AS OF DECEMBER 1, 1938

Sand Horizon	Property Owner	Productive Area		Sand Thickness		Total Sand Volume		Porosity of Sand	Effective Production Factor	Specific Gravity of the Oil	Original Producible Oil Reserves				Total Oil Produced to 12/1/38		Remaining Producible Oil Reserve		Percentage of Reserves Remaining to be Produced 12/1/38
		In m^2	In Acres	In Linear Meters	In Linear Feet	In m^3	In Acre Foot				In m^3	In Metric Tons	In Bbls.	In Bbls. per Acre/Foot	In Metric Tons	In Bbls.	In Metric Tons	In Bbls.	
1	RAG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	EPG	103,600	25.60	5	16.4	518,000	417.84	20%	25%	0.941	25,900	24,372	163,170	390	3,955	26,479	20,417	136,691	83.7
2	RAG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	EPG	102,200	25.25	7	22.9	715,400	578.22	25%	25%	0.941	44,713	42,075	281,692	487	869	5,816	41,206	275,874	97.9
3	RAG	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	EPG	101,100	24.98	5	16.4	505,500	409.67	25%	25%	0.941	31,594	29,730	199,042	485	12,208	81,732	17,522	117,310	58.9
4	RAG	10,600	2.62	3	9.8	31,800	25.67	25%	25%	0.941	1,988	1,870	12,524	487	13	87	1,857	12,437	99.3
	EPG	99,100	24.49	10	32.8	991,000	803.27	25%	25%	0.941	61,938	58,254	390,209	487	14,692	98,363	43,562	291,846	74.7
5	RAG	-	-	-		-	-	-	-	-	-	-	-		-		-		
	EPG	-	-	-		-	-	-	-	-	-	-	-		-		-		
6	RAG	-	-	-		-	-	-	-	-	-	-	-		-		-		
	EPG	-	-	-		-	-	-	-	-	-	-	-		-		-		
7	RAG	41,300	10.20	5	16.4	206,500	167.26	15%	20%	0.941	5,195	5,829	39,028	234	-	-	5,829	39,028	100.0
	EPG	56,500	13.96	5	16.4	282,500	228.94	15%	20%	0.941	8,475	7,975	53,392	234	120	803	7,855	52,589	98.5
8	RAG	32,700	8.08	8	26.2	261,600	211.69	20%	25%	0.936	13,080	12,269	82,404	388	-	-	12,269	82,404	100.0
	EPG	32,800	8.10	8	26.2	262,400	212.22	20%	25%	0.936	13,120	12,307	82,656	388	-	-	12,307	82,656	100.0
9	RAG	113,900	28.14	10	32.8	1,139,000	922.99	20%	25%	0.938	56,900	53,372	358,470	388	61	406	53,311	358,064	99.8
	EPG	122,800	30.34	10	32.8	1,228,000	995.15	20%	25%	0.938	61,400	57,593	386,820	388	-	-	57,593	386,820	100.0
10	RAG	91,100	22.51	8	26.2	728,800	589.76	25%	40%	0.915	72,580	66,685	459,144	778	-	-	66,685	459,144	100.0
	EPG	102,300	25.28	10	32.8	1,023,000	829.18	25%	40%	0.897	102,300	91,763	644,900	778	25,409	178,458	66,354	466,442	72.3
11	RAG	152,600	37.70	2	6.5	305,200	245.05	15%	25%	0.915	11,445	10,472	72,103	294	-	-	10,472	72,103	100.0
	EPG	214,000	52.88	2	6.5	428,000	343.72	15%	25%	0.915	16,050	14,686	101,115	294	-	-	14,686	101,115	100.0
12	RAG	152,600	37.70	15	49.2	2,289,000	1,854.84	25%	30%	0.915	171,675	157,083	1,081,552	583	12,168	83,917	144,895	997,635	92.2
	EPG	214,000	52.88	12	39.3	2,560,000	2,078.16	25%	30%	0.915	192,600	176,229	1,208,360	583	145	998	176,084	1,207,382	99.9
13	RAG	88,500	21.87	12	39.3	1,062,000	859.49	25%	30%	0.920	79,650	72,481	501,795	583	9,752	66,780	62,729	435,015	86.5
	EPG	153,800	38.00	9	29.5	1,384,200	1,121.00	25%	30%	0.890	103,915	92,395	654,664	583	13,834	97,926	78,561	556,738	85.0
Total	RAG	683,300	168.82			6,023,900	4,876.17				413,813	380,061	2,607,020	535	22,014	151,190	358,047	2,455,830	94.2
Total	EPG	1,302,200	321.76			9,906,000	8,016.49				661,905	607,379	4,166,040	520	71,232	490,577	536,147	3,675,463	88.2
Grand Total		1,985,500	490.58			15,929,900	12,892.66				1,075,718	987,440	6,773,060	525	93,246	641,767	894,194	6,131,293	90.5

It has been estimated that the RAG produced approximately 9,250 metric tons or 62,900 barrels during the year 1943. The production from these wells should continue to decline and it is estimated that they should produce some 7,320 net metric tons or 49,776 barrels during the year 1944. The above facts are set forth in the table, "Estimated Production, Austrian Fields, 1943-1944", on last page (89) of section 2.5.5

Gösting concession.- By far the larger and more prolific part of the Zistersdorf field came within the Gösting structure and was exploited for the most part by the Erdölproduktions Gesellschaft m.b.h. and locally was classified as the Gösting field. After the establishment of production in the Sarmatian sand in 1934 by the drilling of Gösting No. 2, a definite program of exploitation was begun. From 1934 to the end of 1939, a total of 18 oil wells were drilled and placed on production. The Sarmatian sands were opened up, several of the wells penetrating more than one possibly productive horizon. The producing practice followed is outlined under the appropriate section of this report. The Gösting wells, however, were permitted to produce at a higher rate than those of the RAG area to the south with the consequent result that where all but one of the RAG wells were produced by flowing, only five of the Gösting wells initially produced by flowing and it was necessary to pump or air lift the remainder from inception. As of the end of 1939, only two wells remained as flowing wells. As stated before, the water drive in this field is effective and if the fluid withdrawal were restricted, the wells would produce a large portion of their total production by natural flow. None of the sands exploited have had free gas caps, the gas oil ratios of all producing wells have averaged from 200 to 300 cubic feet of gas per barrel of oil produced, this being the gas contained in solution in the oil. However, due to the overproduction of the Gösting wells which necessitated the pumping or airlifting of these wells, much of the producing time was lost because of the deposition of paraffin in both pumping and airlift wells. Frequent rod breakage occurred on the pumping wells. Sand difficulties also arose in all of the producing wells, all of which added to the production problems of the companies operating in the field. The airlift wells were off production a large portion of the time due to the inflow of sand into the producing string, thereby forming sand bridges which effectively shut off production.

It has been established by the aerial photographs taken in August 1943 and by other information that the Gösting field as well as the RAG portion has been completely drilled up. Some 51 wells were producing in this area as of August 1, 1943, as contrasted with 18 wells at the end of 1939. Undoubtedly, all of the Sarmatian sands are under exploitation with probably a few wells producing from the lower Pannonian or Tortonian, as well. It is believed that all of the possibly productive horizons underlying both the RAG and Gösting concessions, have been, or presently are being, exploited.

The Gösting field is separated from the RAG field to the south by a low saddle occurring between the two producing areas, and because of this fact, it is not probable that any oil has been drained from one area into the other.

Reserves.- In December 1938, the RAG engineers and geologists made an appraisal of the crude oil reserves of the Zistersdorf field, based upon the information as developed from the drilling done by both the Rohoel-Gewinnungs A. G. and the Erdölproduktions Gesellschaft m.b.h. on the RAG and Gösting concessions. This appraisal is shown on page 56, of this report. It will be noted from this appraisal that estimated sand porosities varied from sand to sand, estimations varying from 15 per cent to 25 per cent. Also, as noted elsewhere, the specific gravity of the oil decreased with increasing depth. The calculated recoverable reserves per acre-foot ranged from a low of 234 barrels in the 7th Sarmatian sand to a high of 778 barrels for the 10th Sarmatian sand. The estimated average crude oil reserve per acre-foot for the field as a whole was 525 barrels. This estimate was based on the information obtained from the cores which were taken, Schlumberger

COMPANY: ROHOEL-GEWINNUNGS A.G.

FIELD: GAISELBERG

WELL NO: GA 3A

POLITICAL DISTRICT: GÄNSERNDORF

COMMUNITY: GAISELBERG

SECTION: 4557/4

PARCEL: 1361

DRILLED BY: ROHOEL-GEWINNUNGS A.G.

ELEVATION OF IMPORTANT FORMATIONS WITH RESPECT TO SEA LEVEL:

UPPER CRETACEOUS FLYSCH 902.70m

DRILLING SYSTEM: ROTARY-DIESEL

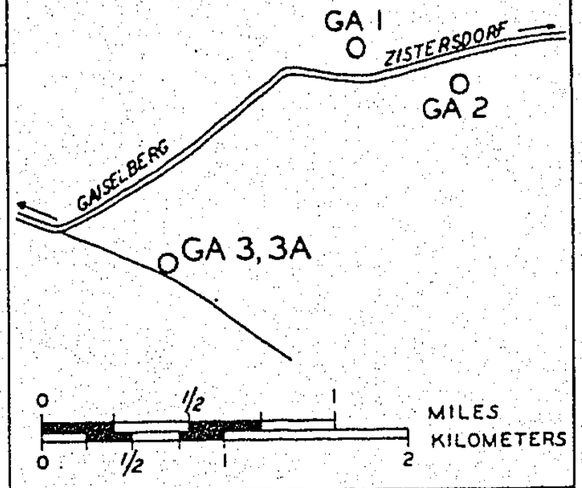
BEGUN: NOV. 10-38 | COMPLETED: DEC. 28-38

SCALE: | FINAL DEPTH: 1190.20 m

GROUND ELEVATION ABOVE SEA-LEVEL: 269.30 m

ELEVATION OF DERRICK FLOOR ABOVE SEA-LEVEL: 272.10m

LOCATION SKETCH:



FILE NO: G 1078

DATE	METERS	MICROFAUNA	MACROFAUNA & FLORA	CORE DETAILS CASING DEVIATION	CORE	FORMATIONS PENETRATED	METERS	OIL, GAS, WATER	DRILLING & PRODUCTION DATA	LITHOLOGIC DESCRIPTION	GEOLOGICAL FORMATION
12-13-38	1000			A 16° S 70° 0′			1000			1000.20 GRAY GREEN, FAIRLY HARD CLAY SHALE 1003.20 GRAY, HARD CALCAREOUS SANDSTONE 1004.20 HARD CLAYEY LINSEY CONCRETIONS.	
									1012.50-1025.50 9. SARMATIAN HORIZON	1012.50 GRAY-GREEN, PARTIALLY INDURATED CLAY SHALE. 1017.00 SAND. 1021.00 CLAY-SHALE SOMEWHAT INDURATED 1022.00 SOFT PLASTIC SANDSTONE. 1023.20 SAND. 1023.70 SANDY CLAY SHALE WITH HARD CONCRETIONS. 1025.50 CLAYEY SAND.	
									1035.50-1054.00 9A. SARMATIAN HORIZON	1034.00 PARTIALLY INDURATED CLAY-SHALE. 1036.00 SANDY CLAY-SHALE, WITH TRANSITION DOWNWARDS INTO CLAYEY SAND. 1036.50 SAND 1038.00 VERY SANDY CLAY-SHALE. 1040.00 SAND WITH SANDSTONE LENSES TOWARD BASE. 1042.00 CLAY-SHALE. 1041.20 GRAY, FAIRLY FINE GRAINED SAND. 1041.80 GRAY-GREEN CLAY-SHALE WITH LENSES OF GRAY, FAIRLY FINE-GRAINED SAND. 1044.40 GRAY, FAIRLY FINE GRAINED SAND 1044.80 DARK, GREENISH-GRAY, FAIRLY HARD CLAY SHALE 1045.20 GRAY, FINE GRAINED QUICKSAND. 1046.20 FIRM SAND TO SOFT PLASTIC SANDSTONE. 1047.50 ALTERNATING SANDY CLAY-SHALE. 1050.00 CLAY-SHALE. 1051.20 SAND. 1051.70 CALCAREOUS SANDSTONE. 1052.50 SANDY CLAY-SHALE. 1054.00 SAND 1057.00 CLAY-SHALE	
	1050			A 13° 30′ S 71° 0′			1050				
12-19-38										1062.00 SANDY CLAY SHALE.	

A 23-1

12-21-38

12-23-38

12-28-38

A23-2

1100

1150

1200

1250

13°45' S 55° 0'

6 5/8"
1188.55

1094.00-1167.00
10. SARMATIAN
HORIZON

SARMATIAN

1077.00 CLAY-SHALE WITH PARTIALLY INDURATED LENSES.

1086.00 ALTERNATING SANDY CLAY-SHALE WITH ZONES OF HARD CONCRETIONS.

1090.00 CLAY-SHALE, PARTLY RATHER SANDY.
1092.00 CLAYEY SHALE.
1094.00 CLAY-SHALE.
1097.00 SAND.
1098.00 CLAY SHALE.
1100.00 SAND.
1101.00 SANDY CLAY-SHALE.
1102.00 SAND.

1106.00 HARD CLAY-SHALE.

1111.00 SAND WITH SANDSTONE INTERCALATIONS.

1116.00 HARD CLAY SHALE.
1117.00 CLAYEY SAND.
1118.00 SANDY CLAY-SHALE.

1122.00 SAND.
1123.50 SANDY CLAY-SHALE.

1128.00 CLAY-SHALE.
1130.50 CLAYEY SAND.

1133.50 SAND.
1134.00 CLAY SHALE.

1137.50 SAND
1139.00 SANDY CLAY-SHALE.
1140.00 CLAY-SHALE.
1141.00 CLAYEY SAND.
1142.00 CLAY SHALE.
1144.00 SAND.
1145.00 CLAY-SHALE.
1146.50 SANDY CLAY-SHALE.
1147.00 CLAY-SHALE.
1148.00 SANDY CLAY-SHALE.
1151.00 SAND.
1152.00 CLAY-SHALE.
1153.00 CLAYEY SAND.
1154.00 CLAY-SHALE.
1157.00 SAND.
1157.40 GRAY-GREEN CLAY-SHALE WITH BROADER BROWN-TO-GRAYISH-BROWN BANDS, LOCALLY WITH THIN SAND INTERLAYERS; BETWEEN 1157.50-1157.55 A SLIGHT SHOWING
1158.40 DARK GRAY-GREEN AND GREEN, FAIRLY HARD CLAY-SHALE WITH LOCALLY DARK-GRAY, THIN SAND INTERLAYERS, THESE AT TIMES GIVING OFF A SLIGHT OIL ODOR
1158.70 GREENISH-GRAY, RATHER FINE, SOMEWHAT CLAYEY SHALE WITH THIN CLAY-SHALE LENSES
1160.00 LIGHT GREENISH-GRAY, FINE SANDY CLAY-SHALE, PARTIALLY WITH VERY SANDY LENSES; SOME
1161.00 CLAY-SHALE, PARTS ARE LIGHT YELLOW IN COLOR AND HAVE A SLIGHT OIL ODOR
1162.50 SANDY CLAY-SHALE.
1163.50 CLAY SHALE.
1167.00 SAND WITH SANDSTONE BANKS.
1168.20 CLAY-SHALE.
1168.60 SANDSTONE.
1172.00 CLAY-SHALE.

1172.00

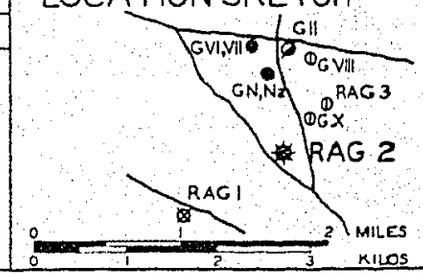
1174.00 BROWN CLAYEY SHALE.
1175.50 VERY HARD CLAYEY SHALE.
1176.50 CLAYEY SHALE WITH SHALE INTERLAYERS.
1177.20 DARK GRAY TO BLACK, BROKEN, CLAYEY SHALE, PARTIALLY WITH GRAY TO VERDIGRIS GREEN
1177.30 CALCAREOUS SANDSTONE. AND RED-BROWN DEPOSITS
1179.20 DARK GRAY TO BLACK, BROKEN CLAYEY SHALE, PARTIALLY WITH GREEN AND RED-BROWN INTERBEDDINGS

CRETACEOUS
FLYSCH

1180.20 GRAY TO DARK-GRAY, VERY THICK AND HARD CLAY STONE WITH STEEPLY DIPPING FRACTURE
1181.20 CLAYEY SHALE. PLANES, PARTLY DRUSY WITH CALCITE AND QUARTZ
1184.20 VERDIGRIS GREEN, BROKEN, CLAYEY SHALE WITH RED-BROWN AND VERY BLACK ZONES
1185.30 CLAYEY SHALE.
1187.10 DARK GREENISH-GRAY TO ALMOST BLACK, BROKEN, CLAYEY SHALE.
1187.40 GRAY, HARD, BEDDED SHALE WITH NEAR VERTICAL DIPS.
1188.10 DARK GREENISH-GRAY, BROKEN CLAYEY SHALE.
1188.55 DARK GREENISH-GRAY, BROKEN CLAYEY SHALE WITH LIGHT GRAY-GREEN GLAUCONITIC SAND
1188.70 DARK GREEN GRAY, BROKEN, CLAYEY SHALE WITH NEAR VERTICAL DIPS. LAYERS
1190.20 CLAYEY SHALE.

1190.20

COMPANY: ROHOEL-GEWINNUNGS A.G.	FIELD: ZISTERSDORF	WELL NO.: RAG 2
POLITICAL DISTRICT: GANSERNDORF	COMMUNITY: GOSTING	LOCATION SKETCH:
SECTION: 4557/4	PARCEL: 1128/1129	
DRILLED BY: RAKY-DANUBIA	SUBSEA ELEVATION OF MOST IMPORTANT HORIZONS	
DRILLING SYSTEM: ROTARY DIESEL	TOP OF 11TH. HORIZON: 1219.10 m	
BEGUN: SEPT. 3, 1936 — COMPLETED: APR. 8, 1937	TOP OF 12TH. HORIZON: 1228.30 m	
SCALE: — FINAL DEPTH: 1472.50 m		
GROUND ELEVATION ABOVE SEA-LEVEL: 215.90 m		
ELEV. OF DERRICK FLOOR ABOVE SEA-LEVEL: 218.70 m		



DATE	METERS	MICROFAUNA	MACROFAUNA AND FLORA	CORE DETAILS CASING DEVIATION	CORE	DRILLED ROCK	METER	OIL, GAS, WATER	DRILLING AND PRODUCTION DATA	LITHOLOGIC DESCRIPTION	GEOLOGICAL FORMATION
4-1-37	1400	NONION GRANOSUM ROTALIA BECARII ELPHIDIUM	CARDIUM PLICATUM	5°30m N80°W 5°30m N80°W			1400			1381.60 1381.70 GREENISH-GRAY CLAY-SHALE WITH CALCAREOUS SANDSTONE INTERBEDDINGS 1382.50 GRAY, FAIRLY COARSE GRAINED CALCAREOUS SANDSTONE 1384.35 GREENISH-GRAY SOMEWHAT LIMY CLAY, SHOWING FAINT BEDDING, LENSES OF FINE SAND WITH MANY COAL FRAGMENTS 1384.50 VERY SANDY CLAY-SHALE, DARK GRAY TO BLACK OR SOMEWHAT GREENISH, TRANSITIONAL DOWN 1386.40 ASSUMED SAND WARDS INTO FINE SAND, MANY CARBONIZED PLANT REMAINS 1386.80 GREENISH GRAY, VERY HARD COMPACT FINE GRAINED CALCAREOUS SANDSTONE. 1392.50 LIGHT GRAY FINE SAND WITH SOME SANDS OF GREENISH GRAY CLAY. 1394.65 VERY SANDY, GRAY CLAY-SHALE 1395.35 GRAY, SLIGHTLY SANDY CLAY-SHALE 1397.80 GRAY SANDSTONE WITH SOME INTERBEDDINGS OF SAND AND SANDY CLAY	
		abundant NONION GRANOSUM	TYPICAL SARMATIAN FAUNA	6°n N79°W 6 5/8" 144685 6°40m N78°W						1451.60 GREENISH-GRAY, SOMEWHAT SANDY CLAY-SHALE, WELL STRATIFIED. 1452.35 GRAY SANDY CLAY-SHALE 1453.40 LIGHT GRAY, VERY FINE GRAINED CLAYEY SAND WITH COAL FRAGMENTS 1453.60 DARK GRAY, SOMEWHAT SANDY CLAY-SHALE WITH A LIGNITE SEAM AT THE BASE 1454.00 GRAYISH GREEN COMPACT CLAY-SHALE WITH COAL FRAGMENTS 1455.00 LIGHT GRAY VERY FINE GRAINED SAND OIL SMELL 1457.00 GRAYISH GREEN CLAY-SHALE WITH NUMEROUS THIN INTERBEDDINGS OF LIGHT GRAY FINE GRAINED SAND 1461.50 GREENISH-GRAY, SOMEWHAT SANDY CLAY-SHALE WITH THIN INTERBEDDINGS OF FINE SAND AND A BROWNISH LAYER A FEW MILLIMETERS THICK. 1463.30 GRAY, VERY SANDY, CLAY-SHALE, WITH A FEW THIN DARK GRAY CLAY-SHALE LAYERS 1465.20 GRAY SOMEWHAT SANDY CLAY-SHALE WITH A GREENISH HUE 1467.70 DARK GRAY FAIRLY COMPACT CLAY-SHALE WITH SOME LAYERS OF LIGHT FINE GRAINED SAND ON THE BEDDING PLANES. 1469.60 DARK GRAY FAIRLY COMPACT CLAY-SHALE, MODERATELY BEDDED MICACEOUS WITH GREENISH HUE 1471.50 GRAY CLAY-SHALE WITH GREENISH HUE SOMEWHAT MICACEOUS AND A FEW FINE GRAINED SAND LAYERS. AT 1470.30 A VERY HARD LAYER 10 CENTIMETERS THICK. 1474.60 DARK GRAY FAIRLY COMPACT BEDDED CLAY-SHALE WITH GREENISH HUE SOMEWHAT MICACEOUS 1476.70 DARK GREENISH GRAY CLAY-SHALE WITH A FEW SANDY LAYERS PYRITE 1476.85 DARK GREENISH GRAY CLAY-SHALE SOMEWHAT PLASTIC AND WITH LIGHT COLORED FECAL	
4-5-37	1450						1450		II. SARMATIAN HORIZON 1437.80 – 1440.90	1479.30 DARK GRAY, FAIRLY COMPACT BEDDED CLAY-SHALE WITH GREENISH HUE 1481.80 DARK GRAY CLAY-SHALE WITH GREENISH HUE, INTERBEDDED WITH NUMEROUS THIN BROWN 1480.15 DARK GRAY COMPACT CLAY-SHALE WITH ABUNDANT FOSSILS LAYERS OF FINE OIL SAND 1437.90 DARK CLAY-SHALE WITH LENSES AND INTERBEDDINGS OF BROWN FINE GRAINED OIL SAND 1440.90 BROWN VERY FINE OIL SAND, INTERBEDDED WITH THIN COMPACT SOMEWHAT PLASTIC OIL SAND STONE	
4-8-37	1500						1500		12. SARMATIAN HORIZON 1447.00 – 1467.00 1447 / 1467 — 130 t / 50 t — 3300 t / 1 1/2	1441.00 GRAY TO GRAY GREEN COMPACT CLAY-SHALE WITH INTERBEDDINGS UP TO 1 CENTIMETER THICK OF BROWN FINE OIL SAND. DROPS OF OIL ON THE BEDDING SURFACE OF THE CLAY-SHALE 1449.70 OIL SAND, NO CORE RECOVERY, KNOWN ONLY FROM SOME DISTANCE DEEP COAL FRAGMENTS 1450.90 DARK GRAY, COMPACT, SOMEWHAT SHALEY CLAY 1451.10 GRAY SANDY COMPACT CLAY-SHALE WITH PYRITE NO FOSSILS 1451.50 GREENISH GRAY CLAY-SHALE WITH THIN INTERBEDDINGS OF FINE OIL SAND, DROPS OF OIL ON THE 1452.40 BROWN VERY FINE OIL SAND BEDDING SURFACE OF THE CLAY-SHALE 1452.50 GRAYISH-GREEN CLAY-SHALE WITH THIN INTERBEDDINGS OF BROWN OIL SAND, DROPS OF OIL 1457.00 GRAY CLAY-SHALE WITH INTERBEDDINGS OF BROWN FINE OIL SAND ON THE BEDDING SURFACE 1464.50 BROWN VERY FINE COMPACT OIL SAND WITH THIN INTERBEDDINGS OF GREENISH GRAY CLAY 1455.70 BROWN VERY FINE GRAINED PLASTIC OIL SANDSTONE SHALE 1459.75 BROWN VERY FINE OIL SAND. 1465.90 GRAY CLAY-SHALE 1466.10 GRAY COMPACT CLAY-SHALE WITH SOME THIN INTERBEDDINGS OF OIL SAND, NO FOSSILS 1467.00 FINE GRAINED OIL SAND, PROBABLY WITH THIN INTERBEDDINGS OF CLAY-SHALE 1468.90 GRAY TO GREENISH GRAY, FAIRLY HARD, SOMEWHAT SANDY CLAY-SHALE WITH THIN INTERBEDDINGS OF HARD LIME SHALE AT 1468.05 A THIN OIL SAND LAYER, NO FOSSILS 1468.50 GRAY FAIRLY COMPACT CLAY-SHALE WITH A GREENISH HUE 1469.75 GREENISH GRAY CLAY-SHALE WITH OIL DROPS ON FRACTURE SURFACE 1469.93 GRAY COMPACT MODERATELY BEDDED CLAY-SHALE WITH A GREENISH HUE AND BROWN SHALEY SOME OIL DROPS ON FRACTURE SURFACE 1472.50 GRAY TO GREENISH GRAY BROWN FLECKED CLAY-SHALE WITH OIL DROPS ON FRACTURE SURFACE NO FOSSILS.	1472.50

records of all of the wells and the assumption of an effective water drive in all sands based on the observation of producing wells.

The total original reserves of the field were estimated as 6,773,060 barrels of which 2,607,020 barrels were placed in the RAG concession and 4,166,040 barrels were placed in the Gösting concession. It was presumed, with good cause, that if the exploitation of these sands were carefully handled, without undue dissipation of the reservoir energy and the production from the sands curtailed to the point where a full utilization of all possible reservoir energy be made, that the recovery from the Zistersdorf field would approximate the appraisal which was made in 1938. That the wells were not so conserved is evidenced by the producing history of the Gösting wells prior to 1940 and by the fact that today, according to the aerial photographs and other information, none of the wells on either concession is producing by natural flow.

Estimated drilling and production rates to December 31, 1943.- Important statistics for wells known to be producing in the Zistersdorf field in August 1939 and the estimated status of the same wells at the end of 1943 have been summarized and appear on pages 52 and 53. The production of the wells as of August 1939 averaged approximately 23 metric tons per well per day, whereas the same wells at the end of 1943 are believed to be producing about 5 metric tons of oil per well per day, less the loss in production due to the time lost owing to mechanical difficulties.

The estimates which follow are based on the production statistics of Rohoel-Gewinnungs A.G., as of August 1939 and deductions from photographs taken in August 1943 which indicates the extent of development in the field as of that date. From known production data, charts were compiled showing the output from month to month for a number of representative wells. For example, one such chart, summarized according to 3 month periods, is as follows:

Production for period	Metric Tons	Barrels	Production for period	Metric Tons	Barrels
First 3 months	3,600	24,480	Ninth 3 months	300	2,040
Second 3 months	2,700	18,360	Tenth 3 months	225	1,530
Third 3 months	2,100	14,280	Eleventh 3 months	195	2,006
Fourth 3 months	1,650	10,540	Twelfth 3 months	180	1,224
Fifth 3 months	1,350	9,180	Thirteenth 3 months	165	1,122
Sixth 3 months	900	6,120	Fourteenth 3 months	150	1,020
Seventh 3 months	650	4,420	Fifteenth 3 months	135	918
Eighth 3 months	450	3,060	Sixteenth 3 months	120	816

From such charts showing monthly production of representative wells the output was estimated for 1940, 1941, 1942 and 1943 for all wells believed to have been producing as of August 1943 as shown by the aerial photographs. From the grouping of wells, as indicated by the aerial photographs, and the map shown on page 30, it is apparent that nearly all of the wells drilled in the Zistersdorf field up to August 1943 produced from oil sands known in 1939. Few, if any, wells have tested sands deeper than RAG 11, completed in the fall of 1939. There was no way of determining the rate at which wells had been drilled or abandoned between 1939 and 1943 and therefore any estimate as to how many of these were in production during each of the intervening years is quite speculative.

That which appeared to be the most likely rate at which wells were drilled and completed, was used and is shown in the estimates given.

In the estimates for Zistersdorf field, given below, allowance has been made for shut-down time and for wells abandoned.

Anticipated production.- It has been estimated that probably one of the RAG wells and three of the Gösting wells would be abandoned late in 1943 and that the remaining wells would continue in production showing the same continued declining trend as that set up for the earlier life of the wells. Based upon these assumptions it has been estimated that the following production might be anticipated:

Estimated Production, 1944

Wells	Metric Tons	Total Metric Tons	Barrels	Total Barrels
RAG wells:				
8 wells	4,560		31,008	
4 wells	2,760	7,320	18,768	49,776
Gösting wells:				
22 wells	15,180		103,224	
10 wells	7,600		51,680	
10 wells	9,000		61,200	
6 wells	13,500	45,280	91,800	307,904
Total anticipated production in Zistersdorf, 1944		52,600		357,680

Total known and estimated crude oil production from the Zistersdorf field, to December 31, 1943 is as follows:

Known and Estimated Production to December 31, 1943
Zistersdorf Field

Period	Metric Tons			Barrels		
	RAG	Gösting	Total	RAG	Gösting	Total
Prior to 1939	24,600	75,400	100,000	167,280	512,720	680,000
1939	40,836	103,688	144,524	277,685	705,078	982,763
1940	52,900	150,200	203,100	359,720	1,021,360	1,381,080
1941	31,750	80,900	112,650	215,900	550,120	766,020
1942	17,500	68,500	86,000	119,000	465,800	584,800
1943	9,250	58,250	67,500	62,900	396,100	459,000
Total	176,836	536,938	713,774	1,202,485	3,651,178	4,853,663

According to the estimate of production recovered from the Zistersdorf field, given above, it is believed that 713,000 metric tons (4,848,400 barrels) of the original estimate of 987,440 metric tons (6,714,592 barrels) crude oil reserves will have been produced by December 31, 1943. It would seem questionable whether the remaining production from these sands will amount to 274,440 metric tons (1,866,192 barrels). The present wells are assumed to have a daily potential producing rate of approximately 4 metric tons or an effective daily producing rate of 2.5 metric tons or 17 barrels per well. According to aerial photographs and other information, all of these wells are being produced artificially and since several installations for the treatment of oil-water emulsions have been observed, it is believed that the wells are producing large quantities of water with the oil. All of the assumptions which have been made and the conclusions reached as to producing rates and total production for the fields, as shown above, are based partly on the known past history of these wells and partly from deductions which have been made on the basis of the known producing performance of wells of this type and character. It seems probable that the present producing sands in this field will continue to decline, producing less important quantity of crude oil after 1944 and that within the term of five or six years all of the present producing wells will have been depleted and abandoned.

Estimates of Production, Zistersdorf Field

WELLS	Metric Tons	Total Metric Tons	Barrels	Total Barrels
1939				
RAG company reported a yearly output for all RAG wells		40,836		277,685
Gösting:				
10 wells (producing for a year)	67,160		456,688	
2 wells (producing 110 days)	7,728		52,550	
	28,800	103,688	195,840	705,078
Total		144,524		982,763
Estimate for 1940				
RAG wells:				
4 wells	9,400		63,920	
2 wells	12,000		81,600	
5 wells	31,500	52,900	214,200	359,720
Gösting wells:				
11 wells	37,400		254,320	
8 wells	62,400		424,320	
8 wells	50,400	150,200	342,720	1,021,360
Total		203,100		1,381,080
Estimate for 1941				
RAG wells:				
10 wells	16,750		113,900	
4 wells	15,000	31,750	102,000	215,900
Gösting wells:				
18 wells	16,200		110,160	
8 wells	27,200		184,960	
10 wells	37,500	80,900	255,000	550,120
Total		112,650		766,020
Estimate for 1942				
RAG wells:				
10 wells	8,100		55,080	
4 wells	9,400	17,500	63,920	119,000
Gösting wells:				
25 wells	22,500		153,000	
10 wells	23,500		159,800	
10 wells	22,500	68,500	153,000	465,800
Total		86,000		584,800
Estimate for 1943				
RAG wells:				
10 wells	6,210		42,228	
4 wells	3,040	9,250	20,672	62,900
Gösting wells:				
25 wells	19,000		129,200	
10 wells	9,000		61,200	
10 wells	16,750		113,900	
6 wells	13,500	58,250	91,800	396,100
Total		67,500		459,000

2.5.2 Neusiedl Field (Steinberg-Naphta Concession)

Introduction.- The Steinberg-Naphta concession in the Neusiedl field is situated some two kilometers southwest of the village of Neusiedl and its southern boundary is about one-half kilometer north of the Zistersdorf field. This tract is approximately 3/5 kilometer wide from north to south and 2 kilometers long from east to west. It crosses the East Steinberg fault, with the greater part of the concession lying west of this fault. By the end of May 1939, three wells in the extreme southeast corner of this tract were producing oil and a location for another well had been made.

Geology.- Since the area lies only about 1/2 kilometer northeastward from the Zistersdorf field, the cross-section through the latter field shown on page 36 will also serve to illustrate conditions for the Steinberg-Naphta concession. All three of the wells known to be producing on this tract in 1939 started either in the Pannonian formation or in the thin veneer of superficial deposits overlying it and drilled most of their total depth on the downthrown or east side of the major Steinberg fault before cutting this fault and entering, on the upthrown side of the fault, the Flysch formation in which all three wells produced oil. None of the wells encountered production in any of the Pannonian or Sarmatian sands penetrated, which was to be expected as these sands are low structurally in this area.

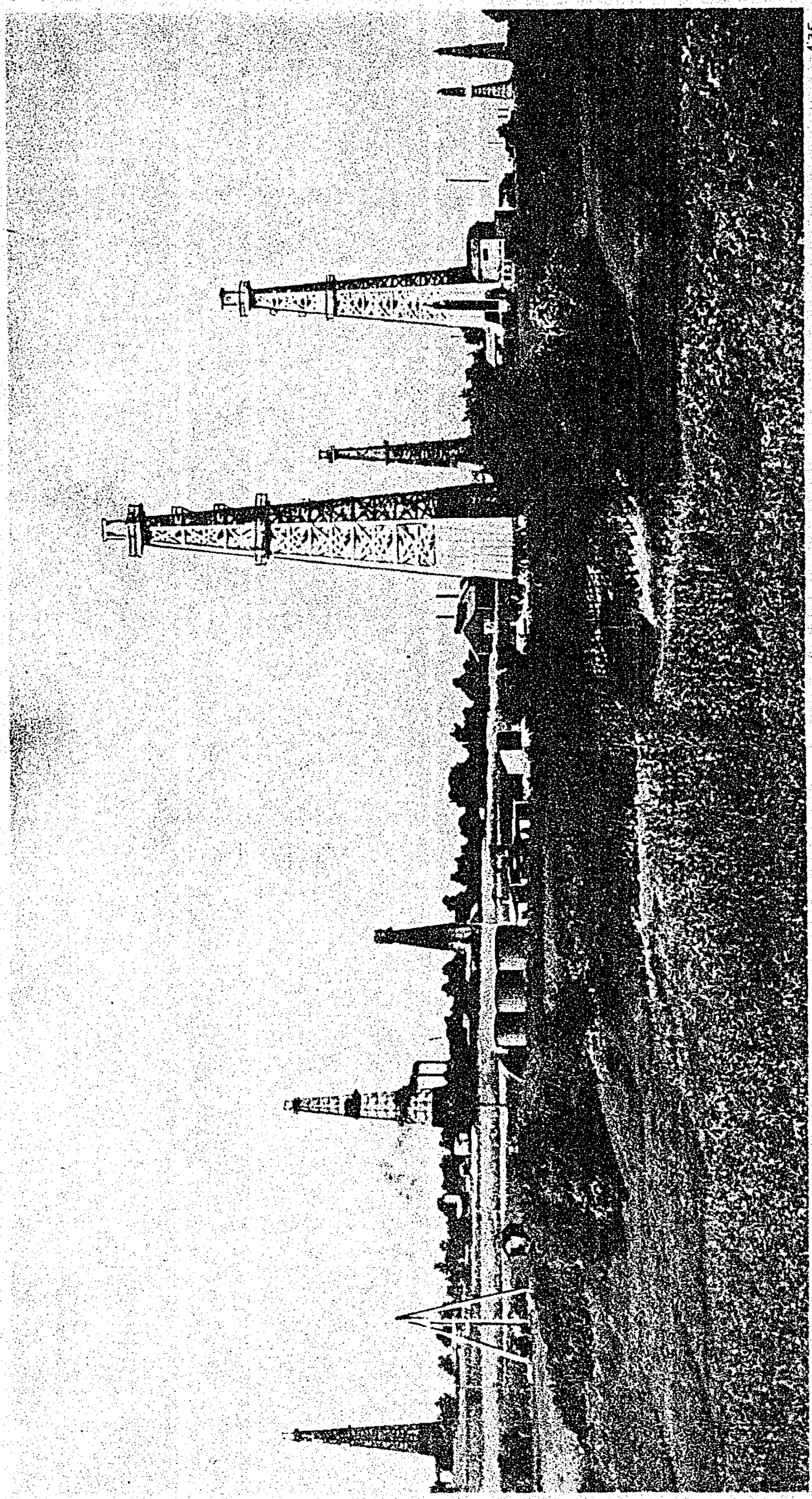
The Flysch has not been known to produce oil in this area except adjacent to the fault and it is therefore assumed that in all three Steinberg-Naphta wells oil coming from this formation accumulated in fracture zones related to the major Steinberg fault.

Drilling and Production Data.- There is little information available regarding the three Steinberg-Naphta wells. The first one drilled had a surface elevation of 223 meters and is located in the extreme southeast corner of the tract. It encountered the first Sarmatian sand at 967 meters (3,173 feet) and penetrated the first seven Sarmatian sands without a show of oil. Immediately below the seventh sand the well cut the east Steinberg fault at 1,176 meters (3,858 feet) and entered the Flysch on the west or upthrown side of the fault. Total depth of the hole is 1,293.2 meters (4,243 feet). The well yielded oil in the Flysch strata from crevices associated with the fault. During the month of April 1939, it produced 52.6 metric tons (358 barrels) of crude and shortly thereafter was shut down for repairs. In May 1939 the output was only 5.8 metric tons (39 barrels).

The second of these wells, located a short distance north of No. 1, had a surface elevation of 223 meters (731 feet) and reached the first Sarmatian sand at 974 meters (3,194 feet). It penetrated upper Sarmatian horizons without encountering an oil show, and cut the East Steinberg fault, entering the Flysch formation on the upthrown side. The hole passed through a fracture zone which produced oil in the Flysch between 1,221 and 1,227 meters (4,004 and 4,024 feet).

The output from this well in April 1939 amounted to 126 metric tons (856 barrels) of crude and in May 1939, 145.1 metric tons (980 barrels). During part of this period the No. 2 well was shut down owing to lack of storage.

Well No. 3, located 125 meters (410 feet) northwest of No. 1, and 103 meters (338 feet) southwest of Number 2, is reported to have penetrated the East Steinberg fault from the lower Pannonian without encountering the Sarmatian. It also reached a fracture zone in Flysch strata which was productive. A 5 3/4 inch liner in this well is set between 1,003 and 1,252 meters (3,289 and 4,106 feet) with perforations between 1,021 and 1,033 meters (3,348 to 3,388 feet), 1,061 to 1,073 meters (3,480 to 3,519 feet) 1,165 to 1,170 meters (3,821 to 3,838 feet) and 1,228 to 1,251 meters (4,028 to 4,103 feet). It is believed that the production comes from all of these levels. The output from this well amounted to 307 metric tons May 1939. It is reported to have been shut down from May 2 to 12, 1939, to clean the well of paraffin.



THE ZISTERSDORF OILFIELD VIEWED FROM THE SOUTH
SEPTEMBER, 1937

For all three of the wells the total potential production as of February 6, 1939 was 22 metric tons (150 barrels) per day. Specific gravity of the oil from well No. 1 was 0.87 and from the other two wells was 0.86. The paraffin content in the crude oil produced of all three of the wells was 13.9 per cent. Production difficulties on these wells were vastly increased by the high paraffin content of the crude oil with consequent heavy deposits of paraffin forming in the tubing.

Estimates of production, 1939 to 1943, inclusive.- In May 1939 there were three producing wells in the Steinberg-Naphta concession of the Neusiedl field, the last having been completed in February of that year and a location for another well having been made. It is estimated that the output for these wells for 1939, after allowance for shutdown time due to cleaning out paraffin, etc. was approximately as follows: one old well produced 500 metric tons (3,400 barrels) during the year, one well completed just prior to 1939 produced 2,200 metric tons (14,960 barrels) and one well during a 10 month period in 1939 yielded 2,300 metric tons (15,640 barrels), making an estimated total production for the year of about 5,000 metric tons (34,000 barrels) of oil. It was not possible to ascertain from the aerial photographs taken in August 1943 whether a well drilled on the location prepared early in 1939 was completed as a producer.

For the interval between May 1939 and August 1943, there is no information available on oil operations in this locality. According to the aerial photographs taken in August 1943, there are two wells currently producing in the southeast corner of the tract, one well was in process of drilling and should be completed in 1943 and 3 sites had been prepared. The latter probably would be drilled in 1944.

In the following estimates of production for the wells in the small area of the Steinberg-Naphta concession, deductions were made for shutdown time:

Known and Estimated Production to December 31, 1943
Neusiedl Field

	Metric Tons	Barrels
1939	5,000	34,000
1940	6,500	44,200
1941	5,000	34,000
1942	4,000	27,200
1943	3,500	23,800
Total	24,000	163,200

Anticipated production for 1944, assuming that the indicated locations were drilled and in all cases were producers, is placed at about 8,000 metric tons (54,400 barrels).

This field does not rank as an important possible source of crude oil owing to (1) the irregularity of the producing formation and (2) the erratic production pattern as set up by the few wells which have been produced.

2.5.3 Gaiselberg Field

General.- The Gaiselberg structure basically is similar to the Zistersdorf structure. It is located several kilometers west/southwest of the Zistersdorf field, approximately halfway between the towns of Gaiselberg and Zistersdorf and is a separate field. In December 1939, the Gaiselberg field was believed to cover a little more than 170 acres, had five producing oil wells and two wells in process of being drilled. According to aerial photographs taken in August 1943 the area of the field is somewhat greater than

was originally estimated and contained, as shown on the map on page 30, 44 producing wells. In 1939 this field was controlled and operated by the Rohoel-Gewinnungs, A. G.

Geology.- The geologic section through the Zistersdorf area, shown in the sketch on page 32, is representative also of a section through the Gaiselberg field. Both are located on the downthrown side of the same major fault, i.e., the eastern side of the Steinberg fault. In both oil fields, wells start in the Pannonian formation or in surface deposits overlying that formation and there is more than 700 meters of Pannonian sediments resting unconformably upon the Sarmatian. The latter is about 1,000 meters (3,280 feet) thick and conformably overlies the Tortonian formation. In both fields, production is derived mainly from numerous sands in the Sarmatian, with the oil trapped in the upper portion of the productive strata where they abut against the fault. In both fields the relatively impervious Flysch formation also is present on the upthrown or west side of the fault.

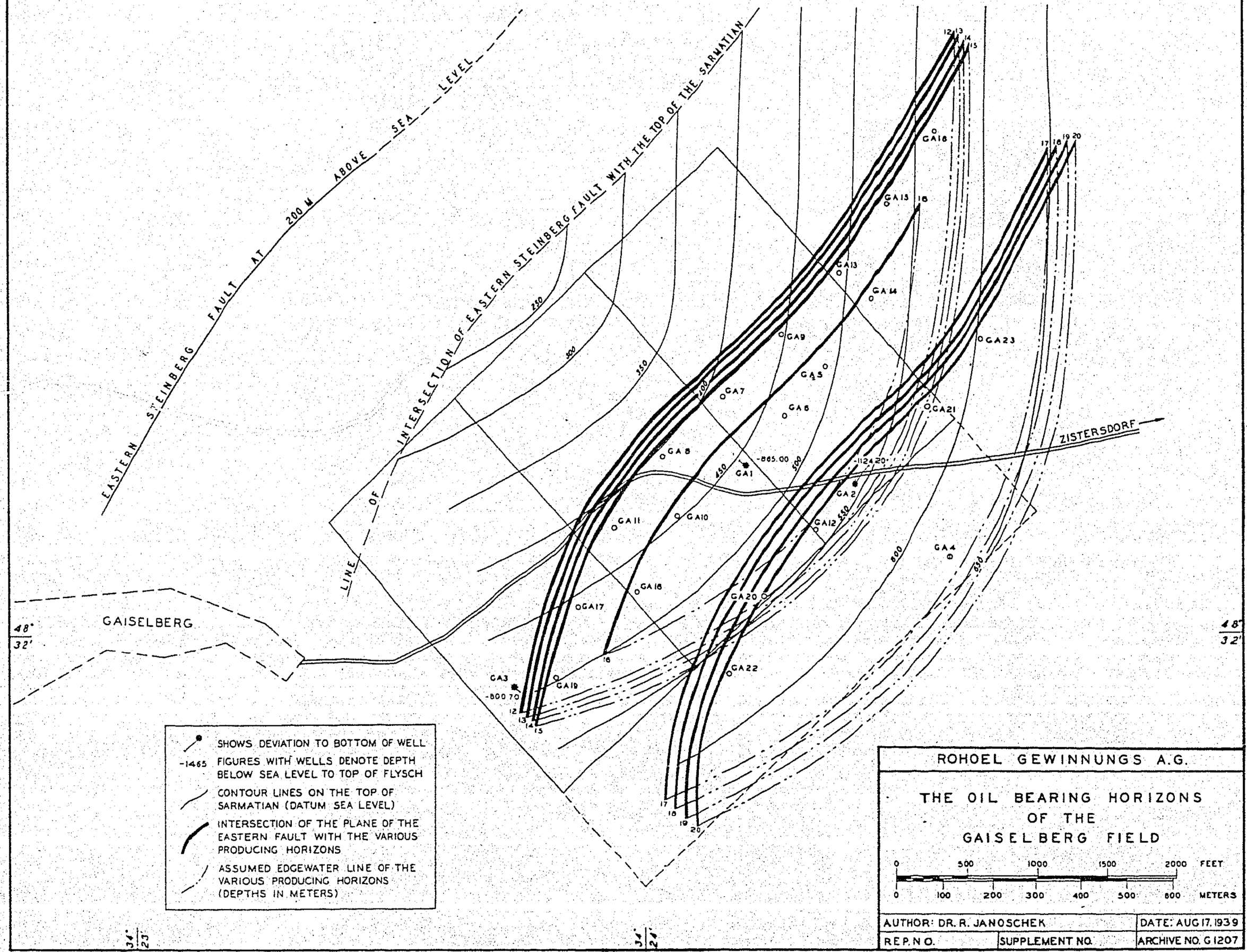
Geologically, the Gaiselberg field is quite similar to that of Zistersdorf, the chief difference between the two fields being that the Gaiselberg field has a larger proven producing area and a much greater potential recovery than has Zistersdorf. Thus, a review of the geology of the Zistersdorf field will serve as a background for the discussion of the Gaiselberg field which follows.

Operations in the Gaiselberg Field 1938-9.- Gaiselberg No. 1 was completed July 15, 1938 at a depth of 1139 meters (3.736 feet) and was perforated for production at 1095-1112 meters (3,591-3,647 feet) in the lowest sand penetrated just above the fault contact, namely, horizon 16. Gaiselberg No. 2 was completed September 10, 1938, and was drilled to a total depth of 1379 meters (4,523 feet), penetrating the 20th horizon before going into the Flysch. The well was completed for production in the 20th horizon, producing through perforations from a depth of 1356-1365 meters (4,448-4,477 feet).

Very little coring was done in either of the two Gaiselberg wells first drilled, the operators having depended on an electrical survey of the wells for their interpretation of the relative productive value of all sands which were penetrated. According to the electrical surveys which were made, the indication for all horizons below the 12th were encouraging. Gaiselberg No. 3 was drilled next but was too far off structure and missed contacting any of the sands above the water level and was abandoned as a failure. However, No. 3A was directionally drilled from the same location, using the upper 500 meters, 1,640 feet, of the No. 3 well. This new well was directed up structure in the direction of the Steinberg fault, penetrating the 12th and 13th horizon at a point far enough above the oil-water contact to secure commercial production. The 14th and 15th horizons which were also penetrated were found to be water bearing at the points penetrated. No. 3A, however, being at the extreme southern limits of the field where potential production and ultimate recovery would be relatively small, was probably abandoned in 1940.

Gaiselberg Nos. 4 and 5 were completed in the latter part of 1939 and were brought into production by natural flow, both being exceptionally good wells, as shown on the chart "Available Well Completion Data, Gaiselberg Field", on pages 70,71. The same chart shows the depths to the sands penetrated by the wells drilled to December 1939 and the sand thickness encountered in each well. Schlumberger well logs of Gaiselberg Nos. 2 and 3a which appear on pages 72, 73 give a good picture idea of the sands encountered in the Gaiselberg field. The probable production status in 1943 of the five Gaiselberg wells which were producing in 1939 is given on pages 70, 71.

Reserves.- As stated before, the Gaiselberg structure is very similar to that of the Zistersdorf field, the production from both fields coming from Sarmatian sands in the upper Miocene. A subsurface map showing the semi-proven area of the Gaiselberg structure, dated August 17, 1939, is presented on page 30. This map illustrates quite clearly the extent and position of



ROHOEL GEWINNUNGS A.G.

THE OIL BEARING HORIZONS OF THE GAISELBERG FIELD

0 500 1000 1500 2000 FEET

0 100 200 300 400 500 600 METERS

AUTHOR: DR. R. JANOSCHEK		DATE: AUG 17. 1939
REP. NO.	SUPPLEMENT NO.	ARCHIVE NO. G 1207

PRODUCING Oil bearing

Production status

Production Status of Gaiselberg Wells at End of 1939

As of December 31, 1939

Well Name & Number	Total Depth (Meters)	Producing Sand December 1939	Rate, Tons Per Day Net Oil (Metric Tons)	Specific Gravity of Oil	Percent Water	Producing Method	Sands Cased Off 1939	Remarks
Gaiselberg 1	1,139	16th Sarmat	40	.923	None	Flowing	13th, 14th, 15th Sarmatian	Continued to flow -- produced estimated 13,721 tons to Dec. 31st, 1939.
Gaiselberg 2	1,383	20th Sarmat	40	.890	None	Flowing	13th, 14th, 15th, 16th, 17th, 18th and 19th Sarmatian	Produced to Nov.17, 1939, 2,800 tons and from Nov.17 to Dec.31, 1939 an estimated 1800 tons, making a total of 4,600 tons.
Gaiselberg 3a	1,190	15th Sarmat	4	.934	70%	Pumping	None	Produced approximately 1,000 tons in 1939 and will produce about 900 tons in 1940.
Gaiselberg 4	1,160	x	55	.923	None	Flowing	x	Came in Nov.23,1939, averaging 45-60 tons per day. Produced 38 days in 1939 an estimated total of 1900 tons.
Gaiselberg 5	1,085	x	50	x	None	Flowing	x	Continued to flow. Produced estimated 2,648 tons from Nov. 27 to Dec. 31, 1943.

Available Well Completion Data, Gaiselberg Field

December, 1939

Well Name & Number	Drilling Commenced	Drilling Completed	Total Depth (Meters)	Producing Zone (Meters)	Initial Daily Production (Metric Tons)	Specific Gravity	Sarmatian Sand Produced	Size of Choke (Mms.)	Tubing Pressure (Atm)	Casing Pressure (Atm)
Gaiselberg 1	6/1/38	7/15/38	1,139	1,095-1,112	44.4	.923	16th	6	16	25
Gaiselberg 2	8/12/38	9/10/38	1,379	1,356-1,365	46	x	20th	6	18	38
Gaiselberg 3a	10/20/38	1/25/39	1,190	1,132-1,138 1,094-1,097 1,118-1,122	23	.934	12th and 13th Sarmatian	x	x	x
Gaiselberg 4	8/20/39	11/23/39	1,160	1,141-1,148	55	.923	x	6	x	x
Gaiselberg 5	x	10/31/39	1,085	1,012-1,038	50	x	x	6	x	x

Estimated Production Status of Gaiselberg Wells at End of 1943 and Anticipated Production for 1944

Estimated as of December 31, 1943

Status of Well	Producing Sand December 1943	Rate, Tons Per Day Net Oil (Metric Tons)	Specific Gravity of Oil	Estimated Percent Water	Producing Method	Sands still Cased Off End of 1943	Anticipated Production 1944 (Tons)	Remarks
Ga.1 Producing	16th Sarmat	15	.923	10%	Flowing	12th, 13th, 14th, and 15th Sarmat	3,500	Probably will be depleted in 16th Sand in 1945.
Ga.2 Producing	20th Sarmat	15	.890	10%	Flowing	13th, 14th, 15th, 17th, 18th, and 19th Sarmat	3,500	Abandoned in 1940.
Ga.3a Abandoned	-	-	-	-	-	None	-	-
Ga.4 Producing	x	x	x	x	Flowing	x	x	x
Ga.5 Producing	x	x	x	x	Flowing	x	x	x

x = Data Unknown
Tons = Metric Tons

Available Well Completion Data, Gaiselberg Field

December, 1939

	Gas-Oil Ratio (M^3/M^3)	Water Content Initially	Surface Casing (Diameter, Inches)	Surface Casing (Depth, Meters)	Oil String (Diameter, Inches)	Oil String (Depth, Meters)	Tubing (Diameter, Inches)	Tubing (Depth, Meters)	Liner (Diameter, Inches)	Liner (Depth Meters)	Well Elevation (Meters)	Remarks
Ga.1	40	None	13 3/8	84	6 5/8	1,134	2	1,033	4 3/4	20	260	Swabbed down 150 meters before well came in.On Aug.25.1939 had produced 9,185 tons of oil. It was averaging 43 tons a day Dec.8,1939 and had made 12,700 tons of oil as of that date.
Ga.2	x	None	11 3/4	224	6 5/8	1,379	2 1/2	1,350	4 3/4	14	245	Well first produced by natural flow 9/18/1938 after lowering fluid level 100 meters. Av. daily prod. 46 tons. Well closed in-for lack of transportation facilities-and produced only 2,800 tons to 11/17/1939
Ga.3a	x	None	11 3/4	208	6 5/8	1,188	2 1/2	1,089	4 3/4	10	269	In January 1939 well tested Salt Water from perforations 1132-8 in base of 10th Zone, Oil 1094-7 and 1118-22 also 10th Sand. This location drilled for political reasons.
Ga.4	x	None	13 3/8	108	6 5/8	1,160	2 1/2	1,141	5 3/16	20	237	Brought in Nov.23,1939. As of Dec.8,1939 averaged 45-60 tons of oil per day.
Ga.5	x	None	x		x	x	x	x	x	x	x	Came in Oct. 31,1939. Averaged 50 tons of oil per day. Produced from Oct.31,1939 to Nov.27, 1939 (last report) 948 tons clear oil.

x = Data Unknown
Tons = Metric Tons

GAISELBERG 2

SCHLUMBERGER ELECTRICAL LOG AND COMPLETION REPORT

ZISTERSDORF SEPT. 10, 1938

FIELD: GAISELBERG

WELL NO. 2

SUMMARY SHEET:

Elevation at rotary table - - - -248 m.
Total depth - - - - - - - - - - 1379 m.
Date commenced drilling -August 12, 1938
Date completed drilling -Sept. 10, 1938
Date in production - - - Sept. 18, 1938
Method of bringing in - - Swabbing
Initial production - - - 46 metric tons
313 barrels
Initial G.O.R. - *
Initial pressure - - - Tubing 18 atm.
Casing 28 atm.
Initial bean - - - - - - - - - 6 mm.
Initial gravity - - - - - - - - - *
Initial B.S.& W. - - - - - - - - - 0

Zone open to production - 20th Sarmatian

CASING RECORD:

11 3/4" cemented at 224 meters
6 5/8" cemented at 1379 meters

PERFORATIONS:

6 5/8" casing perforated- 1356-1365 m.

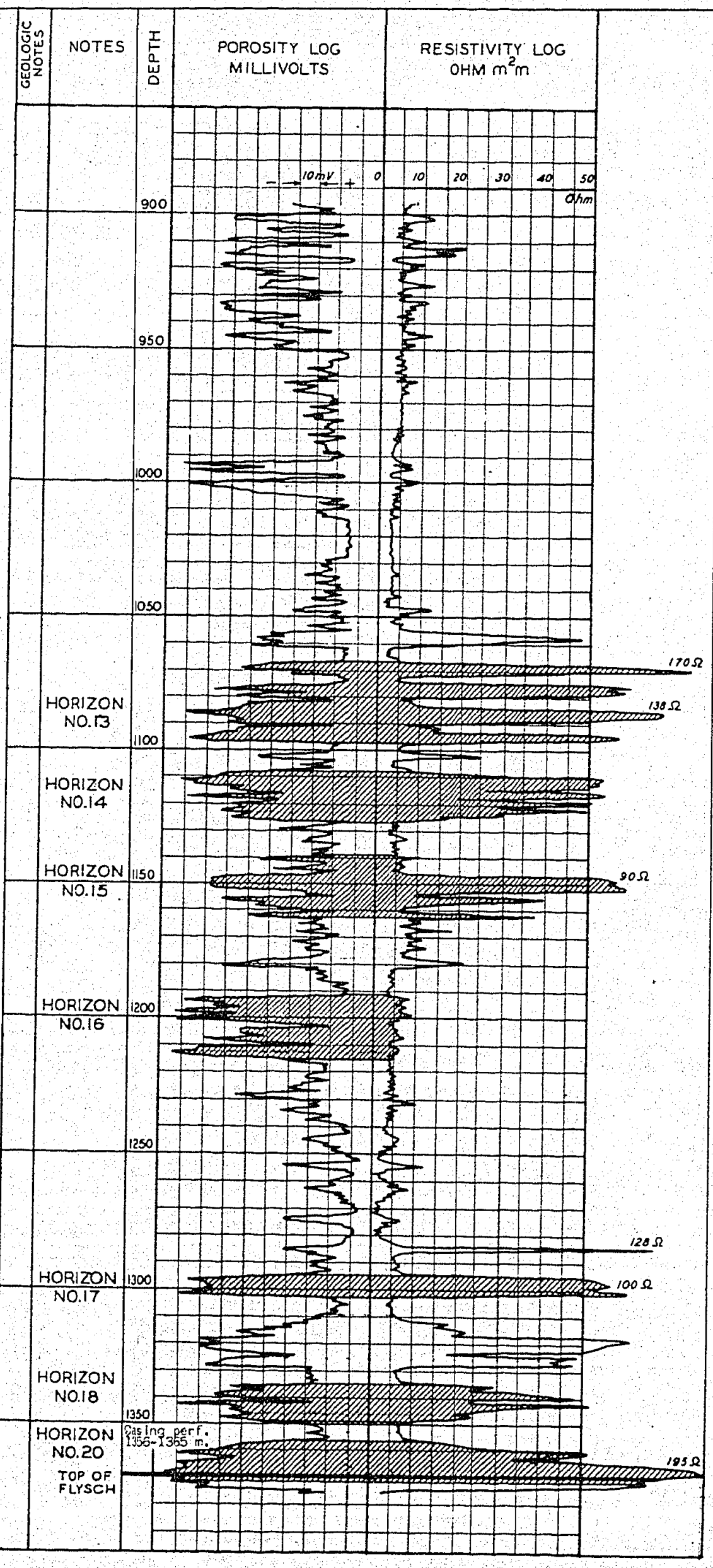
TUBING RECORD:

2 1/2" tubing run to 1350 m.

PRODUCING HORIZON:

20th Sarmatian 1356-1371 m.

* - no information



GAISELBERG 3 A

SCHLUMBERGER ELECTRICAL LOG AND COMPLETION REPORT

ZISTERSDORF, FEB.3, 1939

FIELD: GAISELBERG

WELL NO. 3A

SUMMARY SHEET:

Elevation at rotary table - 269 m.
Total depth - - - - - - - 1190 m.
Date commenced drilling -Oct.20/38
Date completed drilling -Jan.25/39
Date in production - - - Feb. 1/39
Method of bringing in - Swabbing
Initial production - 23 Metric Tons. 175 Bbls.
Initial G.O.R. - 220 cu.ft.per bbl.
Initial pressure - - - - - - - - *
Initial bean - - - - - - - - 6 mm.
Initial gravity - - - -0.934 at 15C.
Initial B.S.& W. - - - - - - - - 0
Zone open to production - 12th-13th Sarmatian

CASING RECORD:

11 3/4" cemented at 208 meters
6 5/8" cemented at 1188 meters

PERFORATIONS:

6 5/8" casing perforated
1094 - 1097 m.
1118 - 1122 m.

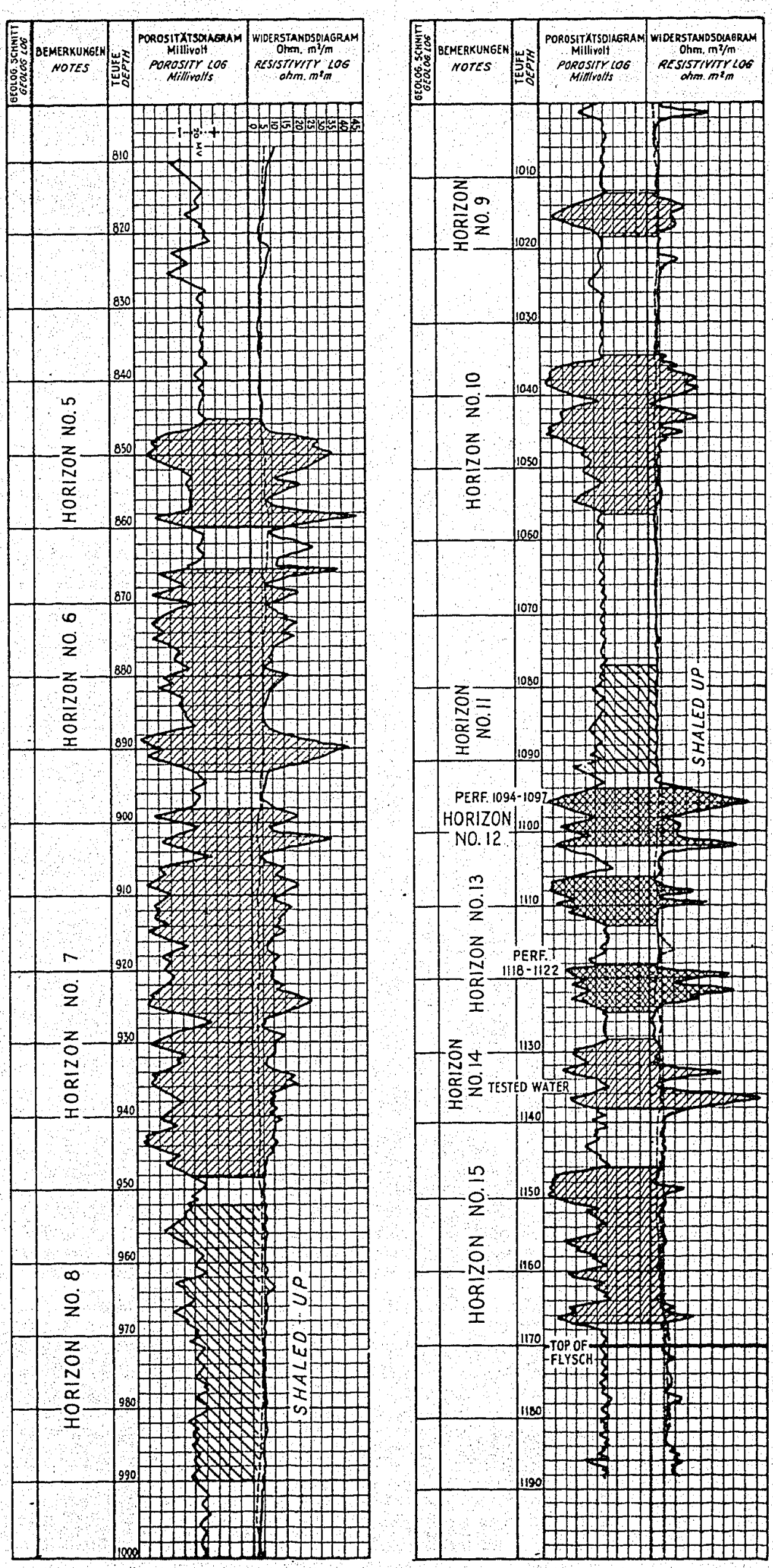
TUBING RECORD:

2 1/2" tubing run to 1089 m.

PRODUCING HORIZON:

12th-13th Sarmatian 1077-1120 m.

* - no information



the various Sarmatian sands. On page 75 is shown an estimate of the reserves of this field, made by the Rohoel-Gewinnungs A.G. in 1938. This estimate of 2,472,652 metric tons (16,814,034 barrels) does not include sands above the 15th, which have since been found to be productive.

It will be noted from both the map and the estimate of reserves that the Gaiselberg structure is much more extensive and important than is the Zistersdorf structure. This map also purports to show proposed wells which the companies had contemplated drilling after 1939, designed effectively to drain the structure.

Probable Exploitation Program of the Gaiselberg Field to December 31, 1943.- It is known that as of December 31, 1939, the Gaiselberg field had 5 producing wells. It was also known that No. 3 had been completed as a non-producer, and had then been plugged back to a depth of 500 meters (1,640 feet) and the hole diverted up structure by directional drilling so that the producing sand was penetrated above the water level. This new well was numbered 3A. According to aerial photographs taken in August 1943, at that time 44 wells were producing by natural flow, two wells were drilling, and one new location had been cleared. These are shown on the map on page 30. The grouping of these 44 producing wells indicates that most of them are producing from sands known to be oil bearing in 1939. However, a few wells on the eastern edge of the field might be producing from horizons deeper than any tested prior to the war.

The rate of exploitation followed in this field during the period December 1939 to August 1943 can only approximately be judged. Naturally, the rate of exploitation of the field has a direct bearing on the estimates of the daily and yearly producing rates for this field. It is believed that the following drilling program probably approximated that followed in the exploitation of the field, up to the end of 1943.

Probable Program of Exploitation - Gaiselberg Field 1938 to 1943

Year	Wells Drilled	Wells Abandoned	Wells Producing at End of Year.
1938	3	1	2
1939	3	-	5
1940	10	1	14
1941	12	-	26
1942	16	-	42
1943	2	-	44

The estimates of daily and yearly production rates and of cumulative production for the Gaiselberg field have been based on production information available from the records of the operations to the end of 1939 of the Rohoel-Gewinnungs, A.G., and from information derived from the aerial photographs taken August 1943, together with data from other sources. From the available information, tables have been prepared to show the probable production rate from month to month for each well. A representative chart compiled in this way and summarized in three months periods follows:

Production for period of:

Period	Metric Tons	Barrels	Period	Metric Tons	Barrels
1st 3 months	5,400	36,720	7th 3 months	2,400	16,320
2nd 3 months	4,500	30,600	8th 3 months	2,300	15,640
3rd 3 months	3,600	24,480	9th 3 months	2,225	15,130
4th 3 months	3,150	19,380	10th 3 months	2,175	14,790
5th 3 months	2,850	17,680	11th 3 months	2,125	14,450
6th 3 months	2,600	17,680	12th 3 months	2,100	14,280

APPRAISAL OF THE OIL RESERVES OF THE SARMATIAN SANDS OF THE GAISELBERG FIELD, AUSTRIA

AS OF DECEMBER 31, 1939*

Sand Horizon	Property Owner	Productive Area		Sand Thickness		Total Sand Volume		Porosity of Sand	Effective Production Factor	Specific Gravity of the Oil	Original Producible Oil Reserves				Total Oil Produced to 12/1/39		Remaining Producible Oil Reserve		Percentage of Reserves Remaining to be Produced 12/31/39
		in M^2	in Acres	in Linear Meters	in Linear Meters	in M^3	in Acre/foot				in M^3	in Metric Tons	in Barrels	in Bbls. per acre/foot	in Metric Tons	in Barrels	in Metric Tons	in Barrels	
15	RAG	689,200	170.64	30	98.42	20,676,000	16,794.39	20%	30%	0.923	1,240,560	1,145,037	7,786,252	466	-		1,145,037	7,786,252	100.0
16	RAG	628,100	155.20	10	32.81	6,281,000	5,092.11	20%	30%	0.923	376,860	347,842	2,365,326	466	13,842	94,126	334,000	2,271,200	95.7
17	RAG	466,900	115.37	8	26.25	3,735,200	3,028.46	20%	30%	0.890	224,112	199,460	1,356,328	466	-		199,460	1,356,328	100.0
18	RAG	472,200	116.68	10	32.81	4,722,000	3,828.27	20%	30%	0.890	283,320	252,155	1,714,654	466	-		252,155	1,714,654	100.0
19	RAG	489,000	120.83	6	19.68	2,934,000	2,377.93	20%	30%	0.890	176,040	156,676	1,065,396	466	-		156,676	1,065,396	100.0
20	RAG	496,900	122.78	14	45.93	6,956,600	5,639.29	20%	30%	0.890	417,396	371,482	2,526,078	466	4,600	31,280	366,882	2,494,798	99.0
Total	RAG	3,242,300	801.16			45,304,800	36,760.45				2,718,288	2,472,652	16,814,034	466	18,442	125,406	2,454,210	16,688,628	99.2

* The original estimate of reserves was made December 1, 1938, hence this estimate does not include reserves which were developed after that date, nor does it include production obtained from these additional sands in wells 3a, 4 and 5, as the sands were not definitely correlated according to last available information.

As the first five wells at Gaiselberg produced only for short periods prior to the end of 1939, in compiling the above chart it has been necessary to use the estimates of anticipated producing rates for new wells made by Rohoel-Gewinnungs, A.G. in 1939. A check on these estimates of production has been provided by a comparison with the average rates per well per day as determined in 1938 and 1939 in both the Zistersdorf and the Gaiselberg fields.

Based on the assumed drilling program which has been set up in the third paragraph above, together with the probable rate of production per well, we believe that the following production was probably obtained from the Gaiselberg field up to the end of 1943:

1939

Gaiselberg	Metric Tons	Barrels
No. 1 Well	13,721	93,302
No. 2 Well	4,600	31,280
No. 3 Well	1,000	6,800
No. 4 Well	1,900	12,920
No. 5 Well	2,648	18,006
Total for 1939	23,869	162,308

All Gaiselberg wells were controlled by the Rohoel-Gewinnungs, A. G. and the above total is based on the records of Rohoel-Gewinnungs, A. G. up to November 17, 1939, an estimate having been made for the remainder of the year.

1940

No. of Wells	Metric Tons	Barrels	Remarks
2	20,300	138,040	1 year old at beginning of year
2	28,200	191,760	3 months old at beginning of year
10	99,000	673,200	Average 6 months production during year
Total	147,500	1,003,000	

1941

No. of Wells	Metric Tons	Barrels	Remarks
2	17,250	117,300	2 years old beginning of year
2	19,050	129,540	15 months old beginning of year
10	122,000	829,600	6 months old beginning of year
12	118,800	807,840	Average 6 months producting during year.
Total	277,100	1,884,280	

1942

In 1942, Gaiselberg field entered upon its fourth year of production. At this stage it is believed that it was necessary, in order to prevent uneven water encroachment, to choke back the wells in this field to a point where they would have yielded about 80 per cent of the potential production for the field. Accordingly, the potential production which is tabulated below is corrected by a reduction of 20 per cent, designed to obtain the estimate output for 1942:

No. of Wells	Metric Tons	Barrels	Remarks
2	16,800	114,240	3 years old at beginning of year
2	17,000	115,600	27 months old at beginning of year
10	91,000	618,800	18 months old at beginning of year
12	146,400	995,520	6 months old at beginning of year
16	158,400	1,077,120	New wells. Average 6 months production during year
Total	429,600	2,921,280	Potential production for 1942
	343,680	2,337,024	Corrected to 80 per cent of potential as stated above.

1943

It is believed that in 1943 the field would produce only about 80 per cent of its potential, due to wells being choked back to prevent uneven water encroachment.

Estimates of Potential Production

No. of Wells	Metric Tons	Barrels	Remarks
4	33,600	228,480	More than 3 years old at beginning of year
10	84,250	572,900	27 months old at beginning of year
12	109,200	742,560	18 months old at beginning of year
16	195,200	1,327,360	6 months old at beginning of year
2	19,800	134,640	New wells.
Total	442,050	3,005,940	Potential production for 1943
	353,640	2,404,752	Corrected to 80 per cent of potential as stated above.

Anticipated Production for 1944.- In 1944, Gaiselberg field would probably produce only about 70 per cent of its anticipated potential production because of wells being choked even farther in order to prevent uneven water-table advancement. The potential production is believed to approximate the following estimate:

No. of Wells	Metric Tons	Barrels	Remarks
14	117,600	799,680	More than 3 years old beginning of year
12	101,100	687,480	27 months old at beginning of year
16	145,600	990,080	18 months old at beginning of year
2	24,400	165,920	6 months old at beginning of year
Total	388,700	2,643,160	Potentiel production for 1944
	272,090	1,850,212	Corrected to 70 per cent of potential production as stated above.

The total known and estimated crude oil production from the Gaiselberg field, to December 31, 1943 is as follows:

Gaiselberg Field

	Metric Tons	Barrels
1939	23,869	162,309
1940	147,500	1,003,000
1941	277,100	1,884,280
1942	343,680	2,337,024
1943	353,640	2,404,752
Total	1,145,789	7,791,365

The original estimate of the crude oil reserves of the Gaiselberg field, made by the Rohoel-Gewinnungs A. G. in December 1938, with a forecast as of December 31, 1939, included only those sands from the 15th to the 20th Sarmatian and were calculated as being 2,472,652 metric tons (16,814,034 barrels). This estimate, which appears on page 75, was based on the information derived from the first three wells drilled in the Gaiselberg field. The wells drilled since that time have proved horizons above the 15th Sarmatian to be productive and possibly have opened up sands even below the 20th Sarmatian. Undoubtedly, appreciable crude oil reserves have been added to the reserves as calculated in 1938.

The fact that all of 44 wells are presently producing in the Gaiselberg field by natural flow after an estimated production to December 31, 1943 of 1,145,789 metric tons (7,791,365 barrels) would seem to indicate (1) that the crude reserves have been increased in a substantial manner since 1938 and (2) that the wells have been produced at a rate comparable to the most efficient utilization of the reservoir energy.

It is safe to assume that the Gaiselberg field, barring unforseen acts of physical destruction, will continue to produce a large quantity of crude oil for several years.

2.5.4 St. Ulrich-Prinzendorf Field

Introduction.- According to the latest available information on Austrian oil activities in the Wien Basin, a new area, the St. Ulrich-Prinzendorf field, has been opened up and is undergoing an intensive drilling, and production program. The map on page 30 sets forth all drilling, producing and abandoned wells in this new field as of August 1943. The eastern limits of the field is about 4 kilometers north-northeast of the Zistersdorf field and 1.2 kilometers east and south of the town of St. Ulrich. Its present western limit is at the eastern edge of the village of Prinzendorf. The field between these two points is approximately 5 kilometers or 3 miles long and averages about 1½ kilometers or approximately one mile wide. This represents approximately 1,980 acres known to be productive and the area is rapidly being extended.

The existence of this large pool was recognized by means of aerial photographs taken in August 1943. Up to the time of the last available data prior to the present war, there were four wells known to be producing in this area, all of which were located at the outskirts of the town of St. Ulrich. These 4 wells were drilled just east of the major or East Steinberg fault, which they penetrated and entered the Schlier formation on the upthrown side of the fault. Two of the four wells were known to be producing in 1939 from the Schlier.

The aerial photographs taken in August 1943 show that there were 130 to 136 producing wells in this field at that time, with 15 wells in the course of being drilled, and 28 drilling sites in preparation of which 17 were rigged up in readiness to start drilling operations. There also appeared to be 13 abandoned wells in this area, which are presumed to have proved non-productive.

80 - PRODUCING
St. Ulrich 1

R.B. ST. ULRICH NO.1

SCHLUMBERGER ELECTRICAL LOG AND COMPLETION REPORT

ST. ULRICH, AUGUST 6, 1938

FIELD - ST. ULRICH

WELL NO. D.P.A.G. NO. 1

SUMMARY SHEET:

Elevation at rotary table - - 163 m.
Total depth - - - - - - - - - 971 m.
Date commenced drilling - - - - *
Date comp.
Date completed drilling - Aug.6/38
Date in production - - - Aug.15/38
Method of bringing in - Swabbing
Initial production -- - 51 cubic m. 321 barrels
Initial G. O. R. - - - - - - - - - *
Initial pressure - - Tubing 38 atm. Casing 78 atm.
Initial bean - - - - - - - - - 5 mm.
Initial gravity - - - - - - - -0.865
Initial B. S. & W. - - - - - - - 0

Zone open to production - -Schlier

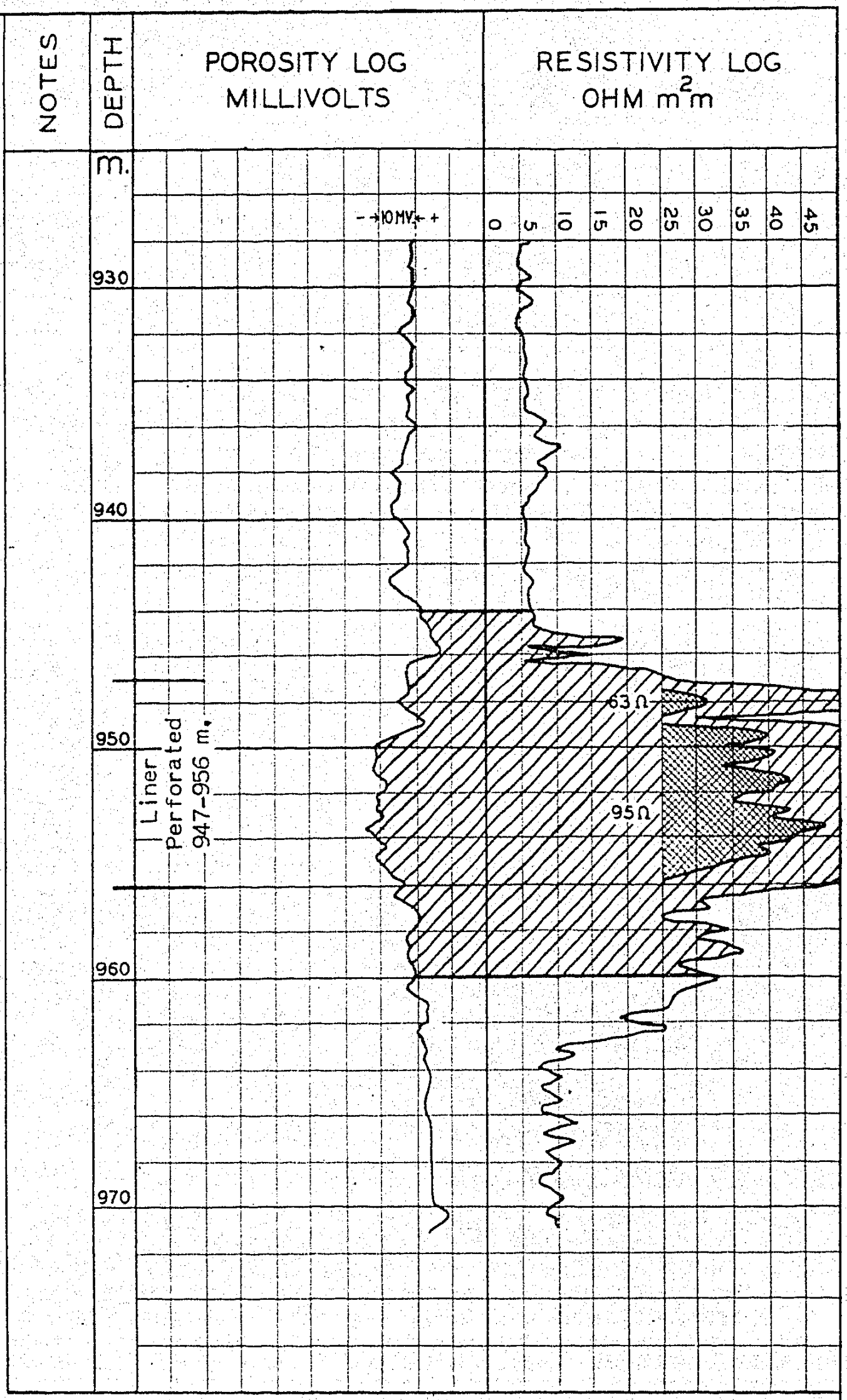
CASING RECORD:
11 3/4" cemented at 268 m.
6 5/8" cemented at 907.4 m.
Liner set 907.4 - 971 m.

PERFORATIONS:
Liner perforated 947 - 956 m.

TUBING RECORD: *

PRODUCING HORIZON:
Schlier 944-960 m.

* - no information



have been drilled recently. With the casing cemented at 907.4 meters (2,976 feet) the well flowed through a 5 mm. choke about 1.5 cubic meters (9½ barrels) in one hour. The specific gravity of the oil was 0.865 (32.1° API) and it was reported as being of a paraffin base. The gasoline content was estimated at about 14 per cent. Production between September 1938 and the end of June 1939 was in excess of 3,200 metric tons (21,760 barrels) of oil.

St. Ulrich No. 2 well was located 180 meters north/northeast of No. 1 and was also drilled by Deutsche Petroleum A.G. This well reached the top of the Sarmatian at 684 meters (2,244 feet), penetrated the first 5 Sarmatian sands before cutting the East Steinberg fault at 787 meters (2,581 feet) and entering the Schlier. The well encountered the Flysch at 971 meters (3,184 feet) and reached a total depth of 977.2 meters (3,205 feet). The basal Schlier conglomerate, producing in the No. 1 well, was located between 952 and 968 meters (3,122 and 3,175 feet). The well was completed January 6, 1939 and in February flowed 15-20 tons daily. Up to the end of June 1939 it had produced in excess of 2,200 metric tons (14,960 barrels) of oil. The other wells which produced in the St. Ulrich area were two, Van Sickle Nos. 2 and 3. The exact location of Van Sickle Number 2 is not available, and all that is known about No. 3 is that it is located 300 meters (984 feet) north of No. 2. Geologically, Van Sickle No. 2 and 3 are similar. They both produced from the Sarmatian and did not reach the basal Schlier conglomerate due to faulting. Van Sickle No. 2 was perforated from depths (in meters) 726.0, 743.0, 755.5 to 767.9 and 780-789.2 (in feet 2,381,2,437, 2,478, 2,519 and 2,558-2,588), correlating approximately with the 7th Sarmatian horizon.

The initial output of Van Sickle No. 2 is reported to have been 50 metric tons of oil daily on 5 mm. bean with casing pressure 65 atmospheres and tubing pressure 25 atmospheres, the oil being of asphaltic base and corresponding in type and quality to the upper Sarmatian crude of the Zistersdorf field. The well was completed in May 1939.

Since the crude produced by the wells of the new St. Ulrich-Prinzendorf field is reported to be paraffinous, the wells of this field may be producing from the same horizon from which the discovery well, Deutsche Petroleum A.G.'s St. Ulrich No. 1 produced.

The available casing records of the two wells known to be completed and producing from the Schlier in 1939 are as follows:

St. Ulrich No. 1	St. Ulrich No. 2
11'-3/4" 88.5 m.	
8'-5/8" 915.1 m.	7"-904.4 m.
6'-5/8" 908-977.2 m.	Liner from 905 m. to bottom
	3" tubing run to 914.2 m.

Intelligence reports on the St. Ulrich-Prinzendorf field together with interpretations from the aerial photographs taken August 1943 show the derricks used in drilling to be approximately 135 feet tall. The producing depth as estimated from the maximum amount of drill pipe observed standing in the derricks of the drilling rigs has been placed at around 1,000 meters (3,281 feet) which correspond roughly to the producing zone of the Schlier. It is reported that after the completion of drilling and the bringing of the wells into production the heavy drilling derricks are immediately displaced by lighter production derricks. This immediate erection of a production derrick would indicate that the flowing life of these new wells is extremely limited, thus necessitating the installation of pumping or lift equipment and, further, that considerable mechanical trouble which would necessitate frequent repairs is expected in producing the wells. There appears to have been no regular spacing pattern and well locations seem to have been chosen mainly on the basis of their accessibility.

Reserves.- In the absence of data on the average porosity, permeability, sand thickness and other generally important reservoir information, it is impossible to arrive at an accurate estimate of the present probable producible reserves of this field. However, it is believed that reservoir conditions in this field are probably poorer than those prevalent in either of the other fields mentioned, therefore, this field would not be as productive per acre-foot as either the Gaiselberg field or the Zistersdorf field. If this conclusion should prove to be correct, then the ultimate recovery per productive acre in this field would be smaller than that calculated for the Gaiselberg and Zistersdorf fields--unless of course the average thickness of the producing formation in this field should exceed that of the average of the Gaiselberg and Zistersdorf fields.

It is believed, after weighing all the known facts, that this formation would probably produce from 250 to 350 barrels of crude oil per acre-foot. According to the perforation records of the D.P.A.G. St. Ulrich No. 1 well, approximately 30 feet of producing sands are present. On the basis of an average of 300 barrels of recovery for acre-foot and 30 foot sand thickness, the calculated recovery per acre would be 9,000 barrels, a calculation which appears conservative and probably below the field average. Upon the basis of 1,980 proven acres in August 1943, a proven reserve of 18,000,000 barrels, could be presumed. Since this field is still undergoing a vigorous program of exploitation and extension it is safe to assume that the ultimate established reserve may be well above 18,000,000 barrels. This would be increased manifold if the St. Ulrich-Prinzendorf and the Kreuzfeld fields link up, the area between them proving to be productive.

Estimated drilling and production rate.- A computation of the probable monthly potential production of these wells has been made based upon the reported known production facts of this field. In this computation, after the very rapid decline of the first three months of the producing life of these wells, a 2 per cent per month decline rate has been set up. Based upon the available information as to the producing conditions in this field, we believe that this computation of the decline in the monthly production potential, which is set forth below, would closely approximate the monthly production rate which might be expected during the first three years of the productive life of the well.

The Probable Potential Monthly Production Rate of an Average Well
St. Ulrich - Prinzendorf Field - 3 Year Period

Month	Metric Tons	Total Metric Tons	Barrels	Total Barrels
1st month	1,150		7,820	
2nd month	525		3,570	
3rd month	495		3,366	
4th month	485		3,298	
5th month	475		3,230	
6th month	466	3,596	3,168	24,452
7th month	457		3,108	
8th month	448		3,046	
9th month	439		2,985	
10th month	430		2,924	
11th month	421		2,862	
12th month	413	2,608	2,808	17,733
Total first twelve months		6,204		42,185
13th month	405		2,754	
14th month	397		2,699	
15th month	389		2,645	
16th month	381		2,591	
17th month	373		2,536	
18th month	366	2,311	2,489	15,714

The Probable Potential Monthly Production Rate of an Average Well
St. Ulrich - Prinzendorf Field - 3 Year Period (cont'd)

Month	Metric Tons	Total Metric Tons	Barrels	Total Barrels
19th month	359		2,441	
20th month	352		2,394	
21st month	345		2,346	
22nd month	338		2,298	
23rd month	331		2,251	
24th month	324	2,049	2,203	13,933
Total second twelve months		4,360		29,647
25th month	318		2,162	
26th month	312		2,122	
27th month	306		2,081	
28th month	300		2,040	
29th month	294		1,999	
30th month	288	1,818	1,958	12,362
31st month	282		1,918	
32nd month	276		1,876	
33rd month	270		1,836	
34th month	265		1,802	
35th month	260		1,768	
36th month	255	1,608	1,734	10,934
Total third twelve months		3,426		23,296

It is known that the producing wells would be shut down from time to time owing to sanding up and other causes. Judging from experience in other fields of the Wien Basin, it is estimated that these wells would be in production an average of about 80 per cent of the time. Accordingly, to determine the output for any period in the life of the above mentioned wells, it would be necessary to correct the total of the potential production for the period by .80 (80%) to obtain the estimated production.

The rate at which wells might have been drilled and completed in the St. Ulrich-Prinzendorf field up to the time the aerial photographs were taken in August 1943 is a matter of speculation. However, it is reasonable to expect that in 1940 and 1941 most of the drilling was done in areas of multiple sand production, namely Zistersdorf and Gaiselberg, particularly the latter.

In 1942 rapid development of the St. Ulrich-Prinzendorf field should have begun. It is known from aerial photogarphs that 130 wells were producing and that fifteen wells were drilling as of August 1943. It has been assumed, for the purposes of calculating the probable production for this field, that the following drilling program has been and will be followed:

Estimated Number of Wells Drilled - St. Ulrich-Prinzendorf, 1942 - 1944

1942	50 wells
1943	170 wells
1944	30 wells
Total	250 wells

Estimated Drilling Program 1939 - 1944

	Metric Tons	Barrels
1939		
2 St. Ulrich Wells	8,500	57,800

	Metric Tons	Barrels
1940		
2 St. Ulrich Wells	7,100	48,280
1941		
2 St. Ulrich Wells	5,500	37,400
1942		
2 old St. Ulrich Wells	4,100	27,880
30 wells averaging 6 months (30 x 3,596 x .80)	86,300	586,840
20 wells averaging 3 months (20 x 2,170 x .80)	34,720	236,096
Total for 1942	125,120	850,816
1943		
30 wells at 4,919 tons each x .8 = ...	118,056	802,780
20 wells at 5,226 " " x .8 = ...	83,600	568,480
80 wells at 4,940 " " x .8 = ...	316,160	2,149,888
90 wells at 2,170 " " x .8 = ...	156,240	1,062,432
Total for 1943	674,056	4,583,580

Anticipated Production From Wells Drilled to End of February, 1944

30 wells at 3,867 tons each x .8 = ...	92,808	631,094
20 wells at 4,105 " " x .8 = ...	65,680	446,624
80 wells at 4,631 " " x .8 = ...	296,384	2,015,411
90 wells at 5,225 " " x .8 = ...	376,200	2,558,160
30 wells at 4,940 " " x .8 = ...	118,560	806,208
Total Anticipated Production	949,632	6,457,497

It has been assumed that at least 30 new wells might be drilled in 1944. However, if the productive area proved to be even larger than now anticipated, then an even more vigorous drilling campaign might be followed than that outlined for 1944 which would in turn call for an increase in the estimate for the 1944 production.

2.5.5 Kreuzfeld Field

Introduction.- The new Kreuzfeld field, in which the Germans are now conducting an aggressive drilling campaign, is located about 4 kilometers south of Prinzendorf village, 2 kilometers east of Maustrenk and about 3 1/2 kilometers northwest of Zistersdorf.

Up to 1939 no oil production had been discovered in this area. However, the existence of the field and the extent of the drilling and production activity now being carried out in the field were established from the aerial photographs taken in August 1943. These photographs showed that at that time the field had nine producing wells, 5 active drilling projects and 5 sites, which had been prepared for additional wells. Several abandoned drilling sites, which were probably off the producing structure, are located several hundred yards to the east of the producing wells. Apparently, the limit of the field is outlined on the east side of the structure, but as evidenced by the spread of the drilling program in progress, its extent in other directions

evidently has not yet been determined. The map on page 30 sets forth the information on this field which was gained from the aerial photographs.

The aerial photographs of the field seem to show a pair of twin producing wells, indicating that more than one oil horizon is being developed in this field. Due to the very great difficulties in maintaining continuous production in the Wien Basin wells because of sand and paraffin difficulties, it is not expected that the Germans have attempted to produce from more than one sand at a time from any one well. Evidently, they have elected to drill two wells where two or more sands are productive at the same location, rather than attempt to make dual completions.

Geology.- The map on page 30 shows the Kreuzfeld field to be located near the top of the Steinberg semi-dome, with the wells starting in Tortonian. On page 32 the cross-section through the Steinberg semi-dome and the Zistersdorf field indicates in a general way the thickness of the Tortonian and underlying Schlier which is shown to rest unconformably upon the Flysch.

Of the two horizons currently producing oil in this field, one may be in the Tortonian and one in the Schlier or both may be in the Schlier. It is less likely that the production is coming from the Flysch, as structures in the latter formation generally do not correspond to the structures in the overlying rocks of the area, though this possibility cannot be ruled out.

It seems most probable that the oil produced at Kreuzfeld is coming from sands pinching out near the crest of the semi-dome. A relatively small fault parallelling the Steinberg fault could cause accumulation of oil. However, this hypothesis is highly speculative since there is no known evidence of faulting.

The only well definitely known to have been drilled on the Steinberg semi-dome prior to the war was Prinzendorf No. 1 located nearly 2 kilometers northeast of the Kreuzfeld field. This well encountered a show of oil in the lower Tortonian and another oil show in the upper part of the Schlier, neither of which horizons were adequately tested, and the well was abandoned in the Schlier at 849.84 meters (2,787.48 feet). This one well furnishes no clue as to the nature of the trap in which oil accumulated at Kreuzfeld.

Available data on wells.- According to the aerial photographs there are 9 locations showing stripped derricks and black fluid on the ground surrounding the wells. These are, accordingly, considered producing wells, five wells having drilling derricks and in four of them drill-pipe and a drilling-stem can be seen. Hence, there are at least 4 and probably 5 drilling rigs operating in the area.

Derricks are 135 feet in height and of steel construction. There are no boilers to be seen in the photographs. Thus, the wells are drilled either by electric motor or direct drive diesel engine power. Lighter steel derricks are observed standing nearby ready to be skidded over the hole when the drilling is completed. The projected installation of these relatively large production derricks immediately after the wells are completed, probably signifies that the flowing life of the wells is quite limited, and preparations are made in advance to place the wells on the pump shortly after completion.

Five drilling sites are in preparation, located in the center and on the eastern side of the field.

Estimated drilling and production rates, 1943-1944.- From the available information it would appear that five sites are being drilled concurrently in this field. With 9 wells producing and 5 drilling as of August 1943, 10 additional wells, or a total of nineteen wells, should be completed and in production before the end of 1943. Based on the present number of drilling rigs employed in the development in the field, it has been assumed that at least 30 additional wells might be drilled during 1944.

WILDCAT WELLS OF EASTERN AUSTRIA

x = Data Unknown
\- = Not Applicable
* - Located in Hungarian Basin

Name of Well	Ownership	Date	Depth In Meters	Geologic Horizon Reached	Remarks
Achau No. 1	Rep.	1939	271.5	Tortonian	Abandoned for technical reasons
Aderklaa No. 1	Rag and Austrogasco	1939	1,918	Tortonian ?	Oil shows around 1700 feet. Still drilling November 1939.
Bernhardsthal	x	older	432.8	Lower Pannonian	Dry hole. Oil and gas shows.
Blumau	x	older	270	Pannonian	Dry hole
Blumenthal No. 1	Rag	1939	-	-	Foundation only
Bruck No. 2	x	older	405	Gneiss	Salt water H_2S in Neogene
Bruck No. 5	x	older	233.35	Gneiss	Dry hole
Bruck No. 6	x	older	196.8	Tortonian	Dry hole
Deutsch Kreutz*	x	older	213.3	Pannonian	Dry hole
Dobermansdorf	x	x	x	x	Dry hole
Eichhorn No. 1	Rag	1939	2,521	Tortonian	Abandoned dry hole
Enzersdorf No. 1	Eurogasco	1934-35	699.5	Sarmatian	Gas eruption in Sarmatian
Enzersdorf No. 2	Eurogasco	1934-35	1,544.4	Tortonian	Gas shows Sarmatian and Tortonian
Enzersdorf No. 3	Rep.	1939	1,677.0	Lower Tortonian ?	Abandoned dry hole
Frauenkirchen P.2* (originally F-1)	Eurogasco	1936	1,625	Granite	Gas show. Dry hole.
Hohenau	x	older	411	x	Oil and gas show
Hohenruppersdorf No. 1	Rag	1939	1,701.0	Flysch	Dry hole
Hohenruppersdorf No. 2	Rag	-	-	-	Locations proposed
Inzersdorf	x	older	130	Sarmatian	Trace of gas in Sarmatian
Johannesberg No. 1	Eurogasco	x	934.1	Rhaet	Oil and gas shows
Kapelln	x	x	742	Tertiary	Gas show
Kierling	x	x	70	Flysch	500 liters oil
Kronberg	Eurogasco	later	566	Flysch	Gas and oil shows in Tortonian and Flysch
Ladendorf	x	older	101	Sarmatian	Dry hole
Lanzendorf No. 1	x	older	487	Pannonian	Dry hole
Lanzendorf No. 2	x	older	600	Pannonian	Gas show
Lanzendorf No. 3	x	older	617	Pannonian	Gas 10,000 cbm/day
Leobendorf	x	x	344	Tortonian	Dry hole
Leopoldsdorf	Oesterr. Bohr & Schurfges	older	1,113.24	Tortonian	Oil and gas shows
Itag-Lichtenwarth No. 1	Steinberg-Naphta A.G.	1939	-	-	Rigging up July 1939
Liesing	x	older	603	Tortonian	Dry hole
Explora No. 1	Explora (Vingerhoets)	1937-38	705	Tortonian	Abandoned for technical reasons.
Neu Erlaa	x	x	95	Sarmatian	Dry hole
Neusiedl a See *	x	x	119.09	Upper Pannonian	Dry hole
Nieder Hollabrunn	Galtol A.G.	1937	150.2	Schlier (Helvet)	Dry hole. Oil and gas shows
Niedersulz No. 1	Rag	1939	1,456	Sarmatian	Abandoned dry hole
Ober Eggendorf	x	older	590	Pannonian	Dry hole
Oberlaa No. 1	Eurogasco	1932-33	266	Tortonian	Gas well from Tortonian
Oberlaa V.C.C. No. 1	Vacuum Oil Co.	1935	483.15	Rhoel	Oil and gas shows in Tortonian
Ober Waltersdorf	x	older	303	Pannonian	Dry hole
Podersdorf P. 1 *	Eurogasco	1936	386.5	Granite	Dry hole. Trace of gas.
Prinzendorf No. 1 (Terrol No. 1)	Kusil & Co. (Steinberg-Rohoel-Ges.)	1933-36	850	(Helvetian Schlier)	" "
Prinzendorf No. 2 (Terrol No. 2)	Kusil & Co. (Steinberg-Rohoel-Ges.)	1937-38	1,500	Sarmatian	Shut down in 12th Sarmatian horizon
Rabensburg No. 1	x	older	350	Pannonian	Oil show
Rabensburg No. 2	x	older	211	Pannonian	Oil show
Raggendorf	Austrian Ministry of War	1915-17	1,070	Sarmatian	Dry hole. Gas shows.
Ringelsdorf No. 1	Rag	-	-	-	Location proposed only.
Rothneusiedl No. 1	Rep.	1939	512.7	Basement	Dry hole. Oil and gas shows
St. Marx	Wiener Erdgas Ges.	1934-35	400.9	Sarmatian	Oil and gas shows. Suspended because of local drilling regulations.
St. Ulrich	Austrian Ministry of War	1915	635	Tortonian	Dry hole
Schönau	x	older	225	Pannonian	Dry hole
Schrattenberg No. 1 (Katzelsdorf No. 1)	Deutsche Petroleum A.G.	1938-39	1,832.5	Flysch	Abandoned dry hole. Gas horizons in Flysch
Schwadorf	x	x	115 ?	x	Dry hole
Sollenau A	x	older	251	Tegel	Dry hole
Sollenau B	x	older	322.6	Tegel	Dry hole
Stefanie	Steinberg-Naphta A.G.	1929	332.6	Pannonian	Oil and gas shows
Itag-Steinberg No. 1	Steinberg-Naphta A.G.	1939	-	-	Rigging up June 1939
Trauersdorf *	x	1923-24	239.7	Probably Pannonian	Dry hole
Unter Olberndorf	x	older	491	Flysch	Dry hole
Wiener Ostbahnhof	x	older	207	Sarmatian	Trace of gas and salt water
Windisch-Baumgarten No. 1a (Ulli)	Raky-Danubia	1930-31 1936	989	Cretaceous Flysch	Abandoned Flysch production
Wollmannsberg (Allberig)	Oplag	1922-24	816.3	Schlier	Dry hole. Gas shows
Ziegel-Fabrik (Wiener)	x	older	144	Pannonian	Dry hole

Rag = Rohoel Gewinnungs A.G.
Rep = Rohoel Gewinnungs A.G. and Elwerath-Preussag
Eurogasco = European Gas & Electric Co.

It has been assumed, based upon the available information, that these wells follow a very similar production pattern to that set up by the St. Ulrich-Prinzendorf wells. Therefore, in estimating the probable production to be derived from the Kreuzfeld field, the average monthly production chart as developed for the St. Ulrich-Prinzendorf wells, and subject to the same 20 per cent lost production time as assumed for those wells, has been used.

Estimated Production Kreuzfeld Field - 1943

	Metric Tons	Barrels
1 well	4,633	31,504
4 wells	15,821	107,582
4 wells	13,002	88,413
5 wells	10,620	72,216
5 wells	6,700	45,560
Total	50,776	345,276

Estimated Production Kreuzfeld Field - 1944

19 wells (completed in 1943)	74,514	506,696
30 wells (drilled during 1944)	78,243	532,052
Total	152,757	1,038,748

Possible development and reserves.- The St. Ulrich-Prinzendorf field as presently developed is 3 miles long and about one mile wide and is located on the north flank of the Steinberg semi-dome. There is no basis for postulating its length around the west flank of the dome, nor its width. The field might conceivably be wide enough on the west flank to include the Kreuzfeld area, so it is barely possible the St. Ulrich-Prinzendorf and Kreuzfeld fields may ultimately connect and be one and the same pool. If this be true, then some 400 or 500 new wells could be drilled in the area between the two present developments. While this suggestion, based on present data, is highly speculative, nevertheless, it indicates that there is ample justification for obtaining other aerial photographs of the Steinberg semi-dome within the near future for the purpose of checking the extent and the trend of the development of these fields.

Summary of Production, Austrian Fields Prior to 1939,
with Estimate for 1943 and Forecast for 1944

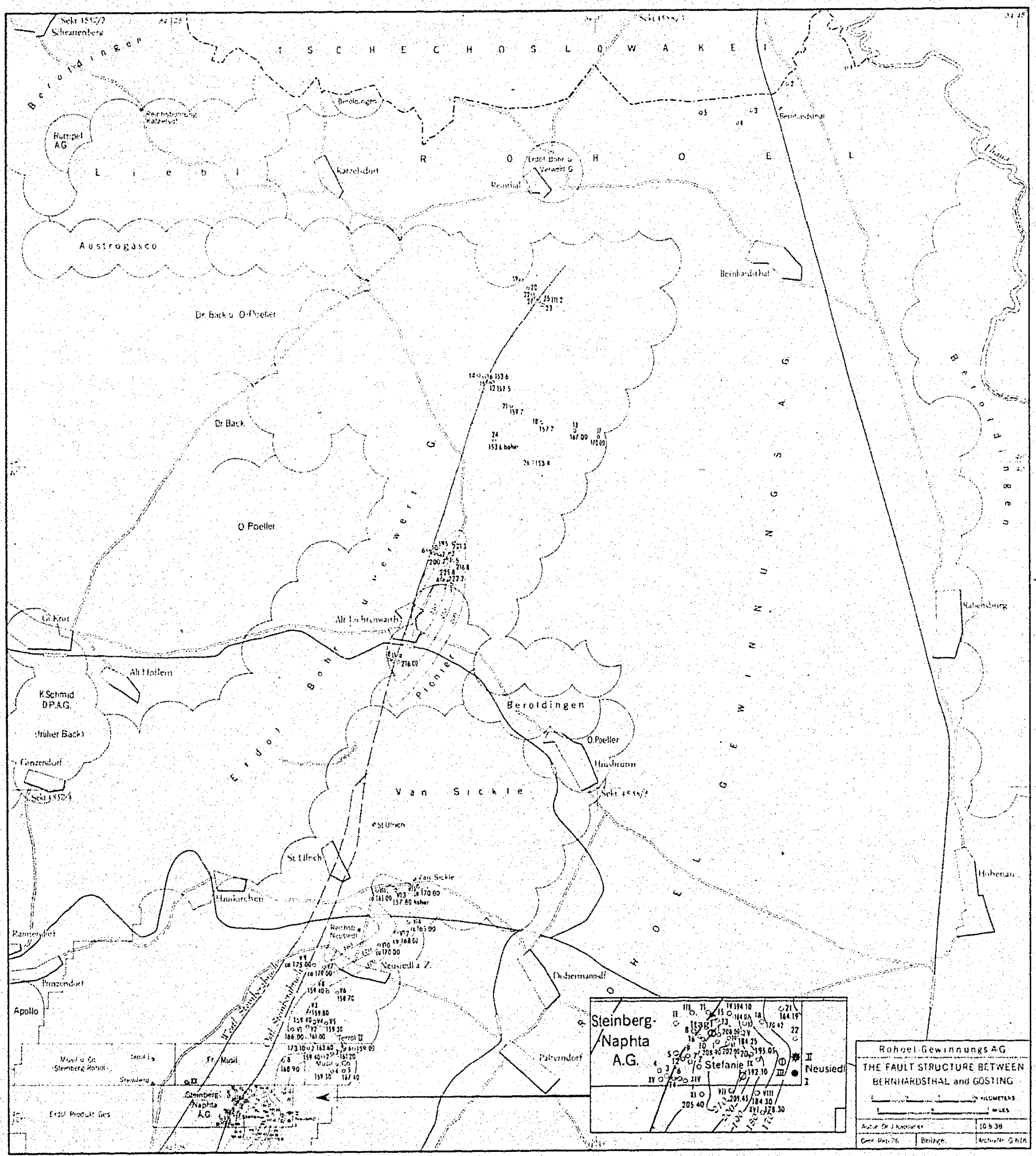
METRIC TONS

	Actual	Estimated						
Field	Prior To 1939	1939	1940	1941	1942	1943	Total	Forecast For 1944
Zistersdorf	100,000	144,524	203,100	112,650	86,000	67,500	713,774	52,600
Neusiedl	-	5,000	6,500	5,000	4,000	3,500	24,000	8,000
Gaiselberg	-	23,869	147,500	277,100	343,680	353,640	1,145,789	272,090
St. Ulrich-Prinzendorf	-	8,500	7,100	5,500	125,120	674,056	820,276	949,632
Kreuzfeld	-	-	-	-	-	50,776	50,776	152,757
Total	100,000	181,893	364,200	400,250	558,800	1,149,472	2,754,615	1,435,079

BARRELS

	Actual	Estimated						
Zistersdorf	680,000	982,763	1,381,080	766,020	584,800	459,000	4,853,663	357,680
Neusiedl	-	34,000	44,200	34,000	27,200	23,800	163,200	54,400
Gaiselberg	-	162,309	1,003,000	1,884,280	2,337,024	2,404,752	7,791,365	1,850,212
St. Ulrich-Prinzendorf	-	57,800	48,280	37,400	850,816	4,583,580	5,577,876	6,457,497
Kreuzfeld	-	-	-	-	-	345,276	345,276	1,038,747
Total	680,000	1,236,872	2,476,560	2,721,700	3,799,840	7,816,408	18,731,380	9,758,536

88 - PRODUCING
Fault structure



The estimated production from the Austrian fields for 1943 and 1944 may be compared, as regards the relative importance of the several fields, as follows:

Estimated Production, Austrian Fields, 1943 and 1944

	1943				1944			
Field	% of Total	Bbls. a day	Barrels a Year	Metric Tons a Year	% of Total	Bbls. a Day	Barrels a Year	Metric Tons A Year
Zistersdorf	5.8	1,258	459,000	67,500	3.6	978	357,000	52,500
Gaiselberg	31.3	6,774	2,472,752	363,640	18.9	5,069	1,850,212	272,090
Neusiedl	00.4	65	23,800	3,500	.5	149	54,400	8,000
St. Ulrich-Prinzendorf	58.2	12,556	4,583,200	674,000	66.1	17,698	6,460,000	950,000
Kreuzfeld	4.3	945	345,276	50,776	10.6	2,845	1,038,747	152,757
Totals	100.0	21,598	7,884,028	1,159,416	100.0	26,739	9,760,359	1,435,347

2.6 PROSPECTS LOCATED IN THE WIEN BASIN

In the portion of the Wien Basin covered by the aerial photographs taken in August 1943, few wells are being drilled outside of the established producing fields. There are two wells drilling on the east side of the Steinberg fault, one located between the Zistersdorf and Gaiselberg fields and the other about five kilometers south of Gaiselberg village, probably on the Niedersulz structure which will be described. On the Steinberg semi-dome a wildcat well is being drilled between the Kreuzfeld field and the St. Ulrich-Prinzendorf field. It is possible that any of these tests may result in additional production being found.

The known structures which were still in the prospect stage of development at the end of 1939 are shown on the index map on page 16. Wildcat wells drilled in the Wien Basin up to that time are briefly described in a summary on page 86. The map and tabulation should be consulted in connection with the description of the various prospects given below.

Niedersulz prospect.- The Niedersulz prospect lies just northeast of the town of Niedersulz and about five kilometers south and slightly west of the village of Gaiselberg. The area of the structure is less than a kilometer in diameter and extends along the East Steinberg fault on the downthrown side. A map of the structure indicates a closure of from 40 to 50 meters in surface beds. A well was drilled on the prospect in 1939 by the RAG Company to a depth of 1,456 meters and was abandoned as a dry hole in the Sarmatian.

Due to its position on the downthrown side of the East Steinberg fault and the closure reported, this prospect will no doubt be thoroughly tested.

Hohenruppersdorf prospect.- The Hohenruppersdorf structure is also situated along the downthrown side of the East Steinberg fault and covers a larger area than the Niedersulz prospect. As shown on the map on page 16, it lies about 3 kilometers southwest of the latter structure. A map of the Hohenruppersdorf prospect shows it to have 60 meters or more of closure in surface beds against the fault.

In 1939, the RAG Company drilled a dry hole in this prospect which was abandoned at a total depth of 1,701 meters in Flysch. This well penetrated

the top of the Sarmatian at 724 meters (2,374 feet) and encountered ten Sarmatian sands about 1,060 meters (3,476 feet). According to the last report on the prospect prior to the war, a location had been made for another well.

A recent Intelligence report indicates that ten locations were observed on the Hohenruppersdorf structure on February 17, 1944. Nine of these were apparently without derricks but on the southeasternmost location a derrick had been built and was equipped for drilling. Some positive results must have been obtained to warrant this activity but according to available intelligence there is no evidence of production. No storage tanks were observed but it is possible the field is producing gas, although the presence of pipe lines has not been reported. The use of only one drilling rig indicates there is no anticipation of major production. Even if the wells produce oil, the output would probably be of the order of about 20,000 metric tons per year.

Blumenthal prospect.- The Blumenthal prospect is a gravity high located on the upthrown side of the Steinberg fault northwest of Blumenthal and due west of Gaiselberg. The prospect has also been referred to as the Gaiselberg torsion balance maximum. A well location was prepared by R.A.G. in 1939 on the southeastern plunge of this torsion balance anomaly. The objective of the well was to test (1) the basal Schlier (Tertiary) conglomerate expected to be found overlapping on Cretaceous Flysch at about 600 or 700 meters depth and (2) the upper 500 or 600 meters of the Flysch. The total proposed depth of the well was around 1,200 meters. Foundations for Blumenthal 1 were completed in June 1939 but no further progress was made up to September 1939 owing to a shortage of drilling rigs. The Kreuzfeld field, which was discovered recently, is located on the northern plunge of the same gravity maximum.

Alt-Lichtenwarth prospect.- The Alt-Lichtenwarth structure, which is about 1 1/2 kilometers long and 1/2 kilometer wide, also lies along the Steinberg fault on the downthrown side, near the northern terminus of the fault. It is located at the eastern edge of the village of Alt-Lichtenwarth and is about three kilometers north and slightly east of the town of St. Ulrich. This structure is believed to show more than 20 meters of closure against the fault in the surface beds (see page 88).

According to the last available report on the prospect, a derrick had been built and was being rigged up during July 1939. No further information was obtained regarding it.

Windisch-Baumgarten prospect.- As indicated earlier in the present report, the Windisch-Baumgarten 1-a well, located east of the town of the same name, was drilled on the downthrown side of the East Steinberg fault, which it penetrated and encountered oil in crevices in the Flysch (see page 81). This led to drilling the discovery well in the Zistersdorf field a short distance to the northeast. The Windisch-Baumgarten well was abandoned after relatively small production because of mechanical difficulties while attempting to sidetrack the hole. The prospect may sometime be drilled for additional Flysch production.

Obersulz prospect.- The Obersulz prospect lies several kilometers north and west of Niedersulz and is located west of the east Steinberg fault. Little is known regarding the prospect other than the approximate extent of its area indicated by the map on page 16. However, an intelligence item dated February 17, 1944, states that an isolated test well is being drilled on this prospect and because of the slow progress made, it is believed the hole is being carefully tested.

The foregoing completes the list of known prospects along the east Steinberg fault. Structures found elsewhere in the Wien Basin of Austria are believed to be due mainly to settling of the Miocene and later rocks over the uneven floor of the basement complex.

Aderklaa prospect.- The Aderklaa prospect is situated some seven miles

northeast of Wien. Reference to the map on page 16 will show approximately the area covered by the structure. There are no data available regarding the amount of closure. In November 1939, the first test was being drilled by RAG and Austrogasco Companies and had reached 1,913 meters, at which depth the well was probably in the Tortonian. A Schlumberger log run in the upper 933 meters of the hole could not be correlated with logs of wells in the Zistersdorf area. An oil show is reported to have been encountered around 1,700 feet. No further data on this well is available.

Intelligence as of February 17, 1944, indicates there are two locations with derricks in this area, one of which is situated 1/2 mile east-southeast of Aderklaa. A completed location lies 1/4 mile east of the latter and farther to the south there are eight other locations with derricks, five of which extend in a gently curving line towards the southwest. These are believed to be producing wells since there is evidence that pipe lines connect several of them. Absence of oil storage tanks in February 1944, indicates the field produced only gas at that time.

Intelligence also describes a pipe line trench running westward to Süssenbrunn which it passes on the south side and continues to the railway junction north of Kagran. This indicates that gas from the Aderklaa field is delivered to the Shell refinery at Floridsdorf, to the Floridsdorf Gas Works or that it is taken on to Vienna itself.

Oberlaa prospect.- The village of Oberlaa is situated on this structure, which is located about three kilometers south of Wien. The outside limits of the prospect are shown approximately on the map on page 16. A well drilled on this prospect during 1932 by Eurogasco encountered nearly pure methane gas in the Tortonian at 266 meters. Initial production was 80 cubic meters per minute at an atmospheric pressure of 37. Another hole drilled to the east in 1933 produced gas from a depth of 299 meters. In 1934 gas production from this field was used by the Municipal Electric Plant of Wien and delivery of gas to that company continued until 1935 when, owing to lack of sufficient pressure, the pipe line was taken up. During the producing period, a total of 13,500,000 cubic meters (70,632,000 cubic feet) of gas from this prospect was utilized in the operations of the Municipal Electric Plant of Wien. In 1935, Vacuum Oil Company drilled their V.O.C. number 1 on this prospect, and encountered shows of oil and gas in the Tortonian, but the hole was abandoned at 483.15 meters.

In 1939, the REP Company drilled Rothneusiedl No. 1 well on this structure to a depth of 512.7 meters (1,679 feet) where the well was abandoned in Triassic of the basement complex. The log of this well follows:

Meters	Feet	
0 - 8.0	0 - 26.2	Quarternary
8 - 59.5	26 - 195.1	Lower Pannonian
59 - 160	195 - 524	Sarmatian
160 - 506.7	524 - 1,662	Tortonian (From 426 - 463 meters (1,397 - 1,519.2 feet) Rothneusiedl conglomerate was encountered which contained oil shows)
506.7 - 512.7	1,662 - 1,679	Upper Triassic

The gas production and showings of oil warrant further development of this structure.

Enzersdorf prospect.- The Enzersdorf prospect, located about 12 kilometers southeast of Wien, is outlined on the map on page 16. It is believed to be a dome sub-oval in shape, having a closure in surface beds of more than 30 meters. Two wells were drilled on this structure in 1934-5 by Eurogasco. At one of these an eruption of gas is said to have occurred in the Sarmatian, but the well was abandoned at a total depth of 699.5 meters (2,294 feet) in the Sarmatian formation. The other well had gas shows in both the Sarmatian and Torton-

ian and was abandoned in the latter formation at 1,544.4 meters (5,055 feet). It is reported that in both wells the operator was unable to case off water and obtain production. A third well was drilled on the prospect by REP Company in 1939 to a total depth of 1,677, where the well was abandoned in the lower Tortonian. A string of pipe is said to have been broken off in the hole.

This prospect was not condemned by the wells drilled prior to the war and should be subsequently tested.

Achau prospect.- The town of Achau, located about 6 1/2 kilometers south of Wien, is situated on this structure, the approximate extent of which is shown on the map on page 16. The REP Company drilled a well in 1939 on the prospect, to a total depth of 271.5 meters (882.4 feet) where for technical reasons the hole was abandoned in the Tortonian.

Probstdorf prospect.- Another structure of some importance is located on the east side of the town of Probstdorf, some ten kilometers east and slightly south of Wien. However, no information is available regarding the prospect other than the approximate extent of its area as shown on page 16.

Podersdorf prospect.- This prospect, located at the east edge of Podersdorf townsite, just east of Neusiedl Lake, is in the Austrian part of the Hungarian Basin. In 1936 Eurogasco drilled a well on the prospect which encountered a slight show of gas and was abandoned in granite at a total depth of 386.5 meters.

Eichorn prospect.- The Eichorn prospect, located about six miles east of Zistersdorf was outlined during 1937 by core-drilling which correlated key beds of colored clays, which were doubtful markers. Geophysical work was inconclusive. In 1939 a deep test was completed at a location believed to be the highest part of the structure. This well found all formations runing low, a fact evidenced by reliable markers such as the Sarmatian-Tortonian contact and certain fossil horizons (top Sarmatian - 1,050 meters, top Tortonian - 2,150 meters). The well was abandoned while still in the Tortonian because of mechanical difficulties.

Other prospects in the Wien Basin.- There are little or no data available on other prospects in the Wien Basin other than the information as to their existence and extent as indicated by the map on page 16 and by the summary of data on wildcat wells on page 86. Some structures were being mapped in detail by means of core-drilling and geophysical methods immediately prior to the war. It is barely possible that deep tests have been drilled on one or more of them since 1939.

Among other wells drilled outside the known prospects included in the table on page 86, is the Schrattenberg No. 1 well, located about a kilometer southeast of the town of the same name. It was drilled in 1939 to a depth of 1,832.5 meters and was reported to have had shows of gas in the Flysch, in which formation the hole was abandoned. The record of the formation tops encountered in this well is available, and reads as follows:

	Meters	Feet
Lower Pannonian	0 - 78	0 - 256
Sarmatian	78 - 370	256 - 1,214
Tortonian	370 - 505	1,214 - 1,656
Schlier	505 - 925	1,656 - 3,034
Flysch	925 - 1,832.5	3,034 - 6,010

This well was reported to have had slight shows of gas and oil and plans were made to drill another well to the gas sand.

Wien Basin fields in Czechoslovakia.- The northern end of the Wien Basin projecting into Czechoslovakia contains three known structures which currently

yield a relatively small production of oil and gas per year. This portion of the basin has the same general geological section found in the larger basin region of Austria, namely, the Schlier was laid down in the deeper parts of the irregular floor of basement rocks, followed by deposition of the Tortonian and Sarmatian which in turn is unconformably overlaid by Pannonian covered in many places by a veneer of Quaternary gravel and loess.

In the Czechoslovakian fields of the basin, however, the structures are broken by normal faults and the oil is produced from Sarmatian and Tortonian sands within small fault blocks.

The following discussion of these fields summarizes briefly known production statistics, together with estimates of production and estimates of reserves.

Gbely field.- As shown on the map on page 16, the Gbely field is located about a kilometer southwest of the village of Gbely (Egbell) and about 25 kilometers northeast of the town of St. Ulrich (see map on page 16). This field is divided into two parts, the old and the new Gbely fields.

Old field.- In the old Gbely field there are two producing horizons, one located 100 meters below the top of the Sarmatian and the other 250 to 260 meters (820 to 852 feet) below the top of the Sarmatian. The upper sand has a proved areal extent of 12 hectares and a net thickness of 8 meters (26 feet) productive oil sand. The lower zone has a surface extent of 58 hectares and a net thickness of three meters of productive sand.

The old Gbely field has been in production since 1914, and in 1939, 220 wells had been drilled in it, spaced about four wells per hectare, of which 180 produced oil, with an average output of about 1,000 metric tons (6,800 barrels) per well. At the beginning of 1939 the rate of decline for the field was approximately 10 per cent per year. Reserves as of January 1, 1939 were estimated at 18,000 metric tons (122,400 barrels), with the field 90 per cent depleted. From the discovery of the field until 1928 all wells were produced by pumping; from 1928 to 1939 inclusive, they have been produced solely by bailing. Total production for the old Gbely field from 1914 to the end of 1938 amounted to 160,808.6 metric tons. Production for the years 1939 to 1943, inclusive, is estimated at a total of 6,000 metric tons.

New field.- The new Gbely field is the most prolific producing area in Czechoslovakia. There is only one oil sand which lies at an average depth of 180 meters. The net thickness of the producing sand is 8 meters. In 1939 the area had 70 hectares of proved production, one half of which was drilled and the other half held as a State reserve. While conditions in the new field are comparable to those in the old Gbely field, the total output per well is assumed to be higher, namely, 1,200 tons over an economic life of six years. From its discovery, in 1928, to the end of 1938, total production from the new Gbely field amounted to 83,110.8 metric tons or 554,960 barrels.

It is estimated that 24 wells can be completed per year with present equipment out of which 18 should be average producers; also, that the decline will average 10 per cent per year. On this basis the estimated production for 1939 to 1943 inclusive for the new Gbely field would be as follows:

		Metric Tons
1939	Old wells, 10% decline	17,500
	18 new wells	2,200
	Total, 1939 Production	19,700
1940	Old wells, 10% decline	15,800
	1939 wells, 10% decline	4,000
	18 new wells	2,200
	Total 1940 Production	22,000

		Metric Tons
1941	Old wells, 10% decline	14,500
	1939 wells, 10% decline	3,600
	1940 wells, 10% decline	4,000
	18 new wells	2,200
	Total 1941 Production	24,300
1942	Old wells, 10% decline	13,000
	1939 wells, 10% decline	3,200
	1940 wells, 10% decline	3,600
	1941 wells, 10% decline	4,000
	18 new wells	2,200
	Total Production 1942	26,000
1943	Old wells, 10% decline	11,700
	1939 wells, 10% decline	2,900
	1940 wells, 10% decline	3,200
	1941 wells, 10% decline	3,600
	1942 wells, 10% decline	4,000
	18 new wells	2,200
	Total 1943 Production	27,600

The estimated total output from the new Gbely field at the end of 1943, according to the above tabulations would be 202,710 metric tons of oil.

Reserves for the new field at Gbely as of January 1, 1939, were estimated at 256,179 tons (1,734,332 barrels) which is consistent with the amount and rate of production given above.

Hodonin field.- The Hodonin (Göding) field is indicated in the map on page 16. It is located about a kilometer southwest of the village of Göding and approximately 13 kilometers north of the Gbely field. Like the latter area, Hodonin field produces from small fault blocks. The producing limits of the field are well defined although in 1939 there were still possibilities for extension in depth to local sands in certain small fault blocks. The field as a whole, however, was drilled up and on the decline. Production per month during 1938 is as follows:

Month	Metric Tons	Month	Metric Tons
January	332.5	July	320.0
February	293.5	August	334.9
March	306.5	September	333.5
April	265.5	October	340.6
May	318.0	November	300.8
June	297.3	December	284.3

Total Production for 1938 = 3,727 tons

There are believed to be sufficient undrilled locations and possibilities for deeper production in this field to maintain the low level of production in 1938 for each subsequent year up to and including 1943. Accordingly, an estimate of 3,700 tons per year is submitted for this period.

Vacenovice gas field.- Vacenovice gas field covers a small area located approximately one kilometer southwest of the town of the same name, sometimes called Watzenowitz. It is about 12 kilometers north and slightly east of the Hodonin field and is indicated on the map on page 16. Gas was discovered in this locality during 1929 when a local sugar refining company was drilling for water. There were 8 wells producing gas from depths less than 200 meters

at the end of 1939. The accumulation of gas in this field is associated with normal faulting. Most of the productions comes from sands in the Sarmatian in relatively elevated fault blocks. Minor amounts of gas are produced from the Flysch. Representative analyses of the Sarmatian and Flysch production are as follows:

	Sarmatian	Flysch
CH_4	90.8%	61.5%
C_2H_4	6.0%	2.0%
CO_2	0.4%	0.2%
O	.3%	7.5%
N	2.5%	28.8%

The gas production from this field is relatively small and owing to lack of sufficient data no estimates on production or reserve are submitted in the present report.

2.7 PIPE LINE FACILITIES

The pipe line situation in Austria may be summarized as follows:

(1) It is believed that a pipe line linking the Zistersdorf oil fields with the Kagran and Floridsdorf refineries at Wien has been built. This line is believed to be a combination 6" and 8" line following the route Zistersdorf-Spannberg-Hohenruppersdorf-Wolkersdorf-Pysdorf-Floridsdorf. The pipe line is thus about 54 kilometers long, and is believed to have pumping stations at Zistersdorf, Spannberg and Wolkersdorf. Its capacity is probably of the order of 20,000 barrels a day.

(2) A pipe line from Zistersdorf to Kolin is reliably reported to have been constructed for transporting important quantities of 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. There have been some reports of an extension of this or a parallel line to Melnik, Czechoslovakia, which point is approximately the head of navigation for large oil barges on the Elbe River. (a)

The detailed history of the pipe line system in Austria is as follows:

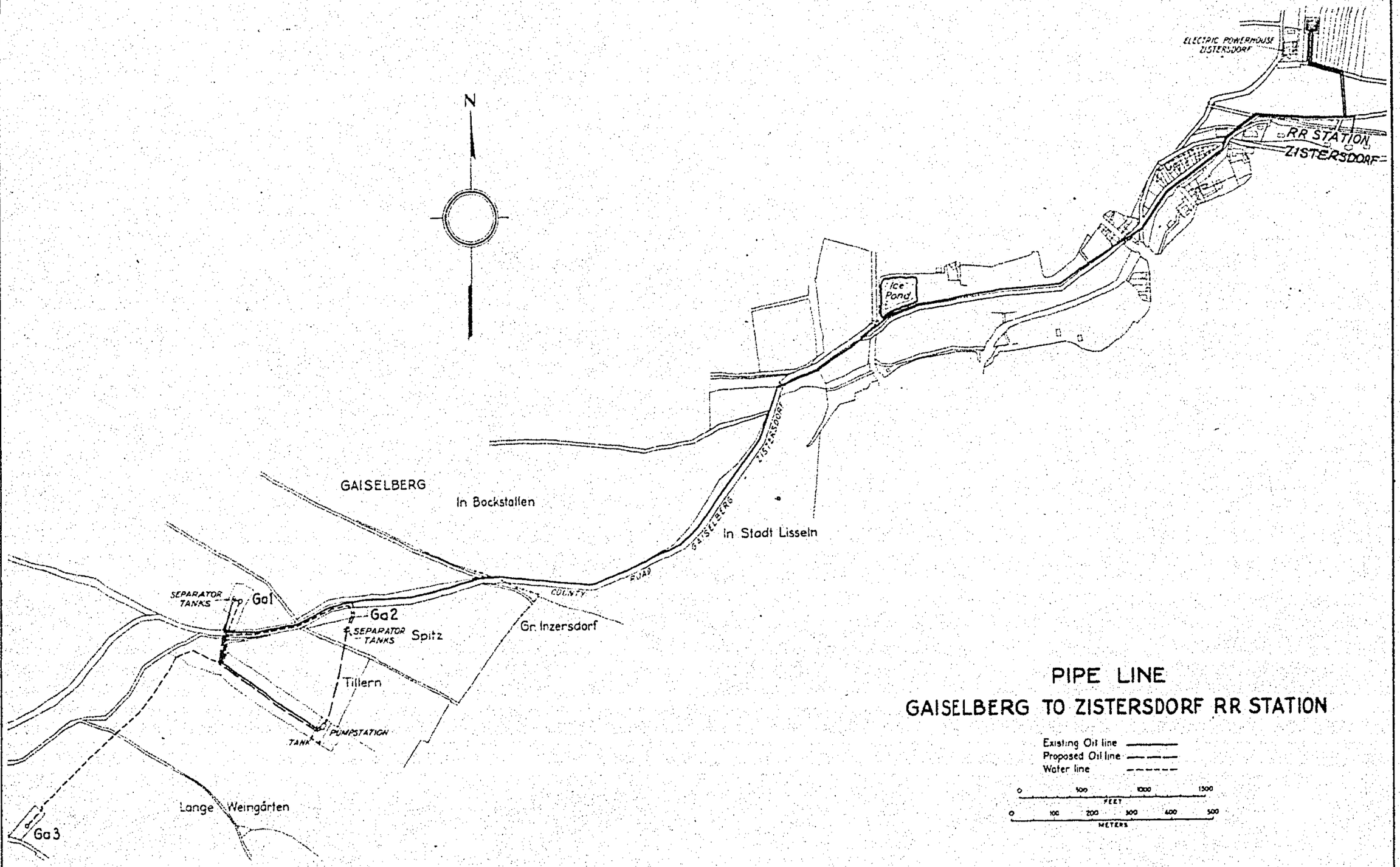
Up until September 1939, there were no oil pipe lines in Austria, except gathering lines which extended from the producing fields in the Wien Basin to the nearest loading racks on the railway. These gathering lines were for the most part quite short, seldom longer than a few kilometers, and usually were built of pipe six inches in diameter. The main gathering line was that from the Zistersdorf field to the loading rack at Gaiselberg, shown on the map on page 96.

Just prior to the present war, Rohoel Gewinnungs A.G. had contemplated building a pipe line for crude oil from the Zistersdorf and Gaiselberg fields to Floridsdorf, near Wien, where it was thought a cracking plant would be built. This was to have been an eight inch welded line of approximately 54 kilometers in length. One main line pump station and two booster stations complete with tank farms, the latter each with a storage capacity of 10,000 tons of crude, were contemplated. The proposed route is shown on the map on page 98 and a plan showing a profile of the projected line is shown on page 99.

The evidence, which leads us to believe that not only was this project carried out, possibly as a combination 6-8 inch line, but that, in addition a

---

(a) Crude oil arriving at Wien by rail or pipe line from the Zistersdorf oil fields can also be transshipped to oil barges and sent on the Danube River, a distance of about 50 kilometers, for treatment at the Bratislava refinery, which could handle about 120,000 tons (816,000 barrels) a year, or 2,235 barrels a day of Austrian crude in addition to treating the entire output of the nearby Czechoslovakian oil fields. Source: Mr. B. H. Grove. Executive Secretary Enemy Oil Committee, in letter to Mr. E. M. Butterworth Special Representative, Petroleum Administration for War, dated 2/8/44.



PIPE LINE
GAISELBERG TO ZISTERSDORF RR STATION

Existing Oil line ———
Proposed Oil line — — —
Water line - - - - -

0 500 1000 1500
FEET
0 100 200 300 400 500
METERS

line also was built from Zistersdorf to Kolin(a), in Czechoslovakia, is as follows:

(1) Mr. Paul Ruedemann, formerly Manager of the M.A.O.R.T., the Hungarian subsidiary of the Standard Oil Company (N.J.), from conversations with German officials, is positive that one line, either 6 inches in diameter or 8 inches in diameter, was built prior to his departure from Hungary in January, 1942.

(2) From a report "AO 230/1/Z, Enemy Oil Intelligence Committee MEW, September 6, 1943, No. 33": "I (b) iii: There have been two fairly reliable reports of the construction of a pipe line from Vienna to Melnik in the Protectorate, and U.S. sources have recently reported a pipe line from Vienna to Kolin."

(3) Mr. Lind Simpson, of the Socony-Vacuum Oil Company's Refining Division and presently in charge of that company's Washington, D. C., office, is quite positive that not only the Wien-Floridsdorf line was laid, but that from Zistersdorf to Kolin also. Mr. Simpson was located in Czechoslovakia prior to the war and obtained his information while still in Europe.

The materials list(b) for the proposed pipe line was as follows:

Proposed Pipe Line (1939), Wien Basin, Austria

		KM.	Miles
8" Pipe line	Spannberg-Pysdorf	30	18
6" Pipe line	(a)Zistersdorf-Spannberg	10.5	6.5
	(b)Hohenruppersdorf-Niedersulz-Spannberg	9	5
	(c)Wolkersdorf-Hochleithenwald Pipe line f. Strasshof	16.	9
6" Pipe line	Pysdorf-Floridsdorf	13.5	8.3

Station S_1 (Zistersdorf):
2 each, Pumps about 6 3/4" x 14"; 2 each, Motors about 140 H.P.
4 tanks of 20 car capacity; Manifolds - Pumphouse

Station S_2 (Spannberg):
2 each, Pumps about 7 1/4" x 15"; 2 each, Motors about 230 PS
2 tanks of 100 car capacity; 2 tanks of 200 car capacity;
Manifold - Pumphouse

Station S_3 (Wolkersdorf-Hochleithen):
1 each, Pump about 6 3/4" x 14"; 1 each, Motor about 140PS
2 tanks of 20 car capacity; Manifold - Pumphouse

Telephone connections throughout

Main Equipment

Iron and Steel			Tons
Pipe	35.5 km. 6" (30 kg/m.)		1,065
	30 km. 8" (45 kg/m.)		1,350
Welded wire			1
Armatures, Manifolds, etc.			30
Pumps	3 each 6 3/4" x 14"		27
		plus	4.5 *
	2 each 7 1/4" x 15"		21.6
		plus	2.7 *
Motors	3 each 140 H. P.		25.5
		plus	4.5 *
	2 each 230 H. P.		22
		plus	4. *

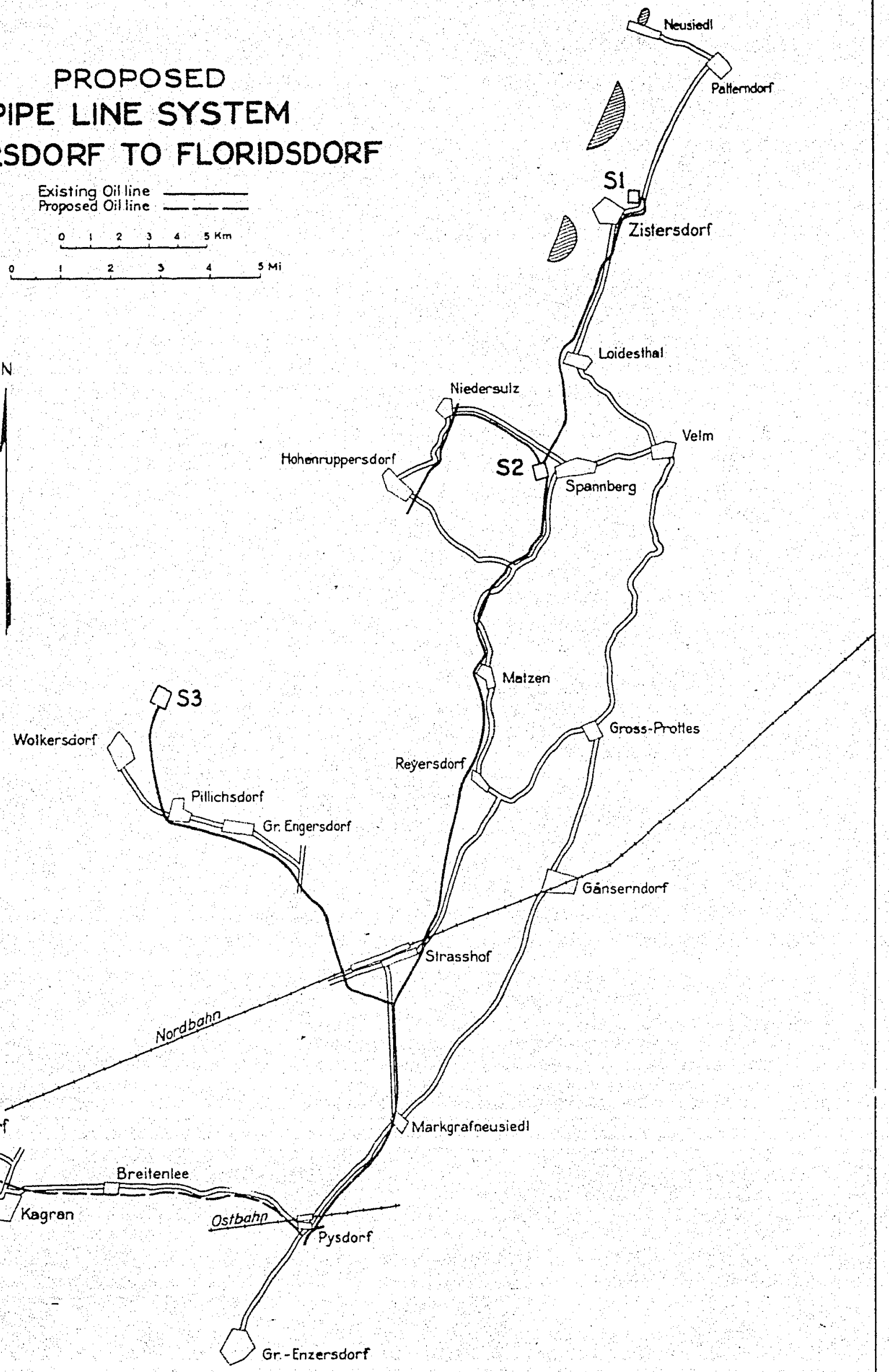
(a) Kolin is located on the Elbe River approximately at the head of navigation.
(b) Furnished by Socony-Vacuum Oil Company

PROPOSED
PIPE LINE SYSTEM
ZISTERSDORF TO FLORIDSDORF

Existing Oil line ——————
Proposed Oil line — — — —

0 1 2 3 4 5 Km
0 1 2 3 4 5 Mi

N



PROFILE OF POSSIBLE PIPE LINE ROUTE

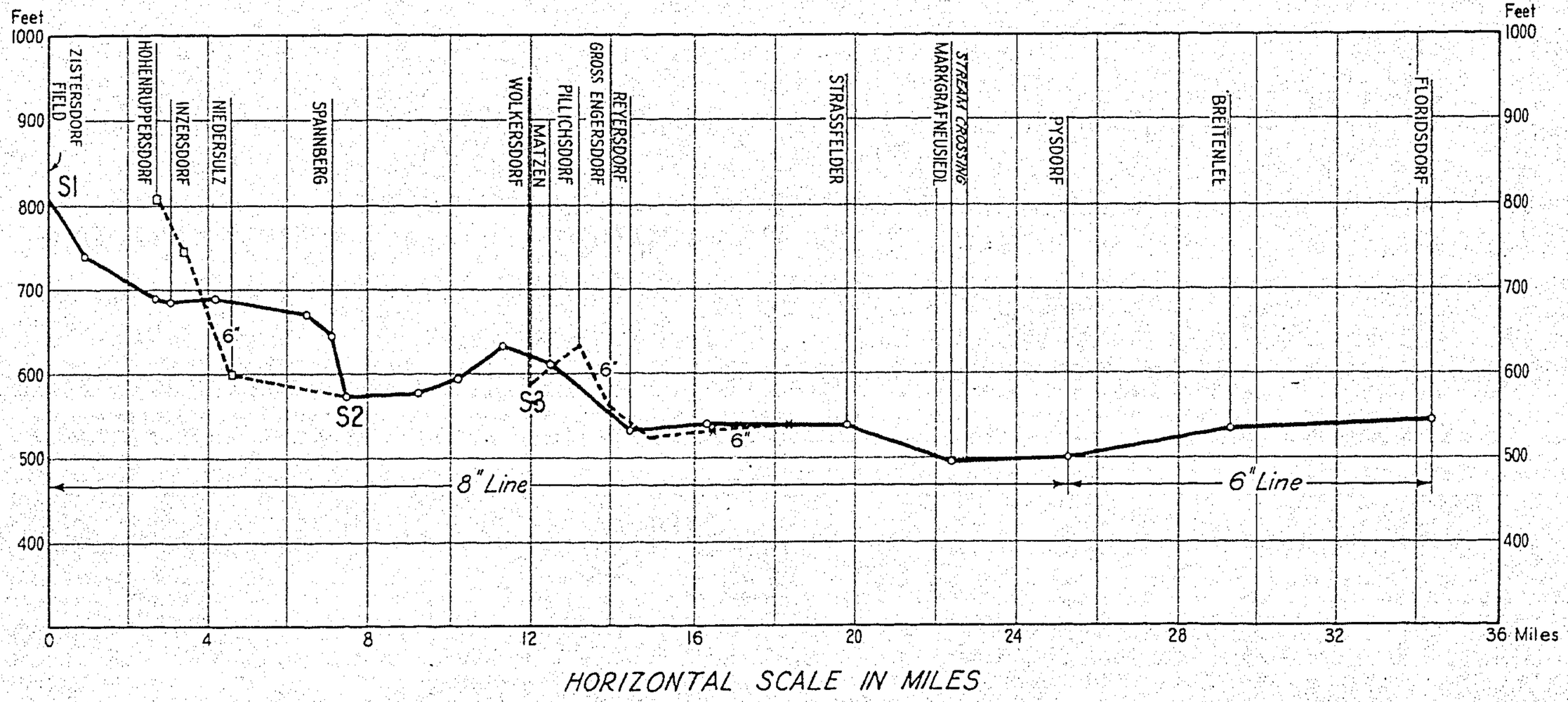
BETWEEN

ZISTERSDORF FIELD & FLORIDSDORF

Main Pipe Line ——————

Branch Pipe Line ---------

STATION	PROPOSED EQUIPMENT					
	PUMPS		MOTORS		TANKS	
	NO.	SIZE	NO.	HORSEPOWER EACH	NO.	CAPACITY EACH
S1 - ZISTERSDORF	2	6¾" X 14"	2	140 H.P.	2	20 TANK CARS
S2 - SPANNBERG	2	7¼" X 15"	2	230 H.P.	2 2	100 TANK CARS 200 TANK CARS
S3 - WOLKERSDORF	1	6¾" X 14"	1	140 H.P.	2	20 TANK CARS
MANIFOLDS AND PUMP HOUSES PLANNED FOR EACH STATION TELEPHONE CONNECTIONS PLANNED THROUGHOUT						



Main Equipment (cont.)

		Tons	
Tanks	6 each 20 car capacity	69	
	2 each 100 car capacity	69	
	2 each 200 car capacity	115	
For telephone line		2	*
Supports for above-ground and ground installation, etc.		5	*
	about 2,817.8/ about 200-250		*

Cement for Concrete

	Tons
Motor foundations	15
Pump foundations	15
20 foundations for 200 T. tanks	60
100 foundations for 1,000 T. tanks	100
200 foundations for 2,000 T. tanks	160
Floors, shafts, etc.	20
	370

Lumber

For 3 pump stations about 50 cu. m. cut lumber
For telephone wires 2,100 masts, 7-9 m. long 15-20 Zopf.
For auxiliary 20 cu. m. cut lumber

70 cu. m. cut lumber; 2,100 masts

Non-ferrous Metals

	Tons
165 k.m. 1.5 mm. Bronze wire about (1.6 kg/100 m.)	3

Line from Pysdorf-Floridsdorf

Iron and Steel

	Tons	
Pipe 13.5 km. 6" (30 kg/m)	405	
Welded wire	.2	
Armatures, Manifolds, etc.	5	
For telephone lines	.3	*
Supports (for above ground and ground installation, etc.)	1.	
	411.5	

* German version included word "Soko", following the tonnage. Translation for "Soko" not known.

2.8 AUSTRIAN MINING LAWS

Unfortunately, Dr. Johan Schenk, of the Socony-Vacuum Oil Company, who was the recognized authority on this subject, died in 1943. His department is now being carried on by Dr. A. Rosenberg and Mr. J. W. Scott, from whom the information contained in this section was obtained.

General permits--Schurfbewilligungen.- The Austrian mining law, which also covered crude oil and natural gas, required anyone proposing to engage in prospecting or exploration work to obtain first a general permit called a Schurfbewilligung. This general permit was valid for one year but in practice readily renewable from year to year. It was not an exclusive exploration permit but was of the nature of a declaration of intent.

Exploration permits--Freischürfe.- The holder of a Schurfbewilligung was eligible to apply for exclusive exploration rights within a specified area, known as a Freischurf, the unit area of which was approximately 36

hectares or 88 acres. However, the number of these units, or Freischürfe that one individual or company might hold was not limited by law. These exclusive exploration rights were valid indefinitely concurrently with and subject to the validity of yearly renewal of the General Permits (Schurfbewilligungen) and the obligation actually to carry on exploration work. With regard to the latter in practice no activity was exacted and renewals were granted without question

Exploitation rights.- The granting of the "Freischurf" right did not, however, accord a right to exploit the minerals found in the "Freischurf" since the minerals themselves were considered the property of the State. The right of exploitation was granted to the Freischurf holder upon submission of proof that he had found minerals in quantity and quality sufficient to justify exploitation. The exploitation right, Verleihung, was granted in units of 45,116 square meters, called Grubenmasse. The concession right to these Grubenmasse remained valid indefinitely, subject to the yearly renewal of the original General Permits (Schurfbewilligungen) and continual operation to the satisfaction of the government.

These salient features of the three steps mentioned above are outlined in a document, marked 1, and are amplified by the memoranda, marked 2, both in Appendix 2.

The petroleum regulations promulgated in 1938, translated as number 3 in Appendix 2 of this report, gave the government mining authority rather broad powers to impose special prescriptions on the acquisition of mining rights and in the enforcement of these prescriptions. A translation of the general regulations, including safety, and fire protection, etc., for enterprises prospecting for or exploiting crude oil and natural gas is given as number 4 in Appendix 2.

From a review of these attachments one would conclude that in the obtaining and operating of petroleum concessions the principal requirement was the establishment of satisfactory contacts with the proper officials.

The situation after the annexation of Austria by Germany.- Shortly after the annexation of Austria by Germany, the German authorities announced that the German petroleum laws would be applied to Austria. Mr. Scott states, "According to our information, in addition to the 'Gesetzblatt für das Land Österreich' of June 8, 1938, the following legal regulations of Germany were applied to Austria:

a. Gesetz über die Durchforschung des Reichsgebietes nach nutzbaren Lagerstatten (Lagerstättengesetz) vom 4. Dezember 1934 (Reichsgesetzblatt I, Seite 1223),

b. Verordnung zur Ausführung des unter 1.) angeführten Gesetzes vom 14. Dezember 1934 (Reichsgesetzblatt I, Seite 1261),

c. Gesetz zur Überleitung des Bergwesens auf das Reich vom 28. Februar 1935 (Reichsgesetzblatt I, Seite 315),

d. Gesetz zur Erschliessung von Bodenschätzen vom 1. Dezember 1936 (Reichsgesetzblatt I, Seite 999),

e. Verordnung über die Zulegung von Bergwerksfeldern vom 25. März 1938 (Reichsgesetzblatt I, Seite 345)".

No texts of any of these regulations could be found in the New York files of the Socony-Vacuum Oil Company. However, the understanding of both Dr. Rosenberg and Mr. Scott was that the major effect of the new German regulations was a change in the methods by which concessions were granted, the alleged purpose being to eliminate speculators who held large areas without making any serious exploration effort.

Holdings

The special petroleum law (Bitumengesetz) for Austria stipulated that the Freischurf rights would expire on July 31, 1940 and that thereafter all areas would be allotted according to the German laws which granted concessions by structures. It is not known how the conversion of existing concessions was carried out.

The more important features of the German petroleum laws on the granting of concessions were:

a) Applicants for a concession were required to show proof of their financial solidity and also some evidence of the existence of a geological structure.

b) The size of the concession was not specified by the law but was usually arranged so as to include the entire structure.

c) The work obligation required the operator to commence drilling by a date fixed by the authorities and to drill continually until oil might be found, or, alternatively, to abandon the concession.

2.9 HOLDINGS OF PETROLEUM LANDS IN THE WIEN BASIN

Rohoel-Gewinnungs, A.G.(b).- During the period 1935-early 1938, the Rohoel-Gewinnungs A.G. had obtained five Grubenmasse on the Zistersdorf and Gaiselberg domes, having a total area of about 450 acres out of a total prospective area of approximately 1,000 acres. It is believed probable that additional Grubenmasse were obtained on the basis of production drilling before July, 1940. However, no information on this subject could be obtained. The total acreage held in the Wien Basin by Rohoel Gewinnungs A.G. just before the annexation of Austria by Germany was as follows:

North of the Danube: 140,580 hectares (347,233 acres)
South of the Danube: 120,160 hectares (296,795 acres)

Late in 1938, under Governmental pressure, the Rohoel-Gewinnungs A. G. entered into a three party contract with "Elwerath" and "Preussag" pooling their holdings in the area south of the Danube, and in the Outer Alpine section

---

(a) Unfortunately, our information on petroleum property holdings is far from complete. In this connection, Mr. J. W. Scott, Socony-Vacuum Oil Company, in a letter to Mr. L. L. Anderson, Dated September 24, 1943 said:

"With reference to our telephone conversation of today's date, we regret to point out that the files available in this office do not provide us with any additional information concerning the land holdings of other companies and individuals in Austria to supplement the data with which we have already provided you.

Most of the companies and individuals with Freischurf holdings in the Ostmark were Austrian Nationals who undoubtedly became German Nationals after the Anschluss.

The 'D.P.A.G.' Company is the Deutsche Petroleum Aktiengesellschaft. The 'Preussag' is the Preussische Bergwerks und Hütten Aktiengesellschaft of Hanover, and the 'Elwerath' is the Gewerkschaft Elwerath of Hanover. All three of these German firms have holdings in the Wien Basin."

The D.P.A.G. came into Austria after the invasion of Austria by Germany in 1938, and the extent of its operations is not known.

(b) Producing Company owned jointly by the Royal Dutch Shell group and Socony-Vacuum Oil Company.

of the Wien Basin. The resulting pool consisted of 3,444 Freischürfe embracing an area of approximately 129,960 hectares (about 321,000 acres). This acreage is shown with the legend "REP Territory" on the map entitled, General Map, Wien Basin, Lower Austria, which appears on page 16. Of the aforementioned holdings the Rohoel-Gewinnungs A.G. contributed 3,277 Freischürfe with an area of 123,960 hectares (about 306,182 acres). This acreage is shown under the legend "RAG Territory" on the map referred to above.

Although the Rohoel-Gewinnungs A.G. contributed the bulk of the Freischürfe making up the Rohoel-Elwerath-Preussag pool, the contract fixed the respective interests of the three companies as follows:

Rohoel-Gewinnungs A. G.	49%
Elwerath	25-1/2%
Preussag	25-1/2%

Expenses and returns were to be shared in this proportion, to the obvious advantage of the Elwerath and the Preussag Companies. However, the German Government was acutely interested in promoting the exploration for and development of oil resources and these two latter firms, being German, were able to contribute certain advantages such as German Government subsidies and were, of course, able to facilitate dealings with the authorities.

After entering into the above agreement the remaining area held 100% by Rohoel-Gewinnungs A. G. amounted to 4,078 Freischürfe covering approximately 145,458 hectares, or about 359,300 acres. All of these 100% holdings were located north of the Danube.

In 1938, just after the annexation of Austria by Germany, basing its claims upon extensive geological and geophysical work done over several years plus the discovery of a number of structures, Rohoel Gewinnungs A. G. applied under the new law for several concessions covering some of the structures lying north of the Danube.

Action by the Government on the applications for concessions was deferred and the Government announced that the old Austrian law would hold until July 31, 1940. Owing to the entrance of the United States into the war no later information as to the eventual disposition of the applications, or other rights of the Rohoel Gewinnungs A. G. has been received.

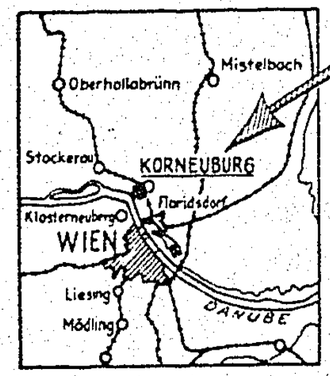
MAP SHOWING LOCATIONS OF PETROLEUM INSTALLATIONS AUSTRIA

All existing Austrian refineries are located in the Wien District.

- Refinery
- River Terminal or Bulk Plant (Approximate Location)

0 1 2 3 4 5 Km
0 1 2 3 Mi

CREDIT MINIER REFINERY (Korneuburg) — On the East bank of the Danube (about 800 yards from the water) in the Southern outskirts of Korneuburg - about 6 miles upstream from the Nordwestbahn Bridge at Wien.



SHELL REFINERY (Floridsdorf)
VACUUM REFINERY (Benzin und Ölindustrie Kagran)
NORDWESTBAHN BRIDGE
NORDBAHN BRIDGE
Kagran
Airport
Radio Sta.
STADLAUER BRIDGE
Grossenzersdorf
OIL TRADING CO. (Standard Oil Co. of N.J.)
VACUUM
MONTAN UNION
SHELL
City Gas Works
City Power Hse
VACUUM
NOVA OIL & BRENNSTOFF CO.
REDEVENTZA CO.
ELWERATH REFINERY (Lobau)
PUMP HOUSE
PIPE LINE
HUBERTUS DAM
NOVA REFINERY (Schwechat)
Schwechat
EVERTH & CO.
Radio Sta.
Radio Sta.
FANTO REFINERY (Vosendorf)
WIEN
RING
N
Streets & Roads
R.R. Sta.
Railroad

48°15' 48°10' 16°15' 16°25' 16°30' 16°35'

3.0 REFINING

3.1 INTRODUCTION

History.- The Austrian refining industry originally was established to operate on Rumanian crude or on artificial crude made up of mixtures of unfinished products. In 1935 the affiliates of the Royal Dutch Shell group (a) and that of the Socony-Vacuum Oil Co. (b) owned the two largest refineries. These were, respectively, the Floridsdorf refinery, running 2,000 barrels per day, and the Kagran refinery, running 1,200 barrels per day. In addition, in 1935 there were the "Nova" (c) refinery at Drösing, running 500 barrels per day, the Creditul Minier (d) refinery at Korneuburg, running 500 barrels per day, and the "Gallia" (later Fanto) refinery (e) at Vösendorf, running 625 barrels per day. These five small refineries represented the entire refining industry of Austria, and they were all clustered around Wien.

The refinery process equipment existing in Austria before the war was quite modest in size and type. The five refineries were remarkably similar in that all had small crude pipe stills and white products treating units, none had cracking units and all had simple acid treating facilities for lubes. The Floridsdorf and Kagran plants were equipped with vacuum rerun stills for the lube stock and several plants had sludge centrifuges in connection with the acid treating. Several had small asphalt equipment. The products from all refineries were gasoline, kerosine, gas oil, ordinary lube oils and fuel oil.

Crude supplies.- In 1939 Austrian crude production still amounted to less then 100,000 tons per year and the principal Austrian refineries were still running primarily on Rumanian stock. Since then, a great increase in Austrian crude production has taken place. Not only is imported crude presently excluded from the country, but the Austrian refineries, even after considerable recent extensions, cannot process all of the crude oil produced in the country; the volume of Austrian crude production, centered some 28 miles from Wien, is now about double the capacity of the Austrian refineries. A part of this excess crude presently is transported to the refinery of the Vacuum Oil Co. S.A. (f), at Kolin, Czechoslovakia, by means of a pipe line reported to have been built recently for the purpose, and the remainder probably is transported by tank car and barge to other refineries in Czechoslovakia.

Extensions and new plants.- It has been reported that, to cope, at least partially, with the rapidly increasing crude production, a small primary distillation plant has been put into operation in the producing fields, that the Floridsdorf refinery has been expanded to a capacity of about 150,000 metric tons (1,020,000 barrels) a year or 3,000 barrels per day, and that a new refinery surpassing in capacity the other refineries of Austria is being built at Lobau near Wien. It is believed that this new plant is already capable of handling 200,000 metric tons (1,360,000 barrels) a year or 4,000 barrels per day, but as yet has no facilities for the manufacture of lube oils.

Capacity and ratings.- The total capacity of the Austrian refineries which before the war was only 300,000 tons per year is now thought to be in the neighborhood of 600,000 metric tons per year and it is believed that it is increasing as fast as new construction work can be carried out.

(a) Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik.
(b) Benzin und Ölindustrie Kagran A.G.
(c) "Nova" Öl und Brennstoffgesellschaft A.G. This refinery was moved from Drösing to Schwechat in 1937-38.
(d) Creditul Minier Österreichisch-Rumänische Petroleum-Vertriebsgesellschaft m.b.H.
(e) Österreichische Fanto A.G.
(f) Wholly owned subsidiary of the Socony-Vacuum Oil Co. Inc.

106 - REFINING
Refinery data

STATISTICAL SUMMARY OF DATA ON REFINERIES OF AUSTRIA
For the year 1943

* = Approximate
x = Data Unknown

1. Common name of Refinery		Floridsdorfer (Shell)			Moosbierbaum (Socony-Vacuum)			Korneuburg (Creditul Minier)			Lobau(4)			"Mineralöl"			Pento		
2. Location of Refinery (a) Place		Floridsdorf			Near Moosbierbaum			Near Korneuburg			At Lobau			Near Schwechat			Near Wiesenberg		
(b) Index Map Coordinates	Lat.(a)	48° 16' N			48° 10' N (b)			48° 21' N			48° 10' N (b)			48° 08' N			48° 07' N (b)		
	Long.	16° 23' E			16° 23' E			16° 20' E			16° 30' E			16° 28' E			16° 18' E		
3. Refinery Capacity:	MT/yr	100,000			60,000			50,000			200,000 (estimate)			50,000			40,000		
	Bbls/day	2,000			1,200			1,000			4,000			1,000			800		
4. Normal throughput:	MT/yr	100,000			60,000			50,000			x			50,000			40,000		
	Bbls/day	2,000			1,200			1,000			x			1,000			800		
5. Crude for which designed		Rumanian artificial			Rumanian artificial			Rumanian artificial			Wien Basin			Rumanian artificial			Rumanian artificial		
6. Crude used currently		Wien Basin			Wien Basin			Wien Basin			Wien Basin			Wien Basin			Wien Basin		
7. Products made, Running for Maximum		Diesel and fuel oil			Diesel and fuel oil			Diesel and fuel oil			Diesel and fuel oil			Diesel and fuel oil			Diesel and fuel oil		
		% of Total	Metric Tons A Year		% of Total	Metric Tons A Year		% of Total	Metric Tons A Year		% of Total	Metric Tons A Year		% of Total	Metric Tons A Year		% of Total	Metric Tons A Year	
Gasoline		5	5,000		5	3,000		4	2,000		x	x		4	2,000		5	2,000	
Kerosine Gas oil & Diesel oil)		25	25,000		27	16,000		26	13,000		x	x		26	13,000		25	10,000	
Lubes		31	31,000		32	19,000		32	16,000		x	x		32	16,000		30	12,000	
Fuel oil		30	30,000		24	14,000		28	14,000		x	x		28	14,000		30	12,000	
Asphalt		-	-		-	-		-	-		x	x		-	-		-	-	
Refinery fuel & loss, and misc.		9	9,000		8	5,000		10	5,000		x	x		10	5,000		15	6,000	
Totals		100	100,000		100	60,000		100	50,000		x	x		100	50,000		100	40,000	
8. Refining Units (a) Crude distillation facilities		Brünn Königsfeld atmospheric pipe still with Foster Wheeler designed vacuum stage, 300 MT/day(2000 B/D)			Brünn Königsfeld atmospheric-vacuum pipe still			Brünn Königsfeld atmospheric - vacuum pipe still			Pipe still			Atmospheric - vacuum pipe stills 1500 MT/day (9460 B/D)			Brünn Königsfeld pipe still with Foster Wheeler vacuum stage		
(b) Cracking facilities		None			None			None			None			None			None		
(c) White products finishing		Usual acid treating			Usual acid treating			Usual acid treating and one gasoline rectifying still			None			Usual acid treating and two agitators			Yes		
(d) Lube facilities		Ordinary acid and clay lube plant and vacuum re-run pipe still good for 70 MT/day.			Ordinary acid and clay plant and three vacuum shell stills of 600 bbls. each for re-running			Ordinary acid and clay plant and four shell stills for re-running			None			Ordinary acid and clay plant and two agitators			Ordinary acid and clay plant.		
(e) Hydrogenation, Alkylation, etc.		None			None			None			None			None			None		
(f) Asphalt facilities		One oxidizing still			Yes			Yes			None			None			Yes		
(g) Gas Plant		None			None			x			None			x			None		
(h) Specialties		Lubricating greases			Grease			x			None			x			Wax, Grease		
(i) Boiler Plant		Two boiler houses, each with two boilers.			Two Tischbein boilers of about 100 and 220 B.H.P. and one Babcock Wilcox of about 330 B.H.P.			Yes			Small			Yes			Yes		
(j) Power Plant		Standby generator set			Two steam electric generators of 25 and 40 kw. respectively			Diesel electric			None			None			x		
9. Tankage Capacity: Black:	M³	x			13,670			x			x			x			x		
	Bbls.	x			86,021			x			x			x			x		
White:	M³	x			7,000			x			x			x			x		
	Bbls.	x			44,100			x			x			x			x		
Total:	M³	31,177			20,670(c)			11,913*			50,944*			38,836*			11,400*		
	Bbls.	196,415			130,281(c)			75,000*			320,854*			244,600*			72,000*		
10. Construction: (a) When built		Pipe still 1937-38 Foster Wheeler unit 1939-40			Pipe still 1933-34 Shell still 1934			1930-31			Begun 1943. Still under construction.			1937-40			About 1910. Rebuilt 1934-7		
(b) Built by what concern		Simmeringer Maschinen-Fabrik			Simmeringer Wagon Fabrik			Brünn Königsfeld			x			Simmeringer Wagon Fabrik			Brünn Königsfeld		
(c) Flow plans and working drawings in possession of whom		Not available			Benzin und Elinindustrie Nagren A.G., Vacuum Oil Co.A.G., Brunn Königsfeld and Simmeringer Wagon Fabrik			Brünn Königsfeld and Creditul Minier			x			Simmeringer Wagon Fabrik and Pento			Brünn Königsfeld and Pento		
11. Name of Company		Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik			Benzin und Elinindustrie Nagren A.G.			Creditul Minier, Österreichisch-rumänische Pet.Vertriebsgesellschaft m.b.H.			(e)			"Vesta" Öl und Fettwaren-Gesellschaft m.b.			Österreichische Pento-...		
12. Address of Company		Wien I, Schubertring 14			Wien			Wien			x			Wien, Graben 29			Wien I, Renngasse 1.		
13. Affiliations of Company (a) Name(s) of owner firms		Royal Dutch Shell group			Socony-Vacuum Oil Co.			Creditul Minier S.A.			(e)			(f)			Deutsch-Amerikanische Petroleum-...		
(b) Addresses of owner firms		London, England			26 Broadway, New York, N.Y.			43 Boulevard Take Ionescu Bucharest, Rumania			x			Paris			Bremen, (NW/F)		

REMARKS: (a) Latitudes and longitudes taken from Index-Gazetteer to "The Times" Sunday Atlas of the World, London, 1944; edited by John Bartholomew, The Edinburgh Geographical Institute. (b) These latitudes and longitudes ascertained otherwise. (c) Divisions of storage between black and white products is approximate only. (d) Presently being enlarged and partially completed (e) Reported to be Elsworth-Winterschall-A.G. Farbenindustrie group. (f) Société Française Industrielle et Commerciale des Pétroles.

Since all the Austrian refineries, except Lobau, are alike in having only ordinary lube facilities and no cracking equipment, they may be rated on a straight crude throughput capacity basis, relative to Floridsdorf as follows: Floridsdorf 100%, Kagran 40%, Schwechat 35%, Vösendorf 30%, Korneuburg 30%.

3.2 STRATEGIC CONSIDERATIONS

Strategic considerations discussed below apply to all Austrian refineries.

Value to enemy.- While the capacities of the Austrian refineries are small compared with other large refineries in other Axis held European countries, their value to the enemy is greatly out of proportion to their capacity, because of their strategic location on the Danube River, in the heart of Eastern Axis operations and because Austrian crude in excess of Austrian refinery capacity presently is being produced.

Possible value to Allies if captured intact.- Due to their proximity to ample crude supplies, large centers of consumption and cheap river transportation, these refineries would be invaluable to the Allies if captured intact.

Effects of damage.- While the damaging and firing of storage tanks may produce the most spectecular results, it is far from the most effective method of putting a refinery out of action. It is unusual that destruction of storage is complete enough to entirely halt the operation of a refinery. Successful bombing of the pipe stills in a refinery would knock it out for at least six months. The destruction of specialized equipment such as hot oil pumps and instrument panels in the refinery control centers could result in shut downs of considerable duration as would the destruction of the central boiler or power plant. If a refinery were totally destroyed by a retreating enemy it would take about a year to rebuild it.

Owing to the high temperatures employed in their operation, refineries are more susceptible to sabotage than are distributing and producing operations.

3.3 FLORIDSDORF - THE SHELL FLORIDSDORFER REFINERY

General description.- This is one of the older Viennese refineries, its pipe still having been built in 1927-28. It is in a rather congested location but has been credited with a recent expansion of capacity from 100,000 to 150,000 tons per year. It is owned by the Shell-Floridsdorfer Mineralöl-Fabrik A. G. of Wien, a subsidiary of the Royal Dutch Shell group.

The processing equipment includes an old Brünn Königsfeld pipe still to which, in 1929-30, was added a vacuum stage designed by Foster Wheeler and built by a local concern "Lokomotif". This two-stage unit is good for 300 tons per day of Austrian crude. There is also a vacuum rerun pipe still which can handle 70 tons per day of lube stock. In addition there are the usual acid treating facilities for white products and lubes and an asphalt oxidizing still. There is no dewaxing plant and no cracking.

Importance in normal times.- This is the most important of the Viennese refineries due to its somewhat higher capacity and complete finishing facilities, although at present it is believed that the new refinery at Lobau is being developed and may outstrip Floridsdorf. As compared to many refineries in Germany, France and Rumania, Floridsdorf would be relatively unimportant if it were not for its strategic location.

Wartime use and expansion.- It is understood that the volume of excess Austrian crude oil has resulted in an increase in the Floridsdorf facilities to a capacity 50% higher than they had before the war. Details of the increases are unavailable.

Sheet 1 of 2

SHELL WIEN (FLORIDSDORF) REFINERY

REFINERY LAYOUT

LEGENDE

1 Kanzleigebaeude
2 Feuerloeschdepot, Garagen, Auto-Reperaturwerkstaette, Schwitzerei Pumpenwerkstaette
3 Brueckenwage, Archiv, Waechter
5 Garagen
6 Spritzerei, Paraffin Raffination
10 Werkstatten
11 Garteroben
13 Filterpressen, Dampfkessel 3-9
14 Benzinraffination
15 Benzinkessel, Reservoir gruppe
16 Benzinmagazin
17 Waaghaus
17a Waggonverschubmaschine
20 Laboratorium
22 Filterpressen
22a Kuehlhaus, Maschinenhaus
23 Materialmagazin
24 Materialmagazin
25 Petrolmagazin, Petrolrampe
26 Oelgruben
27 Geraeteraum fuer Rohoel-Entleerung
27a Rohoelentleerung
28 Kesselwagenfuellbuehne
29 Rohoelgruben
30 TT-Tanks Pumpenhaus
31 Arbeiter Wohnhaus
32 Dir. Wohngebaeude
33 Beamtenwohnhaus

LEGEND

1 Office Building
2 Fire Dept., Garages, Auto Repair Shop, Weld Shop, Pump Shop
3 Scales, Archive, Watchman
5 Garages
6 Spray Plant, Paraffin Refinery
10 Workshop
11 Wardrobe
13 Filter Presses, Boilers 3-9
14 Gasoline Refining
15 Gasoline Still, Tankage
16 Gasoline Storage
17 Weighing house
17a R. R. Car Switching machine
20 Laboratory
22 Filter presses
22a Refrigeration Plant, Power House
23 Material Storage
24 Material Storage
25 Kerosine Storage, Kerosine Ramp
26 Oil Pits
27 Tool Room for Crude Oil Unloading
27a Crude Oil unloading
28 Tank Car filling platform
29 Crude Oil Pits
30 TT-Tanks and Pump House
31 Employees Dwelling
32 Managers Dwelling
33 Employees Dwelling

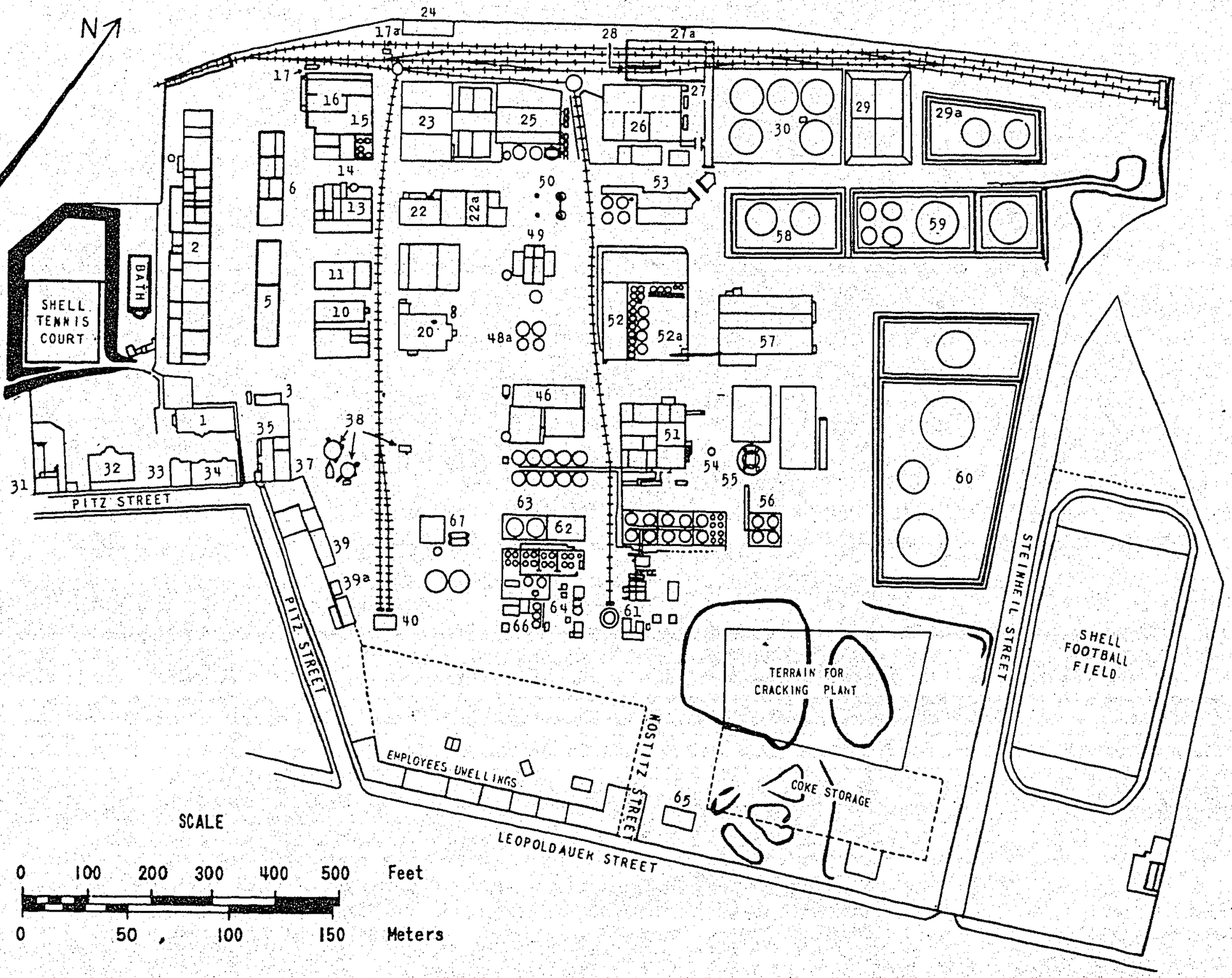
LEGENDE

34 Beamtenwohnhaus
35 Portiergebaeude
37 Arbeiterhalle
38 Klaeranlage
39 Zimmerei
39a Holzschuppen
40 Waggonschuppen
46 Schmieroelraffination, Transformatorenraum, Dampfkessel 10, 11
48a Spritzoeltank - BA
49 Heissoel-u. Spritzoelkessel
50 Tankfuellstellen
51 Fettfabrik, Raffination
52 Schmieroelmagazin, Oelrampe, Reservoirgruppe
52a Abort
53 AR-Tankgruppe u. Tankpumpenhaus
54 Brunnen V
55 Wasserturm, Wasserpumpenhaus
56 Raffinationsvorlagen
57 Binderei, Fasswaescherei
58 CN-Tankgruppe
59 Tankgruppen WW 1,2,3,4; 103,104
60 Rohoeltankgruppe 101,102,105
61 Rohoeldestillation (Trumble)
62 Zentralpumpenhaus
63 Tankgruppe 19,20
64 Schmieroeldestillation (Foster Wheeler)
65 Materialschuppen
66 Asphaltanlage
67 Asphaltabfuelleinrichtung

LEGEND

34 Employees Dwelling
35 Porters Lodge
37 Employees Hall
38 Settling Plant
39 Carpenter Shop
39a Wood Shed
40 R. R. Car Shed
46 Lubricating Oil Treating, Transformer Room, Boilers 10, 11
48a Spray Oil Tank
49 Hot Oil and Spray Oil Heater
50 Tank Filling Station
51 Grease Plant Refinery
52 Lube Oil Storage, Oil Ramp, Tankage Group
52a Privy
53 AR Tankgroup and Tank Pumphouse
54 Well V
55 Water Tower, Water Pump House
56 Refining Plant
57 Cooperage, Barrel washing
58 CN-Tank group
59 Tank Group WW 1,2,3,4; 103,104
60 Crude Oil Tank Group 101,102,105
61 Crude Oil Distillation (Trumble)
62 Central Pump House
63 Tank Group 19,20
64 Lube Oil Distillation (Foster Wheeler)
65 Material Shed
66 Asphalt Plant
67 Asphalt Filling Device

SHELL WIEN (FLORIDSDORF) REFINERY - REFINERY LAYOUT



3.4 KORNEUBURG - THE CREDITUL MINIER REFINERY

General description.- This was formerly the Korneuburger Mineralölraffinerie A.G. It has a Brünn Königsfeld(a) pipe still operated alternately at atmospheric pressure on crude and under vacuum on crude bottoms or lube stock. The peculiarities of this pipe still are, first, that its tubes are jacketed with individual cast steel jackets containing molten lead. Secondly, it is operated batch, that is, there is no fractionating tower but instead the stock is circulated, with continually increasing coil outlet temperature and condensate continually changing in quality. The refinery also has four shell stills for rerunning and a gasoline rectifying still. It had the usual acid and clay treating facilities for lubes and has a boiler and diesel electric powerhouse. There is a pipe line to the Danube 800 meters (2,608 feet), away and a small pumphouse at the barge station on the river.

The refinery is owned by Creditul Minier, Österreichisch-Rumänische Petroleum-Vertriebsgesellschaft, m.b.H. of Wien. Its capacity is rated as 50,000 tons per year although actually its production has been slightly less than 40,000.

Importance in normal times.- This was about the fourth Viennese refinery in point of importance. Schwechat, Korneuburg and Vösendorf were of about the same importance.

Wartime use and expansion.- No report has been received of expansions although plans had been made to increase the lube facilities in order to handle Austrian crude.

3.5 KAGRAN - THE VACUUM REFINERY (b)

General description.- This, one of the older Viennese refineries, is small and simple. It was designed to take care of the Vacuum Oil Company sales quotas in Austria by the refining of Rumanian artificial crude. It is owned by Benzin und Oel Industrie A.G."Kagran" of Wien, a subsidiary of Socony Vacuum Co.

The capacity of the plant is about 60,000 metric tons per year--say 1,200 barrels per day--which is the capacity of the pipe still. This pipe still was built by Brünn Königsfeld in 1934 and has a single coil in its furnace and a single tower about 6 feet in diameter. The unit operated on crude and on bottoms alternately, the latter operation being under vacuum. In addition to the pipe still there are three shell stills each of 600 barrels capacity, and the usual acid treating facilities for white products and lubes with centrifugal separation of sludge.

Importance in normal times.- Kagran was the second largest refinery in Austria but as soon as Lobau becomes a factor it will probably drop back to third place. Its importance, of course, is only relative to other Austrian plants since the capacity of 1,200 barrels per day would be considered very small in certain other European refining centers.

Wartime use and expansion.- There has been no report of expansion at Kagran but it is logical to assume that at least minor improvements have been made since the vast increase in Austrian crude production.

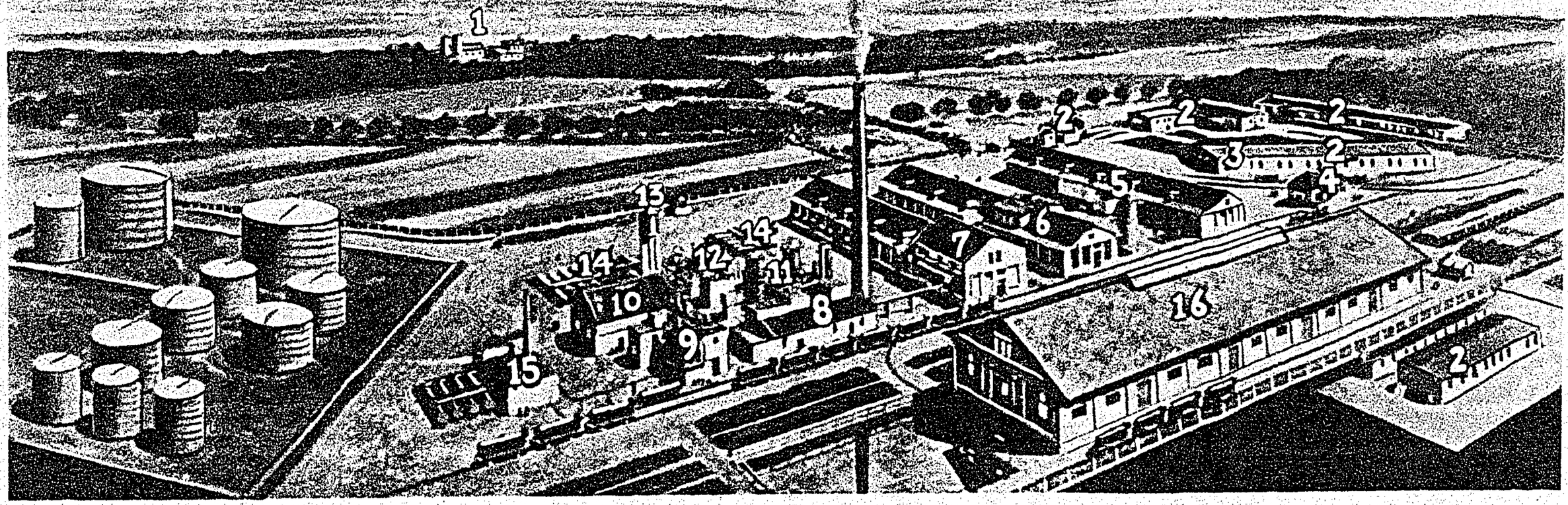
3.6 SCHWECHAT - THE "NOVA" REFINERY

General description.- This refinery, like the other Austrian units, consists principally of a pipe still. This still was built in 1937-38 by Simmeringer Waggon Fabrik following Brünn Königsfeld ideas. It was used alternately on crude and crude bottoms having a single coil and a single tower 5 feet in

---

(a) Brünn Königsfeld pipe stills are made by Brünn Königsfeld Maschinen Fabrik, A.G.

(b) The "Kagran" company was merged with Vacuum Oil Company A.G., Wien, as of June 30, 1941.



REFINERY OF KORNEUBURGER MINERALÖLRAFFINERIE A.G.
LEASED TO CREDITUL MINIER, ÖSTERREICHISCH-RUMÄNISCHE PETROLEUM-VERTRIEBSGESELLSCHAFT, m.b.H.

LEGEND

1. The pump station on the bank of the Danube and two storage tanks, each of 1200 tons storage capacity.
2. Dwellings for workers and engineers.
3. Office.
4. Laboratory.
5. Shipping department.
6. Lubricating oil refinery.
7. Pump and compressor house.
8. Power house.
9. Pre-heater.
10. Tubestill.
11. Straight run distillation.
12. Receiving house.
13. Water tower.
14. Receiving tanks.
15. Gasoline rectification.
16. Repair shop.

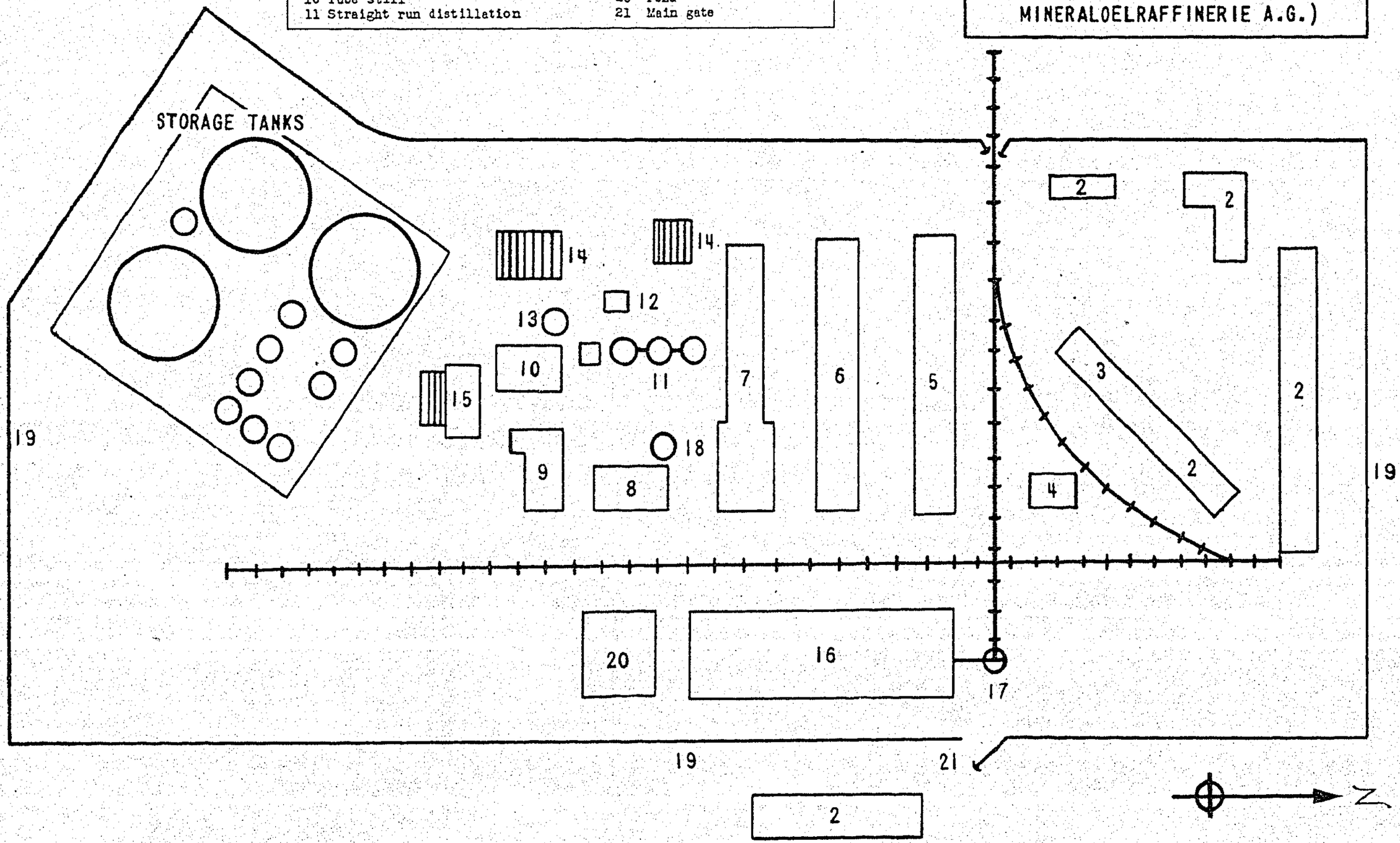
L E G E N D

2	Dwellings for workers & engineers	12	Receiving house
3	Office	13	Water tower
4	Laboratory	14	Receiving tanks
5	Shipping department	15	Gasoline rectification
6	Lubricating oil refinery	16	Repair shop
7	Pump & compressor house	17	R.R. turntable
8	Power house	18	Smokestack
9	Pre-heater	19	Fence
10	Tube still	20	Pond
11	Straight run distillation	21	Main gate

SKETCH SHOWING

CREDITUL MINIER REFINERY at KORNEUBURG (near WIEN)

(FORMERLY THE KORNEUBURGER MINERALOELRAFFINERIE A.G.)



"KAGRAN" REFINERY
BENZIN UND OEL INDUSTRIE A.G.
WIEN, AUSTRIA

SCALE
0 50 100 150 200 FEET
0 10 20 30 40 50 60 METERS

LEGEND

1 GARAGE
2-3 AUTO WERKSTATTEN
4 ARBEITER'S WOHNUNGEN
5 PORTIER
6-7 BUROS
8 GARDEROBEN
9 ARBEITER'S ESSZIMMER
10 MATERIAL MAGAZIN
11 KANNEN WERKSTATTEN
12 KANNEN WASCHER
13 FASS SPRITZEN U REINIGUNG
14 EMBALLAGEN
15 OLFULLHAUS
16 ABWASSER PUMPE
17 WAAGE
18-19 SEPARATORS
20 BENZIN FULLHAUS
21 OL RAFFINATION
22 SCHAUMERZEUGUNG
23 BENZIN ZAPFSTELLE
24 LOSCHGERATE

1 GARAGE
2-3 AUTO REPAIR SHOPS
4 WORKMEN'S DWELLING HOUSE
5 DOORKEEPER
6-7 OFFICES (BLDG)
8 WORKMEN'S DRESSING ROOM
9 WORKMEN'S DINING ROOM
10 MATERIAL STOREHOUSE
11 CAN SHOP
12 CAN CLEANING
13 BARREL CLEANING
14 OIL PACKAGES STORAGE
15 OIL FILLING HOUSE
16 DRAINAGE PUMP
17 SCALES
18-19 SEPARATORS
20 GASOLINE FILLING HOUSE
21 LUB OIL REFINING & COMPOUNDING
22 FOAM EJECTOR HOUSE
23 GASOLINE FILLING STATION
24 FIRE EXTINGUISHING EQUIPMENT

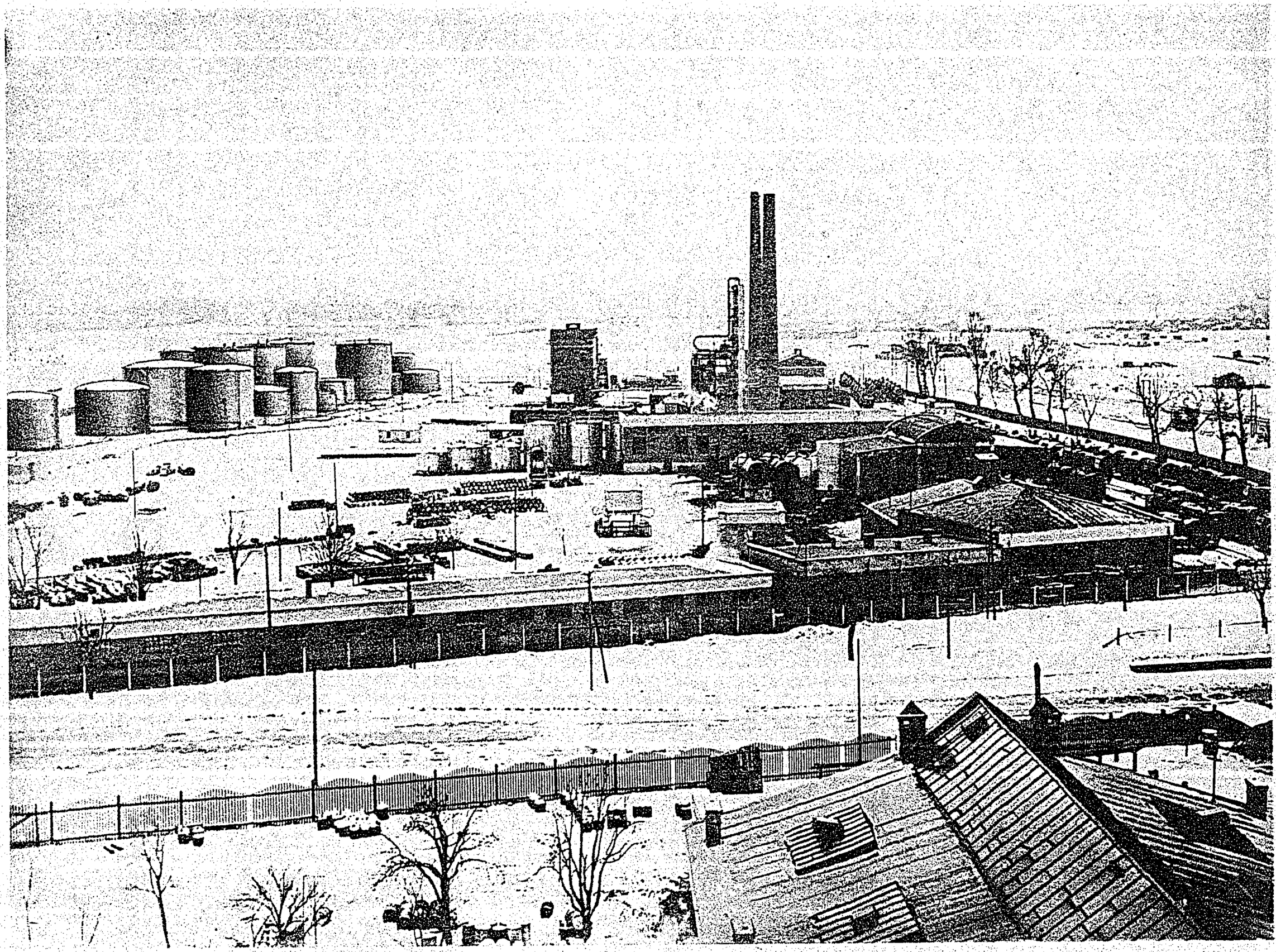
25 ASPHALT ABFULLUNG
26 PUMPHAUS
27 LAUFHAUS
28 BUBBLE HOUSE
29 SEPARATOR
30 PIPE STILL
31-32 DESTILLATION
33 WAAGE
34 DAMPFWINDE
35 LAUFHAUS
36 SEPARATOR
37 SEPARATOR
38 REKTIFIKATION
39 KESSELHAUS
40 MASCHINEN & PUMP HAUS
41 SEPARATOR
42 WASSER BEHALTER
43 LAUGE
44 WASSERREINIGER
45 WERKSTATTEN
46 GARDEROBE
47 BRUNNEN
48 SAURE U LAUGE
49 ABFALL SAURE
50 KALK ABSITZ GRABE
51 KONDENSAT FILTER

25 ASPHALT FILLING
26 PUMPHOUSE
27 STILL HOUSE
28 BUBBLE TOWER
29 SEPARATOR
30 PIPE STILL
31-32 DISTILLATION
33 SCALES
34 STEAM WINCH
35 STILL HOUSE
36 SEPARATOR
37 SEPARATOR
38 RECTIFIER
39 BOILER HOUSE
40 ENGINE AND PUMP HOUSE
41 SEPARATOR
42 WATER TANK
43 LYE STORAGE
44 WATER SOFTENER
45 WORKSHOP
46 DRESSING ROOM
47 WELL
48 TANKS FOR LYE & ACID
49 TANKS FOR ACID WASTE
50 LIME SEDIMENT PIT
51 CONDENSER FILTER

STORAGE TANKS

	CAPACITY IN BBL @ 35 DEGR.
4 TANKS	70
3 TANKS	250
2 TANKS (INSULATED)	300
2 TANKS	320
2 TANKS	500
1 TANK	600
1 TANK	800
2 TANKS	1000
1 TANK	1200
1 TANK (PONTOON ROOF)	1500
1 TANK	2200
4 TANKS (PONTOON ROOF)	3000

GARAGE
SLUDGE DUMPING TRACK
TANK YARD
WATER LINES
FOAM LINE
LUB OIL TREATING PLANT
OIL LINES
DISTILLATE TANKS
FUEL OIL TANKS
WATER LINE
OIL LINE
STEAM LINE
STEAM STILLS
BENZINE-RO TREATING PLANT
ASPHALT TANKS
AGITATORS
BENZINE-RO FILLING HOUSE
PIPE STILL
SHELL STILLS
TRANSFORMER HOUSE
R.R. CARS FILLING RACK

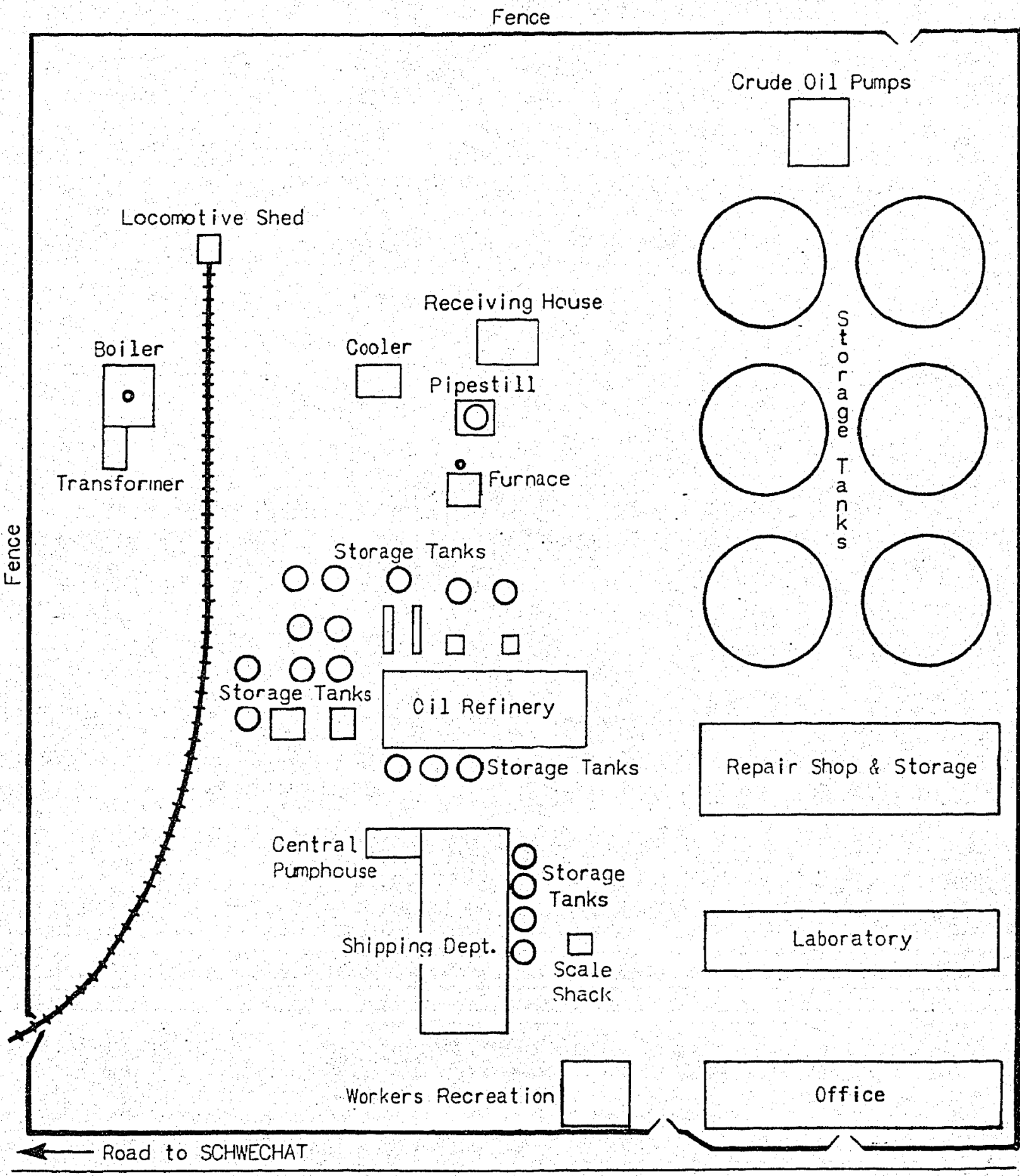


KAGRAN REFINERY. AUSTRIA (NEAR WIEN)

REFINERY OF

NOVA OEL UND BRENNSTOFF A. G.

SCHWECHAT (NEAR WIEN)

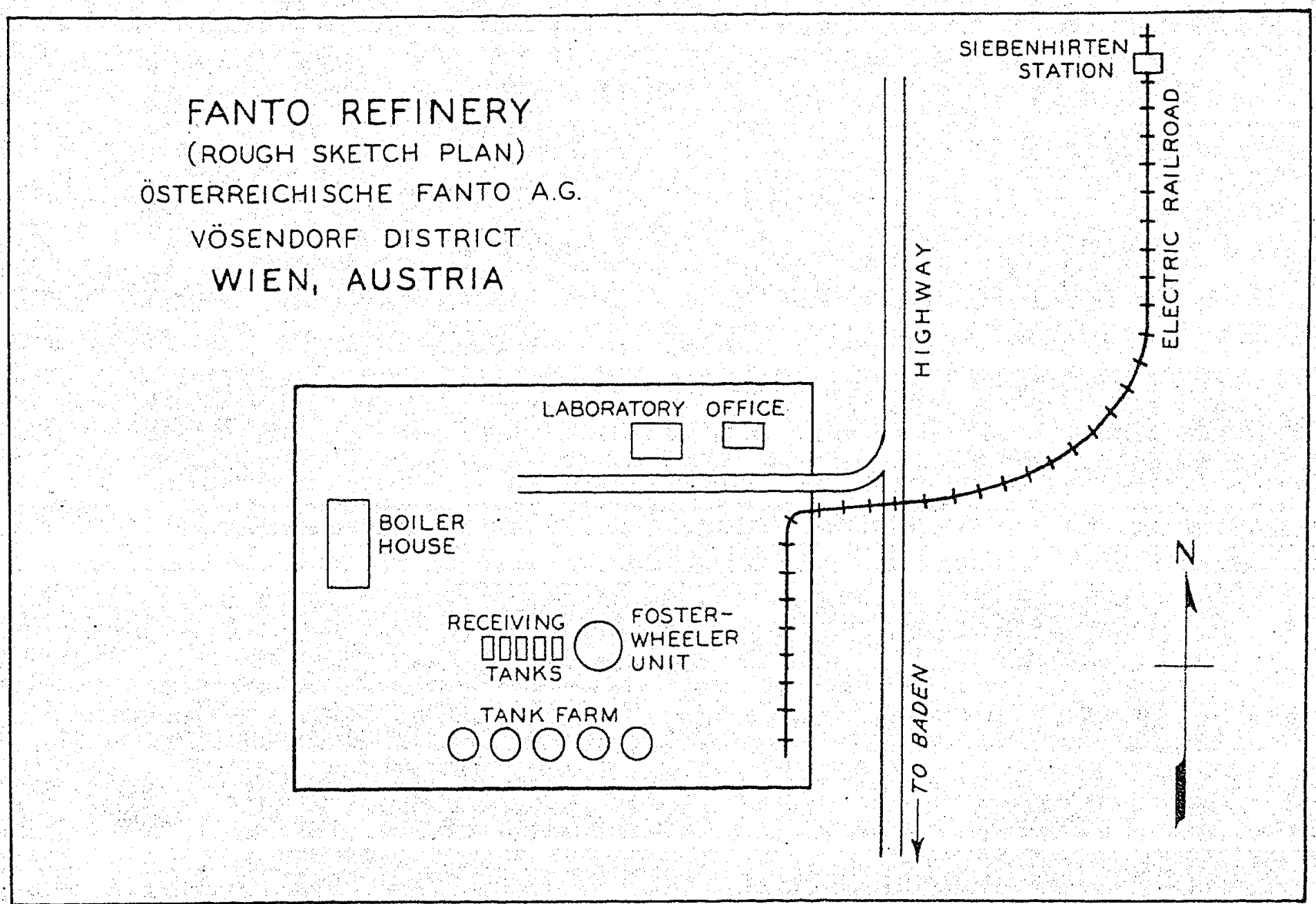


diameter with four side streams. The unit was run under vacuum when operating on crude bottoms or lube stock. There were also four batch agitators, one for gasoline, one for kerosine and two for lubes. Gas oil was simple soda-washed. The lubes were clay contacted after acid treatment. A De Laval centrifuge was used to separate acid sludge. There was no electric powerhouse. The plant had a transformer station for purchased electricity. There was one high pressure steam boiler for process steam. The pipe still pumps were steam-driven, and most other pumps electric-driven. The tankage was to a large extent derived from the dismantling of the old Drösing refinery. A wax plant from Drösing was also to have been installed but the work had not been carried out up to June 1938 at least. A pipe line 1,800 meters (5,904 feet) long, used for either crude or products, runs from the refinery to the Danube where a small pumphouse is located.

The refinery is owned by "Nova" Öl und Brennstoffgesellschaft A. G. of Wien. The capacity is set at 50,000 tons per year--say 1,000 barrels per day-being limited by the alternate operation of pipe still on crude and bottoms. The pipe still can handle Rumanian crude at 200 tons per day (1,360 barrels) and crude bottoms, under vacuum, at 80 tons per day.

Importance in normal times.- This refinery ranked third in importance in normal times, before the new construction of new Lobau refinery was begun. Schwechat, Korneuburg and Vösendorf refineries are of about the same importance.

Wartime use and expansions.- There has been no report of expansion of this plant during the war but minor improvements may have been effected due to the recent shortage of refinery capacity in Austria.



3.7 VÖSENDORF - THE FANTO REFINERY

General description.- This refinery had the same sales quotas as Schwechat. The refinery had one Brünn Königsfeld pipe still with a 5½ foot tower built in 1910. It was run alternately on crude and bottoms. Later a Foster Wheeler (British branch) vacuum stage was added so that the alternating operation could be avoided. The refinery had similar auxillary equipment to the other Viennese plants. It also had a wax plant and asphalt facilities. It is in a built up area, for which reason expansion would be difficult.

The refinery is owned by Österreichische Fanto A. G. of Wien. Its capacity is placed at 40,000 metric tons, which is somewhat more than it actually handled previously.

Importance in normal times.- This was probably the least important of the Viennese refineries although it is of the same order of magnitude as Schwechat and Korneuburg.

Wartime use and expansions.- No expansion in this refinery is expected because it is in a congested zone.

3.8 LOBAU - THE ELWERATH-WINTERSHALL REFINERY

General description.- Very little is known of this unit except that it contains a fair sized pipe still and considerable tankage and was still under construction in 1943. The owners are supposed to be the Elwerath-Wintershall-I. G. Farbenindustrie groups (a) and the capacity is assumed at about 200,000 metric tons per year. It is well located on the northeastern side of the Danube.

Importance in normal times.- When complete this plant promises to be larger than any other Viennese refinery.

Wartime use and expansions.- This plant is a product of the war, hastily built to cope with part of the increased Austrian production.

3.9 EVALUATION OF AUSTRIAN CRUDES

3.9.1 Character of the (Wien Basin) Crude Oil

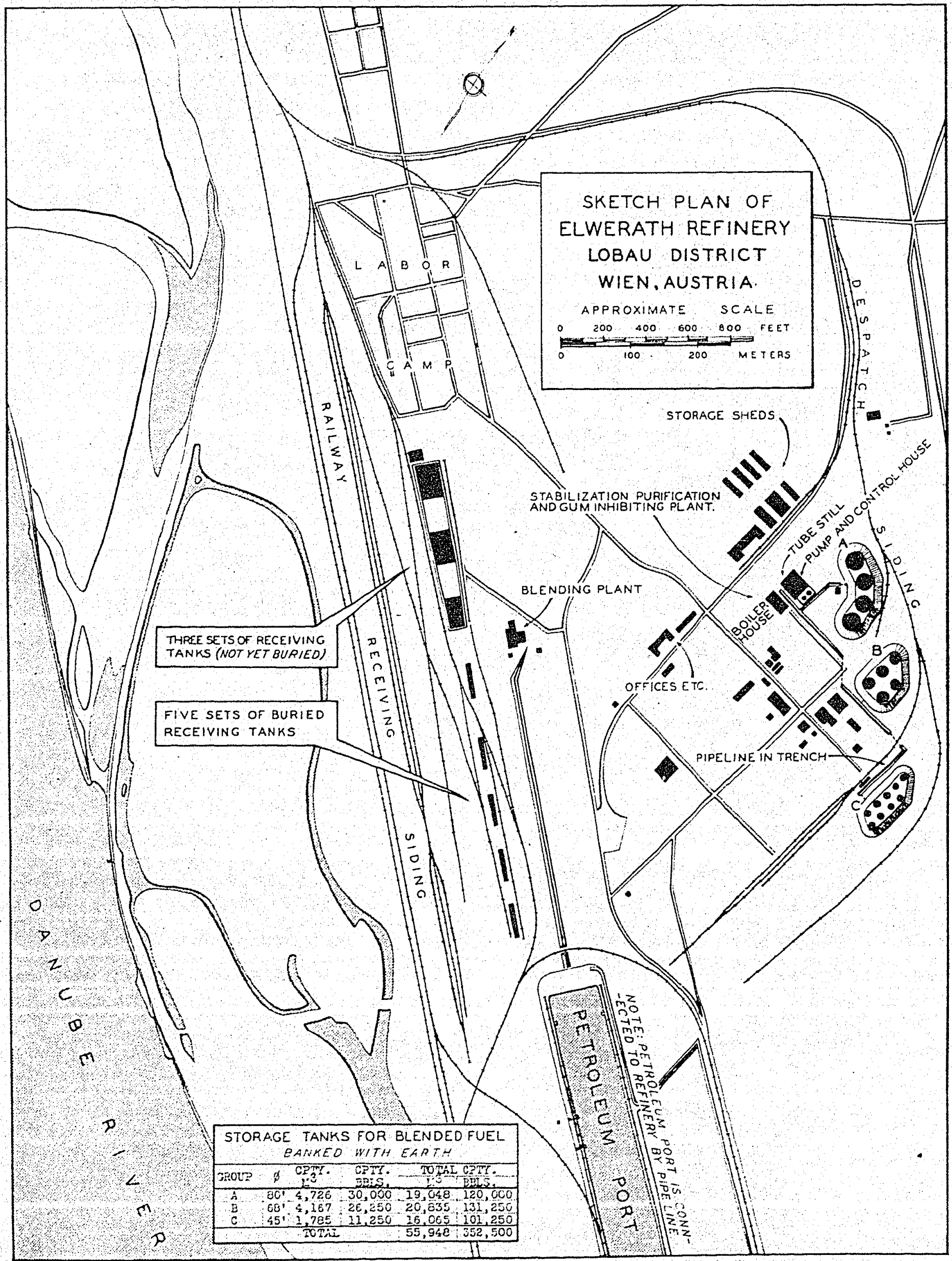
To date oil has been produced in all the formations filling the Wien Basin except the Pannonian, or Upper Tertiary. The Sarmatian, Tortonian, and Schlier have all yielded commercial quantities of oil. In addition, oil has been produced from the Flysch, which forms the basement of much of the northwestern part of the basin, at Zistersdorf and Neusiedl in commercial quantities, and at Ratiskovice, in Moravia, in sub-commercial quantities.

The average quality of the Flysch oil produced in the Wien Basin wells has varied both in gravity and in base. Ordinarily the oil has been similar to the oil in the contiguous Sarmatian beds. The production from the known Schlier wells was of a comparatively high gravity, 0.865 specific gravity, of a paraffin base and averaged around 14 per cent gasoline content upon straight distillation.

The oil of the Sarmatian and Tortonian beds in the Zistersdorf area manifests a regular change in gravity, gasoline content and base with increase in depth, that is to say in the geologic age, of the oil-bearing beds. The uppermost Sarmatian sands contain an asphaltic oil of gravity of about .930 and showing little or no gasoline content on straight run distillation. In the deeper Sarmatian beds the gravity of the oil approaches .890 it is of paraffin base and gasoline

---

(a) All German firms as follows: Gewerkschaft Elwerath, Wintershall Aktiengesellschaft in Berlin, and I. G. Farbenindustrie A. G.



STORAGE TANKS FOR BLENDED FUEL
BANKED WITH EARTH

GROUP	ø	CPTY. M³	CPTY. BBLS.	TOTAL CPTY. M³	TOTAL CPTY. BBLS.
A	80'	4,726	30,000	19,048	120,000
B	68'	4,167	26,250	20,835	131,250
C	45'	1,785	11,250	16,065	101,250
		TOTAL		55,948	352,500

content may be more than 10 per cent. These changes are sufficiently systematic to fall along a straight line curve if the gravity of the Sarmatian-Tortonian oil is plotted against the depth of the wells in a given reservoir.

The systematic nature of such changes suggests that the Neogene oil was generated essentially in situ; the source beds are in the Sarmatian-Tortonian formations in which the oil occurs. The observed changes in the character of the oil may reflect systematically the increasing factors of temperature, pressure and time with increase in depth of the wells.

Based on Intelligence reports it is believed that the oil from both the St. Ulrich-Prinzendorf field and the Kreuzfeld field is similar to that produced by the first two producing wells drilled in the St. Ulrich field before the Socony-Vacuum people left Austria. This oil was of a paraffinous base and showed upon simple distillation a gasoline content varying from 10 to 20 per cent, possibly averaging around 12 per cent. Accepting this premise as a basis for calculations and further assuming that the proportion of paraffinous crude to asphaltic crude which prevailed in the Zistersdorf and Gaiselberg fields in 1942 (a) persisted and should continue to persist during 1944, we should anticipate that the daily production of crudes of paraffinous vs. asphaltic bases in Wien Basin during 1944 would be as shown on the table on page 122, with gasoline content, upon simple distillation as follows:

Asphaltic base crudes: 3 per cent
Paraffinous base crudes: 12 per cent

3.9.2 Detailed Analyses of Zistersdorf Crude

A typical sample of crude from the Zistersdorf field was of 25.5° API gravity, 129 SSU viscosity at 100, and 0.24 per cent sulphur. It showed upon simple distillation only 3 per cent gasoline, 40 per cent automotive diesel fuel, 45 per cent of high pour lubricating stock and 12 per cent of asphalt.

If worked up without cracking or lube equipment it is estimated to yield:

3 per cent gasoline	44 per cent residual fuel oil (high pour)
45 per cent diesel oil	8 per cent refinery fuel and loss

The 3 per cent virgin gasoline is of 67-1/2 ON and 300° F end point. A kerosine cut could be taken out of the virgin diesel oil but it would be very smoky. The diesel oil would have about 50 cetane number.

If worked up for maximum lube production, according to N. V. Bataafsche Petroleum Maatschappij, an affiliate of the Royal Dutch Shell group, it would yield:

	Gasoline	3%	Unfinished	Heavy Machine Oil	8%
	Power Kerosine	27%	"	Cylinder Oil	4%
Unfinished	Spindle Oil	9%	"	Asphalt	15%
"	Light Machine Oil	27%	"	Loss	7%
					100%

The raw lubricating stocks would be 55-105° F pour point and of low viscosity index. After de-waxing and acid treating the finished lubes would have only fair viscosity index. High quality lubes could be made from the de-waxed stock by solvent extraction. The maximum yield of finished lubes of 80 V.I. or better would be over 30 per cent.

If cracked in Dubbs units, again according to N.V. Bataafsche Petroleum Maatschappij, the yields would be as follows, depending on whether run to fuel oil or to coke:

(a) As based on the forecast prepared by the Rohoel-Gewinnungs A. G.

Run to Fuel Oil		Run to Coke	
Gasoline	25%	Gasoline	30.5%
Power Kerosine	27%	Power Kerosine	27.0%
Residue	39%	Residue	23.5%
Gas and Loss	9%	Coke, Gas and Loss	19.0%

If worked up with moderate use of cracking and for moderate lube recovery the Austrian crude would produce an average of:

26 per cent gasoline	33 per cent fuel
16 per cent diesel oil	9 per cent refinery fuel and loss
16 per cent lubes	

In pages first and second following are presented tables which give a laboratory work-up of a typical Austrian crude and show the characteristics of the crude from various wells of the Zistersdorf and contiguous fields. These tables were prepared from data furnished by the Socony-Vacuum Oil Co.

Forecast Showing Anticipated Production of Crude Oils

Asphaltic vs. Paraffinous Base

Wien Basin, 1944

F i e l d		Asphaltic	Paraffinous	Total
Zistersdorf		18,410	34,190	52,600
Neudiedl		2,800	5,200	8,000
Gaiselberg		95,231	176,859	272,090
St. Ulrich-Prinzendorf		-	949,632	949,632
Kreuzfeld		-	152,757	152,757
Total:	Metric Tons (a)	116,441	1,318,638	1,435,079
	Barrels	791,799	8,966,738	9,758,537
Average per day:	In Metric Tons	319	3,612.7	3,931.7
	In Barrels	2,170	24,566	26,736
	Per cent of total	8.1	91.9	100

(a) Conversion factor of 6.8 barrels to the metric ton of Austrian crude was used throughout.

Wien, April 26, 1939

SUMMARY OF ANALYSES OF CRUDE OIL FROM THE ZISTERSDORF OIL FIELD OF AUSTRIA

Company		Erdölproduktionsgesellschaft												
Well		Gösting 2	Gösting 4	Gösting 6	Gösting 7	Gösting 8	Gösting 11	Gösting 11	Gösting 12	Gösting 12	Gösting 14	Gösting 14	Gösting 14a	Gösting 15	Gösting 16
Sample No.		4276	7666a	9401	7666b	9322	8671	9323	9073	9324	9322	9326	9325	9400	9403
Date Sample Taken		1935	4/12/37	2/16/39	4/12/37	1/13/39	1/13/38	1/13/39	7/26/38	1/13/39	11/12/38	1/25/39	11/12/38	2/16/39	2/16/39
Water %	SAM 14/36	-	-	0.6	-	1.4	0.15	0	-	1.4	-	-	-	0.3	0
Sp. Gr. @ 15°C	SAM 1a/36	.940	.897	.939	.937	.896	.879	.885	.934	.936	.899	.902	.881	.939	.880
Flash Point	DIN/DVM 3661	127	101	120	118	86	48	51	116	112	55	55	46	117	54
Viscosity Engler @ 20°C	SAM 54/36	-	10.0	72.6	74.0	13.6	-	9.1	69.0	62.8	7.6	9.3	-	85.5	7.6
Viscosity Engler @ 50°C	SAM 54/36	12.3	2.84	10.1	10.4	2.4	1.8	1.9	10.1	9.5	2.5	2.7	1.8	11.1	1.8
Pour Point	SAM 3/36	below-15	below-15	below 15	below-15	below-15	+20	+10	below-15	-15	below-15	below-15	+20	below-15	-4
Paraffin % n. Engler Holde		0.65/55	3.7/52	1.25/49	0.6/50	3.6/56	8.7/51	6.2/54	1.35/47	0.45/53	2.3/51	3.4/57	3.9/52	0.7/51	8.6/50
Sulphur %	SAM 39/36	0.36	0.1	0.34	0.2	0.19	0.12	0.22	0.26	0.30	0.17	0.15	0.11	0.29	0.14
Acid Number	SAM 26/36	1.9	0.3	1.6	1.7	0.2	0.3	0.2	2.1	1.65	0.5	0.4	0.4	1.6	0.13
Carbon	SAM 12/36	-	2.6	4.3	3/7-	2.1	1.6	1.8	4.3	4.2	2.5	2.4	1.7	3.9	1.7
Distillation--Yield: Initial		129	150	170	185	86	97	224	135	64	110	84	195	95
Weight % over to 150°C		1	-	-	-	2	2	-	-	1.5	1	1.5	-	1
" % " " 175°C		3.5	-	-	-	4.5	3	-	0.5	3.0	1.5	4.0	-	2.5
" % " " 200°C		7	0.5	1	-	8	5	-	1	5	3.5	7.5	-	5
" % " " 250°C		16	2	4	8	18	13.5	0.5	5	12.5	11.5	17	2	13.5
" % " " 300°C		29	9.5	13	24	32	27.5	9.5	13	24.5	23.5	30.5	11.5	26
" % " " 320°C		36	15.5	19	31.5	38	36.5	15	19	30.5	30	36.5	18	33
Distillation Residue Weight %		65	84	81	68	62	63	85	80.5	69.5	69.5	63.5	81.5	66.5
Sp. Gr. @ 15°	SAM 1a/36	.929	.952	.949	.917	.904	.909	.950	.948	.922	.915	.906	.948	.904
Viscosity Engler @ 50°	SAM 54/36	16.4	28.8	37.3	8.6	7.5	7.2	27.1	29.7	10.5	12.5	7.1	16.5	5.7
True Maximum Pour Point (Circular London-Mag of 3/26/37)		+30	-11	-7	+34	+38	+30	-10	-8	+15	+15	+34	-10	+35
Carbon %	SAM 12/36	4.3	5.4	5.3	3.7	2.8	3.0	4.3	4.4	4.6	4.5	2.9	5.3	2.9
Distillation of Residue: Temperature limits at 5 mm		-	160-220	-	160-220	-	-	-	160-220	-	-	-	160-220	160-230
Weight % of crude oil		-	22	-	-	-	-	-	8	-	-	-	-	17.5
Viscosity		2.9/20	26.6/20	3.1/20	2.8/20	-	-	-	2.7/20	-	-	-	9.3/20	about 5/20
Cloud Point		-	-	-	+23	-	-	-	-	-	-	-	-	+22
Pour Point		+3	below-15	below-15	+13	-	-	-	below-15	-	-	-	-32	+28
Temperature limits at 5 mm.		-	220-280	-	220-280	-	-	-	220-275	-	-	-	220-275	230-290
Weight % of Crude Oil		-	20	-	-	-	-	-	15.5	-	-	-	-	14.5
Viscosity		2.6/50	10.0/50	5.9/50	3.6/50	-	-	-	2.6/50	-	-	-	8.3/50	4.7/50
Cloud Point		-	-	-	+32	-	-	-	-	-	-	-	-	+42
Pour Point		+22	-15	below-15	+30	-	-	-	below-15	-	-	-	-19	+40
Temperature limits at 5 mm.		-	280-310	-	-	-	-	-	275-320	-	-	-	275-305	290-315
Weight % of Crude Oil		-	18	-	-	-	-	-	25	-	-	-	-	7
Viscosity		8.2/50	37.4/50	7o.6/50	-	-	-	-	14.6/50	-	-	-	21.6/50	about 20/50
Cloud Point		-	-	-	-	-	-	-	-	-	-	-	-2	+56
Pour Point		+37	-2	0	-	-	-	-	-12	-	-	-	-8	+51

Wien, April 26, 1939.

SUMMARY OF ANALYSES OF CRUDE OIL FROM THE ZISTERSDORF AND GAISELBERG OIL FIELDS OF AUSTRIA

Company	Rohoel-Gewinnungs A.G.									
Well	RAG 1	RAG 2	RAG 2	RAG 5	RAG 6	RAG 8	RAG 9	Gaiselberg 1	Gaiselberg 1	Gaiselberg 2
Sample No.	6401	7725	9325	8803	8928	9135	9259	9086	9327	9153
Date Sample Taken	4/1936	5/8/37	1/24/39	3/1/38	5/11/38	9/13/38	11/28/38	8/5/38	2/2/39	9/28/38
Water SAM 14/36	16	4.0	42	-	-	-	-	-	-	-
D/15 SAM 1a/36	.929	.913	.911	.911	.911	.940	.938	.921	.922	.896
Flash Point DIN/DVM 3661	128	108	90	78	87	114	125	109	118	87
Viscosity (E/20) SAM 54/36	-	17.4	13.1	14.3	19.6	-	69.5	23.1	22.0	3.9
Viscosity (E/50) SAM 54/36	8.5	3.8	3.4	3.2	3.3	13.8	10.1	4.7	4.6	1.8
Pour Point SAM 30/36	-15	below-15	below-15	below-15	below-15	below-15	below-15	below-15	below-15	below-15
Paraffin % n. Engler Holde	-	2.5/49	1.6/54	3.0/54	3.1/56	0.6/54	0.7/51	1.2/50	1.5/50	3.3/51
Sulphur % SAM 39/36	-	0.19	0.17	0.26	0.22	0.28	0.3	0.21	0.22	0.21
Acid No. SAM 26/36	0.46	0.25	0.22	0.20	0.12	2.2	1.6	0.5	0.5	0.36
Carbon SAM 12/36	-	2.6	2.65	2.6	2.8	3.7	4.3	2.6	2.7	1.8
Distillation Yield:										
Initial	-	140	115	108	176	245	220	216	190	118
Weight % over to 150°C	-	-	-	-	-	-	-	-	-	1.5
" % " " 175°C	-	1	0.5	1	-	-	-	-	-	3.5
" % " " 200°C	-	3	1.5	2.5	2	-	-	-	-	7.0
" % " " 250°C	-	10	7.0	10.0	9	-	1	4	4	17.0
" % " " 300°C	-	23	20.0	23.0	22	15	9.5	16.5	17	33.0
" % " " 320°C	-	30	27.0	30.0	30	26	16.0	24.5	24.	40.0
Distillation Residue	-	-	-	-	-	-	-	-	-	-
Weight %	-	78	72.5	70	70	74	84	75	75.5	60
D/15 SAM 1a/36	-	.935	.930	.931	.928	.945	.948	.935	.936	.917
Viscosity (E/50) SAM 54/36	-	19.9	12.5	22.7	10.8	27.5	25.1	11.0	14.4	7.2
True Max. Pour Point (Circ. London-Haag of 3/26/37)	-	+6	-2	+20	+25	-10	-18	-15	-12	+5
Carbon % SAM 12/36	-	4.5	4.0	4.9	4.3	5.13	5.0	3.6	3.6	2.8
Vacuum Distillation of Residue:										
Temperature limits at 5 m/m	-	-	-	-	-	150-200	-	160-215	180-245	140-200
Weight % of crude oil or	-		-		-		-			
specific gravity at 15°C	-	(.897)	-	(.896)	-	(.913)	-	(.906)	17-	(.872)
Viscosity	-	3.0/20	-	4.3/20	-	4.5/20	ca.4/20	4.2/20	7/20	1.85/20
Cloud Point	-	-	-	-	-	-	-	-	-	-1
Pour Point	-	below-18	-	-6	-	-50	below-36	-54	-51	-6
Temperature limits at 5 m/m	-	-	-	-	-	200-265	-	215-275	245-290	200-255
Weight % of crude oil or										
spec. gravity at 15°C	-	(.914)	-	(916)	-	(935)	-	(921)	12	(894)
Viscosity	-	3.8/50	-	3.4/50	-	6.2/50	ca.4/50	5.1/50	9.3/50	2.38/50
Cloud Point	-	-	-	-	-	-	-	-	-	+25
Pour Point	-	+6	-	+13	-	-24	below-36	-27	-21	+19
Temperature limits at 5 m/m	-	-	-	-	-	265-320	-	275-330	290-330	255-315
Weight % of crude oil or										
spec. gravity at 15°C	-	(936)	-	(925)	-	(947)	-	(931)	8	(916)
Viscosity	-	8.0/50	-	12.4/50	-	38.0/50	ca.16/50	18.6/50	26.3/50	11.06/50
Cloud Point	-	-	-	-	-	-	-	-7	-	+36
Pour Point	-	+22	-	+24	-	-4	below-20	-3	+7	+33

SUMMARY OF ANALYSES OF CRUDE OIL FROM THE

ZISTERSDORF OIL FIELD OF AUSTRIA

Wien, April 26, 1939.

Company		Gewerkschaft Roky Danubia			Steinberg Naphta A.G.	
Well		Wind Baumg.	Ulli	Ulli	Neusiedl 1	Neusiedl 1 and 2
Sample No.			7211	8180		8861
Date Sample Taken		1930	2/14/36	9/13/37	1937	4/6/38
Water	SAM 14/36	-	-	-	-	-
Sp. Gr. 15°C	SAM 1a/36	.897	.868	.913	.873	.870
Flash Point	DIN/DVM 3661	101	60	121	60	42
Viscosity Engler 20°C	SAM 54/36	10.0	2.0	20.3	-	-
Viscosity Engler 50°C	SAM 54/36	3.84	1.4	3.9	1.7	1.62
Pour Point	SAM 30/36	-30	below-15	below-15	+36	+30
Paraffin %	n. Engler Holde	3.76/52	-	4.0/52	-	9.0/52
Sulphur %	SAM 39/36	0.1	-	0.23	-	0.13
Acid Number	SAM 26/36	0.3	-	0.34	-	0.05
Carbon	SAM 12/36	-	-	2.4	-	1.4
Distillation--Yield:						
Initial		-	-	132	-	64
Weight % over to 150°C		-	-	-	-	3
" % " " 175°C		-	-	0.5	-	7
" % " " 200°C		-	-	2.0	-	11
" % " " 250°C		-	-	10.0	-	21
" % " " 300°C		-	-	24.0	-	38
" % " " 320°C		-	about 58	31.0	-	45
Distillation Residue:						
Weight %		-	about 41	69	-	55
Sp. Gr. 15°C	SAM 1a/36	-	.927	.929	-	.901
Viscosity Engler 50°C	SAM 54/36	-	15	26.7	-	6.4
True Maximum Pour Point (Circular London-Hague of 3.26/37)		-	+5	+23	-	+48
Carbon %	SAM 12/36	-	-	4.0	-	2.9
Vacuum Distillation of Residue:						
Temperature limits at 5 mm		-	-	-	-	-
Weight % of crude oil or specific gravity at 15°C		-	-	-	-	-
Viscosity		-	-	-	-	-
Cloud Point		-	-	-	-	-
Pour Point		-	+9	-	-	-
Temperature limits at 5 mm		-	-	-	-	-
Weight % of crude oil or specific gravity at 15°C		-	-	-	-	-
Viscosity		-	-	-	-	-
Cloud Point		-	-	-	-	-
Pour Point		-	-	-	-	-
Temperature limits at 5 mm		-	-	-	-	-
Weight % of crude oil or specific gravity at 15°C		-	-	-	-	-
Viscosity		-	-	-	-	-
Cloud Point		-	-	-	-	-
Pour Point		-	-	-	-	-

EVALUATION OF ZISTERSDORF CRUDE

INSPECTIONS OF PRODUCTS

Product	Power Kerosene #1	Power Kerosene #2	Gas-Oil	#2 Fuel	Paraffin Distillate	Heavy Lubricating Oil*
Laboratory No.	344120	345101	348590	348634	344119	346945
Yield, Vol. %	16.2	13.9	11.4	38.0	32.6	31.8
Cut Range, °F.	Start to 500	300-500	500-575	557-678	575-815	-
Cut Range, %	0.0-16.2	2.5-16.2	16.2-27.6	5.0-43.0	27.6-60.2	60.7-92.5
Gravity, °A.P.I.	39.5	37.5	32.2	31.8	27.5	20.1
Distillation, °F.					5 mm. @ 760 mm.	
Initial B. P.	272	341	491	409	278 555	
10%	320	367	510	452	302 585	
20%	344	378	515	481	318 605	
30%	366	390	517	504	332 620	
40%	386	403	520	529	344 635	
50%	404	420	524	548	364 660	
60%	422	430	528	567	383 680	
70%	436	441	532	585	399 700	
80%	449	454	537	602	419 725	
90%	467	467	544	624	443 750	
Final B. P.	496	490	560	638	474 785	
Recovery, %	98.0	98.0	99	98	98	
Residue, %	1.0	1.5	-	-	-	
Loss, %	1.0	0.5	-	-	-	
Octane Number	-	50	-	-	-	
Thermo Viscosity	325	370	-	-	-	
Ring Number	0	-11	-	-	-	
Flash, Abel, °F.	80	127	-	-	-	
Flash, P.M., °F.	-	-	240	192	-	
Flash, C.O.C., °F.	-	-	-	-	330	500
Pour Point, °F.	-	-	-	0	55	105
Vis. S.U. @ 100°F., sec.	-	-	-	39	80	-
" " @ 130°F., "	-	-	-	-	-	802
" " @ 210°F., "	-	-	-	-	-	116
Viscosity Index	-	-	-	-	-	55
Sulphur, %	-	-	-	-	-	-
Aniline Cloud Point, °F.	-	-	151	151	-	-
Carbon Residue, Conradson, %	-	-	-	nil	-	-

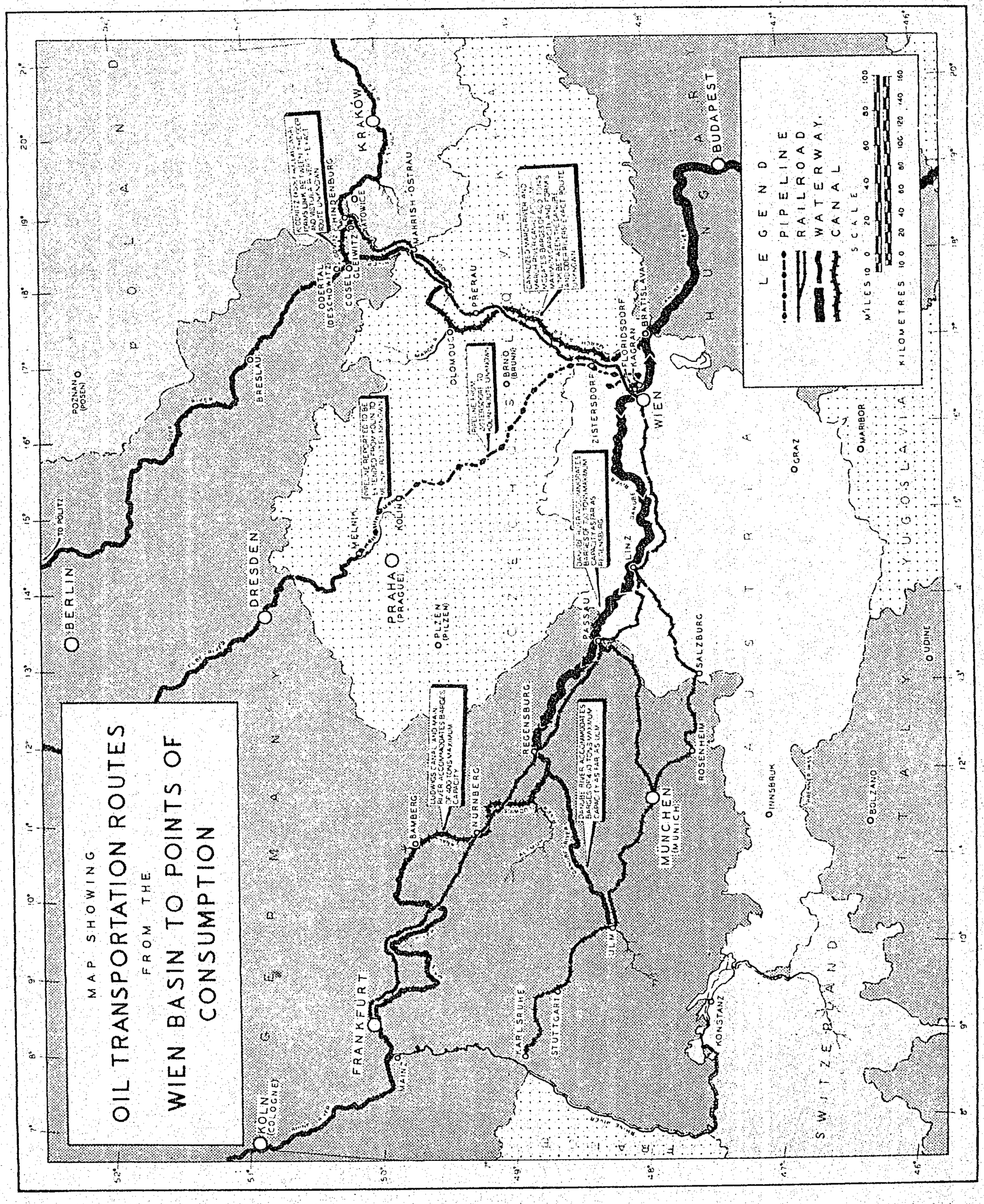
* Running to 23 Penetration Asphalt

TRUE-BOILING DISTILLATION OF ZISTERSDORF CRUDE

INSPECTION OF CUTS

Cut No.	Lab. No.	Cut Range, °F.	Vol. % Change	Total % Off	% Off @ Midpoint	°API Gravity	Aniline Pt. °F.	Thermo Viscosity	S. U. Viscosity at 100°F	S. U. Viscosity at 130°F	S. U. Viscosity at 210°F	Pour Pt. °F.	Flash °F C.O.C.
1	343704	Start to 300	2.3	2.3	1.2	53.1	128						
2	343705	300-363	3.0	5.3	3.8	44.9	124						
3	343706	363-409	2.8	8.1	6.7	39.1	123	300					
4	343707	409-470	4.5	12.6	10.4	35.5	135	450					
5	343708	470-500	3.6	16.2	14.4	33.1	136	610					
6	343709	500-534	6.0	22.2	19.2	32.2	144						
7	343710	534-575	5.4	27.6	24.9	32.2	160						
8	343711	575-615	5.9	33.5	30.6	31.0			47			10	280
9	343712	615-646	6.0	39.5	36.5	29.0	168		54				
10	343713	646-671	2.9	42.4	41.0	27.7			65			40	
11	343714	671-721	4.8	47.2	44.8	27.5	180		85				350
12	343715	721-744	2.8	50.0	48.6	26.7			117	70		65	
13	343716	744-770	3.1	53.1	51.6	25.9	187		148	83		70	
14	343717	770-796	3.1	56.2	54.7	25.3			189	103		75	395
15	343718	796-815	4.0	60.2	58.2	24.3	192		251	121		85	
16	343719	-	5.2	65.4	62.8	23.3			-	220	60*	95	450
Bottoms													
34.6%	343720					15.9				4556	382	65	510
39.8%	348589					17.0				2653	260	80	500

* 79 Viscosity Index


MAP SHOWING
OIL TRANSPORTATION ROUTES
FROM THE
WIEN BASIN TO POINTS OF
CONSUMPTION
LEGEND
PIPELINE
RAILROAD
WATERWAY
CANAL
SCALE
MILES 10 0 20 40 60 80 100
KILOMETRES 10 0 20 40 60 80 100 120 140 160
BERLIN
POZNAN (POSEN)
BRESLAU
DRESDEN
KRAKÓW
GLEIWITZ
KATOWICE
MAHRISH-OSTRAU
PRAHA (PRAGUE)
PLZEN (PILZEN)
OLOMOUC
PŘEROV
BRNO (BRUNN)
ZISTERSDORF
FLORIDSDORF
KAGRAN
WIEN
BRATISLAVA
BUDAPEST
LINZ
PASSAU
SALZBURG
REGENSBURG
NURNBERG
BAMBERG
MÜNCHEN (MUNICH)
ROSENHEIM
INNSBRUK
BOLZANO
UDINE
MARIBOR
GRAZ
KÖLN (COLOGNE)
FRANKFURT
KARLSRUHE
STUTTGART
ULM
KONSTANZ
TO POLITZ
MĚLNÍK
KOLÍN
ODERTAL (DESCHOWITZ)
HINDENBURG
COSEL
CANALIZED MARCH RIVER AND
MARCH-DANUBE CANAL FOR
BARGES OF 400 TONS
MAXIMUM CAPACITY AND PORTS
AT BRECLAV (LUNDENBURG)
AND HODONIN
PIPELINE TO BE CONSTRUCTED TO
OSTERSDORF FROM KOLIN TO
KOLIN-HAFEN UNKHAFEN
PIPELINE PROJECTED TO BE
EXTENDED FROM KOLIN TO
MELNIK AND USTI-A-LABEM
LUDWIGS CANAL AND MAIN
RIVER ACCOMMODATES BARGES
OF 400 TONS MAXIMUM
CAPACITY
DANUBE RIVER ACCOMMODATES
BARGES OF 1000 TONS MAXIMUM
CAPACITY AS FAR AS ULM
SWITZERLAND
ITALY
YUGOSLAVIA
AUSTRIA
HUNGARY
CZECHOSLOVAKIA
POLAND
GERMANY

4.0 D I S T R I B U T I N G

4.1 INTRODUCTION

4.1.1 General Remarks

In this section of the report are presented all the available data on distributing facilities in Austria. The locations of river terminals are shown on the map on page 104, and the locations of inland bulk plants are shown on page 6.

A summary of the available data on Austrian storage facilities appears on page 134. Available layout plans of river terminals and bulk plants will be found in appropriate order in this section of the report. The available details of refinery tankage are shown in the refining section of this report.

4.1.2 Strategic Considerations

Storage facilities are, of course, essential to the enemy's operations. Refineries, particularly, cannot operate without adequate storage for crude oil, intermediate and finished products.

Oil storage has not proven an especially good target for aerial bombardment. Isolated attacks generally fail to destroy the entirety of an installation and damage from bombardments can be repaired relatively quickly. However, storage facilities in Austria are uniquely susceptible to bombardment operations in that, with the exception of small interior bulk plants, all the storage facilities of the country are concentrated in the river terminals and refineries in or near Wien.

From such information as is available, it would appear that fire walls and retaining walls around tanks in Austria are less effectively installed than are those of most other European countries.

Denial operations.- Denial operations by the enemy certainly would be expected, and it is likely that these would be complete.

Susceptibility to sabotage.- Owing to the inflammable nature of the contents, oil storage naturally is susceptible to sabotage, but not to the extent that is commonly supposed. Larger units usually have a water seal which would have to be drawn off before a fire could be started, and except possibly for an active refinery installation, spectacular results from ordinary sabotage efforts should not be expected. Acids or abrasives, properly introduced, might be effective but probably not widely so.

Transport.- As will be described in section 4.3 of this report, oil products are moved by barges on the Donau and by railway tank cars. Transportation is perhaps the weakest point in the Axis oil economy and likewise one of the most important. Unfortunately, transport is both a difficult and highly dispersed target, and successful operations generally do not result in permanent damage. Even temporary results are well worth while, however, in terms of effect on the enemy oil economy. The same remarks are equally applicable to sabotage.

As concerns denial operations, it may be assumed that most tank cars and rolling stock will be sent out of the country before Allied occupation, and that roads and rights-of-way will be seriously damaged. No substantial residue of marine equipment is likely to be left.

4.2 DISTRIBUTING COMPANIES

The main companies distributing products in Austria were:

Company	Common Name or Symbol	Address of Head Office of Company	Name and Address of Owner Firm
Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik	Shell-Floridsdorfer	Wien I, Schubertring 14	Royal Dutch Shell Group, London
Creditul Minier Österreichisch-Rumänische Petroleum-Vertriebsges. m.b.H.	Creditul Minier	Wien	"Creditul Minier" S.A., Bucharest
Everth & Co. A.G.	Everth	Wien I, Landskrongasse 1.	Unirea, S.A. Romana de Petrol, in turn owned by Phoenix Oil Products Co., London.
Montan Union A.G.	Montan Union	Wien I, Schwarzenbergplatz	Montan Union, G.m.b.H. Hamburg
Österreichische Fanto, A.G.	Fanto	Wien I, Bankgasse 1.	Benzol-Verband, G.m.b.H., Bochum
Redeventza Österreichisch-Rumänische Petroleum-Handels - und Industrie-A.-G.	Redeventza	Wien I, Renngasse 14	"Redeventa" S.A. pentru exploatarea si comertul produselor subsolului, Bukarest.
Standard Oil Trading Company	Oil Trading Company	Wien III, Traungasse 12.	Standard Oil Co. (N.J.)
Vacuum Oil Company A.G.	Vacuum	Wien I, Schwarzenbergplatz 18	Socony-Vacuum Oil Company, New York, N. Y.

4.3 TRANSPORTATION

Crude oil.- While details of the pipe line system have been described in Section 2 of this report, in order to complete the story of oil distribution in Austria a summary is given here as follows:

a) The pipe line linking the Zistersdorf oil fields with the Kagran and Floridsdorf refineries at Wien is believed to be a combination 6" and 8" line following the route Zistersdorf-Spannberg-Hohenruppersdorf-Wolkersdorf-Pysdorf-Floridsdorf. The pipe line is thus about 54 kilometers long, and is believed to have pumping stations at Zistersdorf, Spannberg, and Wolkersdorf. Its annual capacity is probably of the order of 20,000 barrels per day.

b) A pipe line from Zistersdorf to Kolin is reliably reported to have been constructed for transporting important quantities of 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. There have been some reports of an extension of this or a parallel line to Melnik, Czechoslovakia, which point is approximately the head of navigation for large oil barges on the Elbe River.

Crude oil arriving at Wien by rail or pipe line from the Zistersdorf oil fields can also be transshipped to oil barges and sent on the Danube River a distance of about 50 kilometers for treatment at the Bratislava refinery, which could handle about 120,000 tons (816,000 barrels) a year, or 2,235 barrels a day of Austrian crude in addition to treating the entire output of the nearby Czechoslovakian oil fields.

Movements of Petroleum products.- As already pointed out, the current production of refined products of Austrian refineries is sufficient not only for Austrian consumption but for export as well. It is believed that the present crude production in excess of the Austrian refining capacity is transported by pipe line and railway to Czechoslovakia for refining. There is, likewise, as already pointed out, a large movement for products through Austria from Rumania to Germany. The main routes of movement of these products in and through Austria are described below and are shown on the map on page 128. Movements to inland bulk plants, however, are described in Section 4.5 "INLAND STORAGE FACILITIES" of this report.

The principal centers of consumption in southeastern Germany are the Wien metropolitan area and the industrial district of eastern Schlesien (Silesia) bounded approximately by the triangle Breslau, Gleiwitz, and Odertal. The main routes for the distribution of oil products for southeastern Germany and Austria probably are the following:

1. Wien district to Schlesien and Sudentenland (rail and water routes)

   a) Via the Danube River from Wien or Bratislava to the March River canal, 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 Adolf Hitler (Klodnitz) canal.

   b) From Wien via the rail route Wien-Breclav-Prerau-Mahrisch-Ostrau-Hindenburg.

   c) Via Danube barge to Linz with further Austrian distribution over the local rail system.

The Danube ports of Wien and Bratislava are equipped for handling oil. Bratislava has storage for about 90,000 tons (675,000 barrels) of petroleum products, and pumping equipment capable of discharging 100,000 tons (750,000 barrels) per month. Facilities at Wien, which will be described in Section 4.4 of this report, are on a much larger scale, and include at least 350,000 tons (2,625,000 barrels) of oil storage capacity.

2. Wien district to southwestern Germany (rail and water routes)

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

   b) By railroad over the routes:

      Wien-Linz-Salzburg-Rosenheim-München;
      Wien-Linz-Passau-München-Ulm-Karlsruhe;
      Wien-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 waterborne goods brought up the Danube from Balkan sources. A similar, but less important, breaking point with oil transfer facilities exists at Passau.

River terminals

Barges of 400 tons maximum deadweight capacity can ascend the Danube as far as Ulm with transfer to rail at that point. Barges of 400 tons maximum capacity can also pass through the canal connecting the Danube and Main Rivers, which leaves the Danube some 50 kilometers up stream from Regensburg, and passing via Nürnberg enters the Main 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 large number of alternative lines, except for the stretch Wien-Linz, which affords the only direct link between southeastern 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 the year, and it is to be expected that maximum use is made of them, particularly as much of the subsequent secondary distribution of the products moved can also be effected by water.

The oil transport facilities between southeastern and southwestern Germany are of primary importance for handling imports of Rumanian products. Surplus oil supplies originating in eastern Germany will largely be sent east and northeast to supply the central and northern Russian fronts. An exception may be an amount of about 190,000 tons (1,235,000 barrels) of fuel oil and 24,000 tons (172,800 barrels) of diesel oil of local origin which may be sent from eastern Germany to France for military needs.

Railway tank cars.- Before the outbreak of the war, the total number of railway tank cars in Austria was some 1,500 of from 15 to 30 M^3 (96 to 126 barrels) capacity.

4.4 RIVER TERMINALS

With the exception of the Shell plant at Linz, all the river terminals of the companies were located on the Praterspitz, Wien. The relative locations of these plants are shown on the map on page 104, and a summary of the available data concerning them appears in the tabulation on page 134.

There are indications that facilities adjacent and to the west of the Shell-Floridsdorfer's bulk plant were owned by the Donau Öltank Lagergesellschaft m.b.H. This was a local concern carrying on no independent operations of its own, and it is thought that its facilities were leased to some of the operating companies.

These terminals were designed for the reception, storage and distribution of both crude oil and finished products as already described under section 1.2 "Imports", on pages 7 and 9. Layout plans of the Shell-Floridsdorfer and Vacuum Oil Company terminals appear on pages 150, 152.

4.5 INLAND STORAGE FACILITIES

In addition to the river terminals, there are smaller bulk storage plants in all the towns of importance. The Vacuum Oil Company and Shell-Floridsdorfer were the principal distributors and maintain facilities in some 23 localities. Österreichische Fanto A.G., Creditul Minier Österreichisch-Rumänische Petroleum-Vertriebsgesellschaft m.b.H., and Everth & Co. A.G. maintained bulk depots only in six or seven larger centers. Layout plans of all of the Vacuum Oil Co. bulk plants, with the exception of those at Bregenz and Scheibbs, appear on pages 138 to 153.

As a general rule, interior bulk plants, other than the river terminals on the Praterspitz in Wien and the Shell-Floridsdorfer plant at Linz, were located in or near the railroad freight yards. In many cases the land was owned by the Railway and the necessary areas made available to the oil companies on lease.

The majority of the interior bulk plants were of simple design and small capacity. A typical plant of any of the companies usually consisted of one or two hcrizontal steel underground tanks of some 200 to 400 barrels capacity each, which sometimes were divided into two compartments so that two products might be stored, a small shed used for filling drums and tank trucks and storing small stocks of packaged lubricants. Some contained a garage and a small office. Gasoline and kerosine were the principal products handled. Diesel and fuel oil were usually stocked only in the larger centers. Products were distributed by railway tank cars to the interior bulk plants where they were, in most cases, unloaded into the underground tanks by gravity. Delivery and filling from the bulk plant tanks was accomplished by small pumps, hand-operated in the smaller plants and electrically powered in the larger ones.

Distribution.- In Wien, in addition to the oil companies' bulk plants, there were underground storage tanks for gasoline at the airport and also on the premises of the various large bus operators. The exact number and location of these bus stations are not known, but the storage capacities involved were not large.

Distribution to consumers and retail outlets was effected by package trucks and tank trucks of conventional design, and also by horse-drawn tank wagons.

4.6 RETAIL MARKETING

Products.- Gasoline and kerosine were the principal products distributed through the interior bulk plants, the demand for diesel oil and fuel oil being largely limited to a few of the larger industrial centers. There was, however, a certain seasonal demand for diesel oil for the electric power plants in the provincial centers. These plants, normally operating on water power, had auxiliary diesel engines for use during the low water season when the water power supply might be inadequate.

Kerosine was extensively employed outside the urban areas for light and heat, and much of it was marketed in drums. Considerable quantities were also distributed by company owned-horse-drawn tank wagons. These tank wagons, having capacities ranging from 400 to 800 gallons, operated from the more important bulk plants and covered extensive routes in the surrounding areas where many groceries, hardware shops, drugstores and other retailers were also kerosine dealers. A few of these dealers owned basement storage tanks of capacities up to 250 gallons. The majority, however, employed shop tanks ranging from 20 to 60 gallons in capacity, which were loaned to them by the oil companies (a).

A table of consumption of petroleum products for Austria for the year is given on page 11.

Retail outlets.- There were no complete modern service stations in Austria, but the country was abundantly supplied with retail gasoline outlets, estimated to have totalled 3,000 fixed pumps in pre-war years. The majority of these outlets consisted of a curb pump located in front of a shop or garage, but there were also some 50 or 60 drive-in filling stations located in or near important points on the major highways. These stations usually consisted of a small kiosk and two fixed pumps. Only one company was represented at any one outlet and the Vacuum Oil Company and the Shell-Floridsdorfer held the dominant positions.

Types of fixed pumps and tankage.- Prior to the war, approximately 3,000 fixed pumps, of various makes, were in operation. These pumps were all hand operated, mostly of the glass bowl visual measurement type. Both Gilbert & Barker and Satam (b) pumps were used. The tanks, of normal cylindrical type

---

(a) The Vacuum Oil Company has some 6,000 of these small storage containers on loan to retailers throughout the country. Forty horse-drawn tank wagons were used to supply them.

(b) Made in France.

STATISTICAL SUMMARY OF STORAGE FACILITIES, AUSTRIA

IDENTIFICATION OF PLACES			IDENTIFICATION OF PLANTS		SITUATION OF STORAGE TANKS		CAPACITY OF STORAGE TANKS								REMARKS
	Locations on Index Map						Black		White		Total Plant		Total Place		
Places	Lat.N ° m	Long.E ° m	Owners of Plants	Location of Plants	Above-ground	Under-ground	M³	Barrels	M³	Barrels	M³	Barrels	M³	Barrels	
REFINERIES															
Korneuburg	48 21	16 20	Creditul Minier	East Bank of Danube			x	x			11,923*	75,000*	11,923*	75,000*	
Wien	48 12	16 22	Benzin und Ölindustrie Kagran A.G. (Vacuum Oil Co.A.G.)	Breitenleer Strasse, 363; at intersection with the Staditsbaum, District 21,(Kagran), Wien	23		13,670	86,021	7,000	44,100	20,670	130,221			Refinery working tanks not included. Divisions of storage between black and white products is approximate only.
Wien	48 12	16 22	Fanto	Southwest of intersection of Luxemburger Allee and road from Vösendorf to Siebenhirten, Vösendorf Village, southwest of Wien			x	x	x	x	11,923*	75,000*			
Wien	48 12	16 22	"Nova"	Schwechat district, southeast of Wien			x	x	x	x	33,366*	210,000*			
Wien	48 12	16 22	Shell-Floridsdorfer	XII Bezirk, Floridsdorf district, Wien	278		x	x	x	x	31,177	196,418			
Wien	48 12	16 22	Wintershall-Elwerath	Lobau District, east of Wien	18		x	x	x	x	55,952*	352,500*	153,106	964,129	
RIVER TERMINALS Linz	48 18	14 18	Shell-Floridsdorfer	On Danube River just off Dertflinger Strasse	3	3	x	x	x	x	3,614	22,770	3,614	22,770	Product allocation of tankage not known. See Inland bulk plants for other storage at Linz.
Wien	48 12	16 22	Montan Union	On the Praterspitz. See location map			x	x	x	x	35,714*	225,000*			
Wien	48 12	16 22	"Nova"	Ibid.			x	x	x	x	83,333*	525,000*			
Wien	48 12	16 22	Standard Oil Trading Co. (SONJ)	Ibid.											
Wien	48 12	16 22	Redeventza	Ibid.			x	x	x	x	23,809*	150,000*			
Wien	48 12	16 22	Shell-Floridsdorfer	On the Praterspitz	11		31,619	199,200	x	x	31,619	199,200			Was used for crude oil, fuel oil and Diesel oil only; other products stored at refinery.
Wien	48 12	16 22	Vacuum Oil Co. A.G.	Ibid	37		5,672	35,734	8,880	55,942	14,552	91,676	189,027	1,190,876	Division of tankage by products is approximate.
INLAND BULK PLANTS															
Amstetten	48 8	14 53	Shell-Floridsdorfer	Near railway freight yards		1	x	x	30	189	30	189	30	189	
Bregenz	47 30	9 46	Vacuum Oil Co. A.G.	Ibid.		1	x	x	30	189	30	189	30	189	
Feldkirch	47 14	9 36	Shell-Floridsdorfer	Ibid.		2	x	x	x	x	80	503			
			Vacuum Oil Co. A.G.	Ibid.		2	x	x	60	378	60	378	140	881	
Göss bei Leoben	47 23	15 6	Shell Floridsdorfer	Ibid.		1	x	x	30	188	30	188	30	188	
Graz	47 4	15 29	Creditul Minier				x	x	x	x	159*	1,000*			
			Everth				x	x	x	x	159*	1,000*			
			Fanto				x	x	x	x	159*	1,000*			
			Shell-Floridsdorfer	Puntigam district		3	x	x	x	x	90	566			
			Vacuum Oil Co. A.G.	At freight yards, east railway station		4	70	441	120	756	190	1,197	737*	4,663*	Army has some underground tanks at Airport.
Hochst bei Lustenau	47 28	9 38	Shell-Floridsdorfer	Near railway freight yards		3	x	x	x	x	45	283	45	283	

Innsbruck	47 16	11 23	Creditul Minier	Near railway freight yards			x	x	x	x	159*	1,000*			
			Everth	Ibid.			x	x	x	x	111*	700*			
			Fanto	Ibid.			x	x	x	x	159*	1,000*			
			Shell-Floridsdorfer	Karwendel Strasse near R.R. freight yards.		4	60	376	150	934	210	1,319			
			Vacuum Oil Co. A.G.	Bahnhofauffahrtsstrasse at R.R. freight yards		2	x	x	90	567	90	567	729*	4,586*	
Klagenfurt	46 38	14 18	Creditul Minier				x	x	x	x	127*	800*			
			Everth				x	x	x	x	100*	630*			
			Fanto	Adjacent Shell-Floridsdorfer plant			x	x	x	x	111*	700*			
			Rumwolf	Across street from Vacuum Oil Company plant			x	x	x	x	111*	700*			Rumwolf was an independent local jobber owning storage facilities in this town only.
			Shell-Floridsdorfer	Adjacent Vacuum Oil Company plant		2	x	x	x	x	124	780			
			Vacuum Oil Co. A.G.	On road to St. Ruprecht, approx. one mile east of main R.R. sta.		2	x	x	120	756	120	756	693*	4,336*	
Krems a.d.Donau	48 25	15 37	Shell-Floridsdorfer	Near R.R. freight yards.		1	x	x	30	188	30	188			
			Vacuum Oil Co. A.G.	Near railway freight yards, main railway station.		1	x	x	60	378	60	378	90	566	
Lambach	48 6	13 52	Vacuum Oil Co. A.G.	Reichsstrasse		1	x	x	30	189	30	189	30	189	
Landeck	47 7	10 34	Shell-Floridsdorfer			2	x	x	x	x	50	314	50	314	
Lienz	46 50	12 46	Shell-Floridsdorfer			1	x	x	30	188	30	188	30	188	
Linz a.d.Donau	46 18	14 18	Creditul Minier				x	x	x	x	159*	1,000*			
			Everth				x	x	x	x	111*	700*			
			Fanto				x	x	x	x	159*	1,000*			
			Vacuum Oil Co. A.G.	Hühnersteigstrasse		2	x	x	120	756	120	756	549*	3,456*	
			Shell-Floridsdorfer	See River Bulk Plants											
Neunkirchen	47 43	16 3	Vacuum Oil Co. A.G.			1	x	x	60	378	60	378	60	378	
Salzburg	45 53	13 2	Creditul Minier				x	x	x	x	159*	1,000*			
			Everth				x	x	x	x	120*	750*			
			Fanto				x	x	x	x	397*	2,500*			
			Shell-Floridsdorfer	Itzling District	1	2	x	x	x	x	284	1,791			1 aboveground tank, 1280 barrels 1 underground tank, 314 barrels 1 underground tank, 197 barrels
			Vacuum Oil Co. A.G.	Itzling District		4	35	220	105	692	140	912	1,100*	6,953*	
Scheibbs	48 00	15 10	Vacuum Oil Co. A. G.			1	x	x	35	220	35*	220*	35*	220*	
St. Polten	48 12	15 37	Shell-Floridsdorfer			1	x	x	50	314	50	314			
			Vacuum Oil Co. A. G.	Teufelhof on R.R. line		3	30	189	60	378	90	567	140	881	
Villach	46 36	13 50	Fanto				x	x	x	x	127*	800*			
		*	Shell-Floridsdorfer	Near R.R. freight yards		3	x	x	x	x	90	566			
			Vacuum Oil Co. A.G.	Near R.R. freight yards		3	15	95	70	441	85	536	202*	1,902*	
Wels	48 10	14 2	Shell-Floridsdorfer			1	x	x	30	188	30	188	30	188	
Wien	48 12	16 22	Everth	Südbahnhof		2*	x	x	x	x	100*	630*			
			Vacuum Oil Co. A. G.	Aspangstrasse 33, Aspang-bahnhof R.R. station		3	40	252	80	504	120	756	220*	1,386*	
Wiener Neustadt	47 49	16 16	Shell-Floridsdorfer			1	x	x	50	314	50	314			
			Vacuum Oil Co. A.G.	Grabnerring District		2	x	x	60	378	60	378	110	692	
Zell am See	47 18	12 47	Shell-Floridsdorfer			2	x	x	x	x	147	943	147	943	
Zeltweg	47 11	14 44	Vacuum Oil Co. A.G.	Bezirksstrasse		1	x	x	70	441	70	441	70	441	

* Estimated. Details not available.

NOTE: Allocation of storage capacity by products is on basis of pre-war operations and may since have been altered to suit current needs. Gas oil and lubricating oils are included under black oils in these tables.

MARKETING POSITION OF VARIOUS MARKETING COMPANIES IN AUSTRIA

1937

(In Metric Tons)

	Total	* Vacuum	+ Shell Group	○ Creditul Minier	△ Everth	▼ Fanto	□ Galtol	⌀ Montan Union	■ Steaua	Others
Motor Fuel	143,970	38,920	30,355	11,654	9,063	13,385	3,743	6,191	5,615	25,044
Kerosine	57,260	18,120	11,613	5,497	4,123	5,950	1,087	1,030	1,602	8,238
Gas/Diesel Oil	35,070	5,360	6,523	2,174	2,595	2,981	456	351	631	13,999
Fuel Oil	85,510	10,920	31,048	855	1,967	-	-	-	-	40,720
Lubricating Oils	19,530	4,620	5,239	3,496	-	2,324	-	-	-	3,851
Greases	470	220	-	-	-	-	-	-	-	250
Paraffin	2,750	60	-	-	-	-	-	-	-	2,690
Asphalt	19,700	1,440	8,292	-	-	-	-	-	-	9,968
Coke	4,700	-	-	-	-	-	-	-	-	4,700
Other Products	5,000	-	-	-	-	-	-	-	-	5,000
Total	373,960	79,660	93,070	23,676	17,748	24,640	5,286	7,572	7,848	114,460
Per cent of Total	100.0	21.3	24.9	6.3	4.7	6.6	1.4	2.0	2.1	30.7
Ships Bunkers	Nil									

(In Barrels)

	Total	Vacuum	Shell Group	Creditul Minier	Everth	Fanto	Galtol	Montan Union	Steaua	Others
Motor Fuel	1,223,745	330,820	258,017	99,059	77,036	113,772	31,816	52,624	47,728	212,874
Kerosine	452,354	143,148	91,742	43,426	32,572	47,005	8,587	8,137	12,656	65,080
Gas/Diesel Oil	252,504	38,592	46,966	15,652	18,684	21,463	3,283	2,527	4,543	100,792
Fuel Oil	555,815	70,980	201,812	5,557	12,786	-	-	-	-	264,680
Lubricating Oils	136,710	32,340	36,673	24,472	-	16,268	-	-	-	26,957
Greases	-	-	-	-	-	-	-	-	-	-
Paraffin	20,625	450	-	-	-	-	-	-	-	20,175
Asphalt	118,200	8,640	49,752	-	-	-	-	-	-	59,808
Coke	-	-	-	-	-	-	-	-	-	-
Other Products	37,500	-	-	-	-	-	-	-	-	37,500
Total (Except Grease, Coke)	2,797,453	624,970	684,962	188,166	141,078	198,508	43,686	63,288	64,927	787,866

* Vacuum Oil Co., A.G.
\+ Aktiengesellschaft der Shell-Floridsdorfer Mineralöl-Fabrik
○ Creditul Minier, Österreichisch-Rumänische Petroleum-Vertriebsgesellschaft, m.b.H.
△ Everth & Company A.G.
▼ Österreichische Fanto A.G.
□ "Galtol" Mineralol-Handels A.G. Sales agent for Galizische Naphtha-Aktiengesellschaft "Galicia" of Poland
⌀ Montan-Union A.G.
■ "Steaua" Flüssige Brennstoffe A.G.

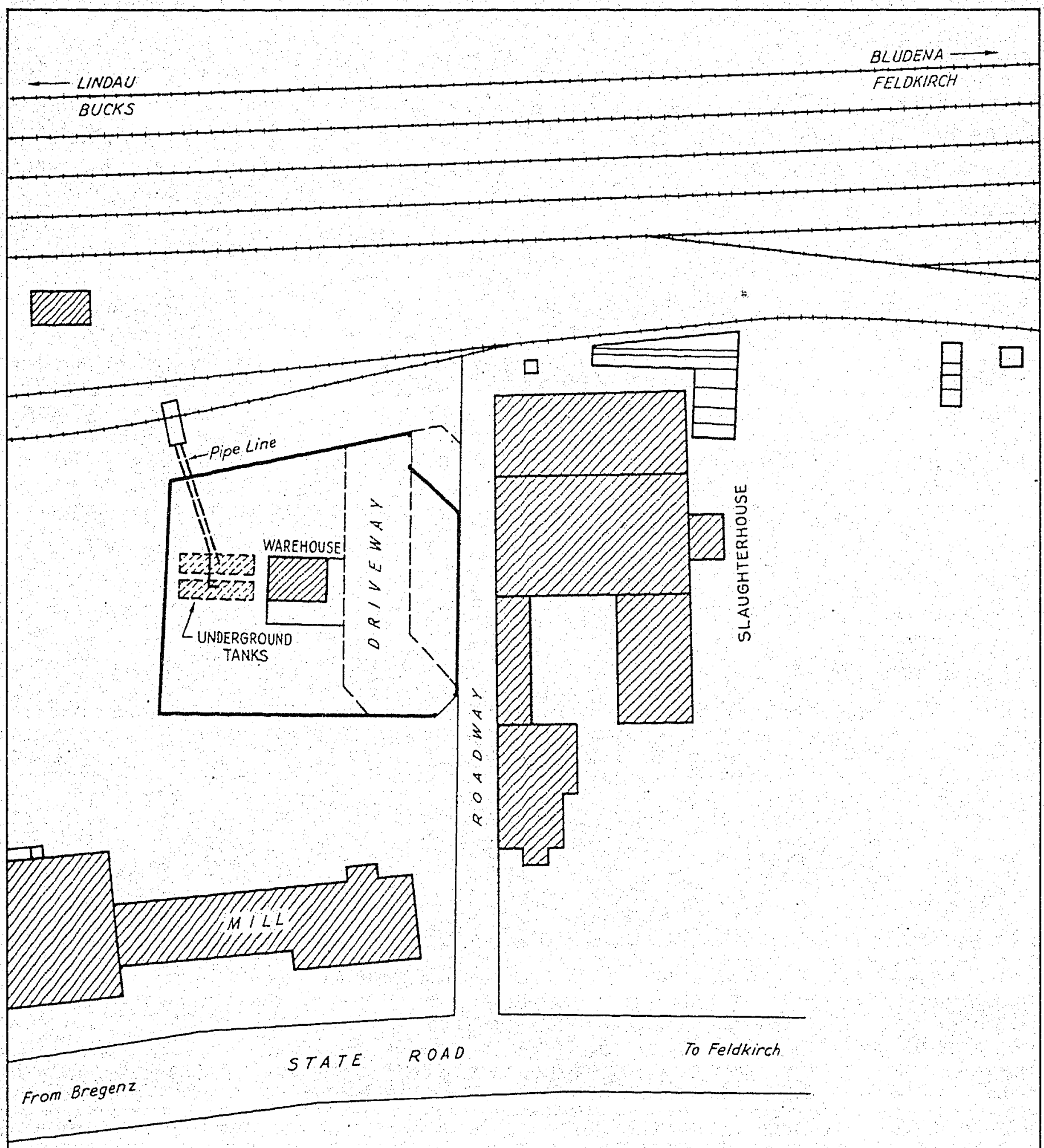
were underground and usually were small--ranging in capacity from 500 to 1,500 gallons.

Movable pumps and tankage.- In addition to the fixed pumps, there were 1,300 movable pumps with 50 gallon containers in use. Deliveries to gasoline outlets were, as a rule, made by company-owned tank trucks.

4.7 PRODUCTS: IMPORTS AND DOMESTIC MANUFACTURE

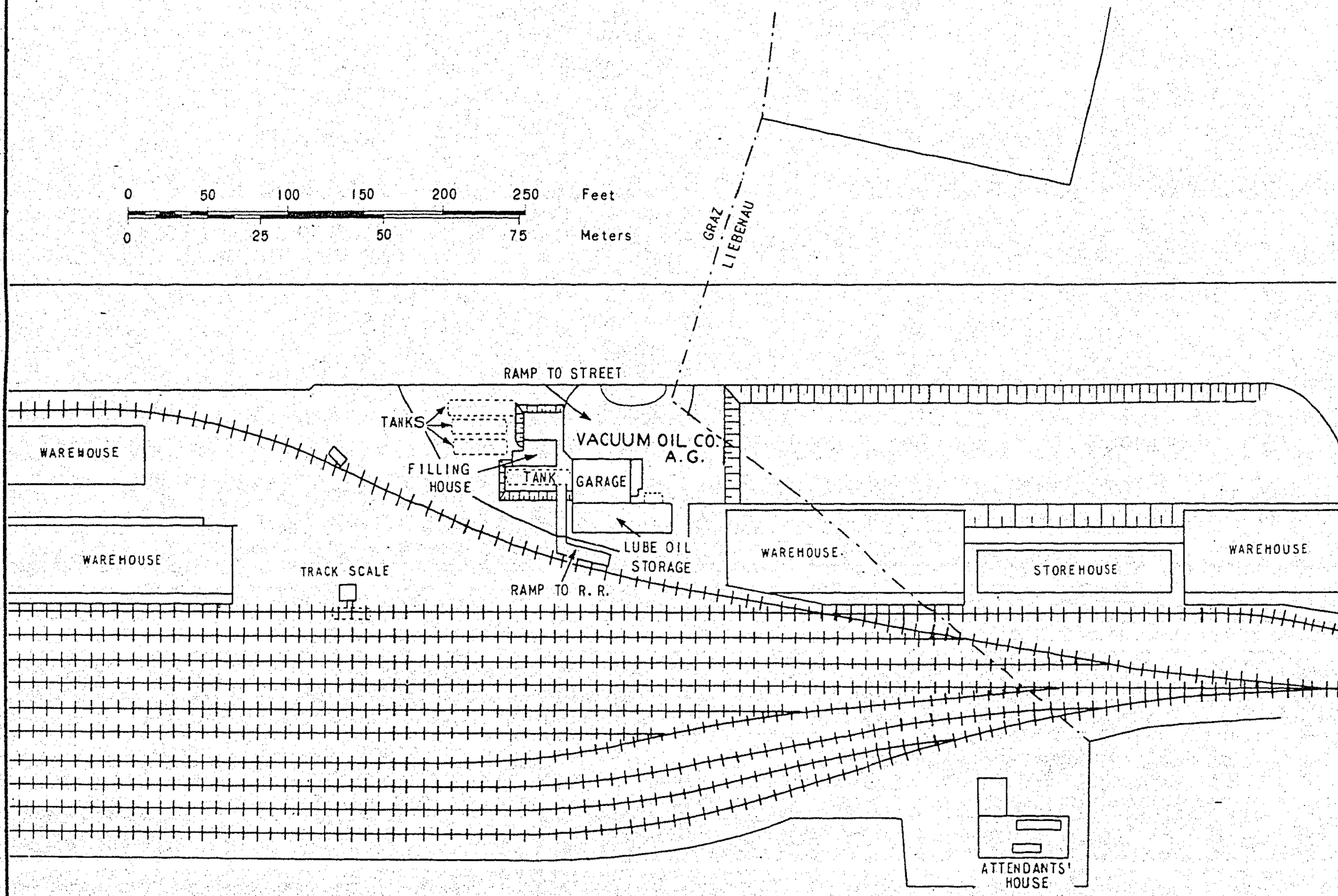
Imports and Manufactured Products in Austria in 1937

Finished Products	Imports	Refinery Production	Total Metric Tons
	Metric Tons		
Gasoline	81,477	86,658	168,135
Kerosine	39,010	22,519	61,529
Gas Oil	35,359)	31,541	119,328
Fuel Oil	52,428)		
Lubricating Oils	12,706	7,036	19,742
Greases	-	290	290
Paraffin Wax	2,413	-	2,413
Asphalt - Road Oils	16,116	3,197	19,313
Others	5,473	9,560	15,033
Total	244,982	160,801	405,783
	Barrels		
Gasoline	692,554	736,593	1,429,147
Kerosine	308,179	177,900	486,079
Gas Oil	247,513)	220,787	835,296
Fuel Oil	366,996)		
Lubricating Oils	88,942	49,252	138,194
Greases	-	-	-
Paraffin Wax	18,097	-	18,097
Asphalt - Road Oils	96,696	19,182	115,878
Others	41,047	71,700	112,747
Total (except Greases)	1,860,024	1,275,414	3,135,438



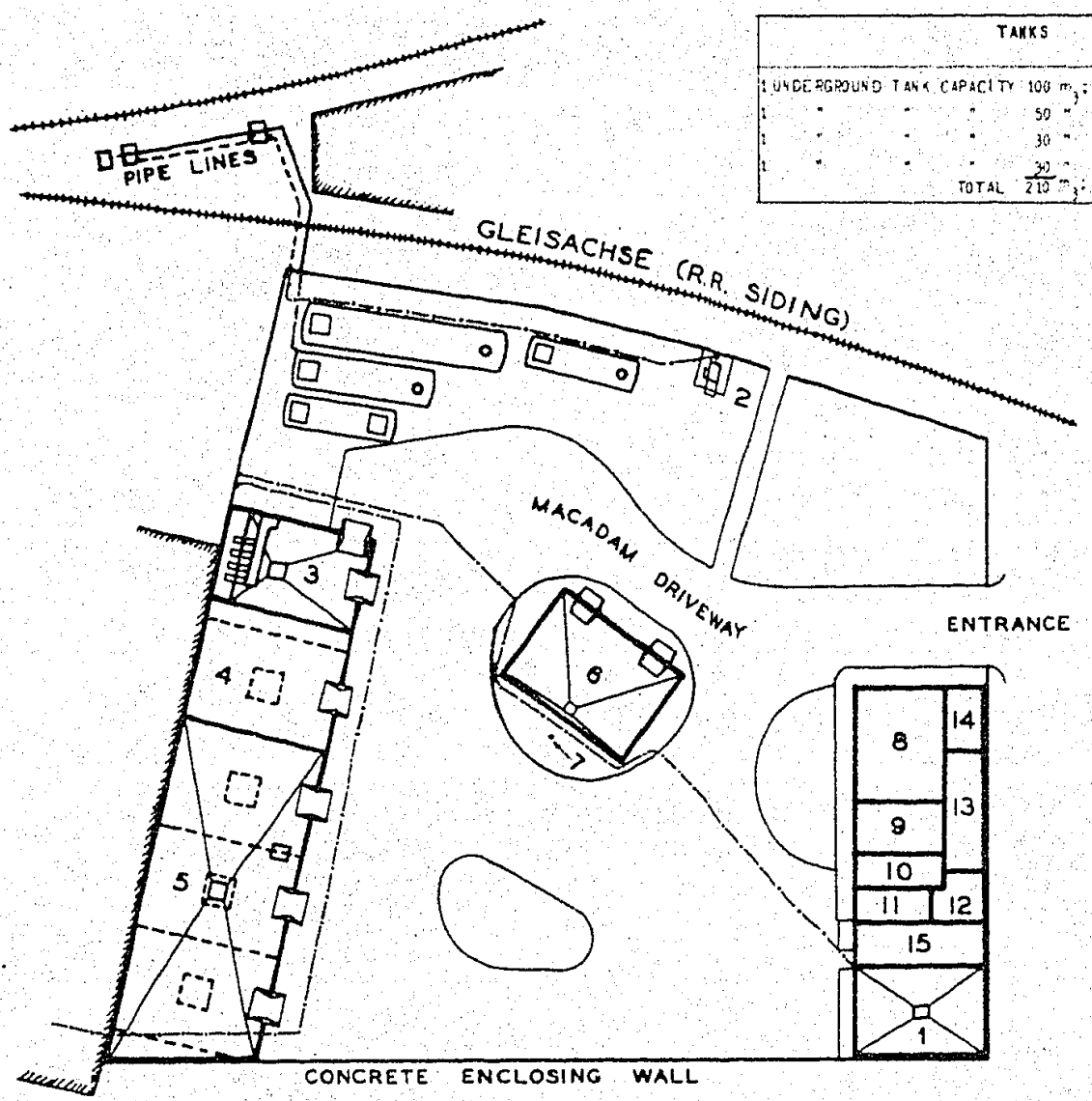
BULK PLANT
VACUUM OIL COMPANY, A.G.
MAIN RAILROAD STATION
FELDKIRCH, VORARLBERG, AUSTRIA

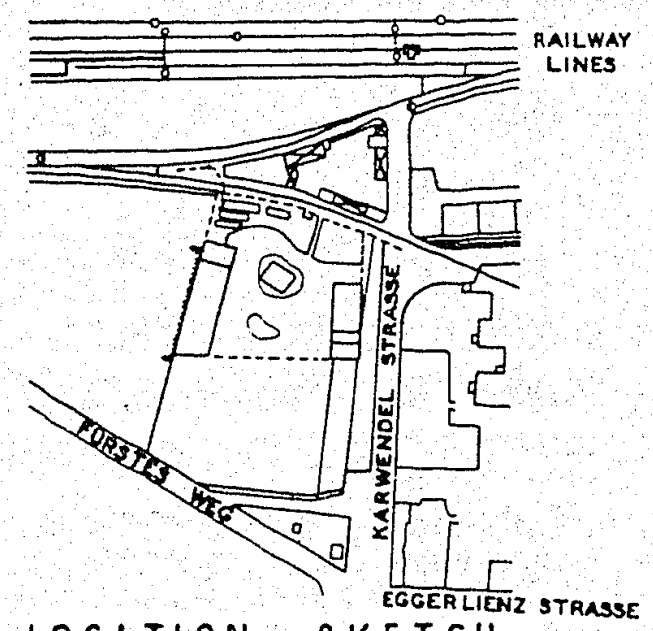
BULK PLANT
VACUUM OIL COMPANY, A.G.
East Railroad Station
GRAZ, AUSTRIA



OIL STORAGE TANKAGE

TANKS								
1	UNDERGROUND TANK	CAPACITY	100 m³	629.42	U.S. GAL.	BBLS		
1	"	"	50 "	314	"	"	"	"
1	"	"	30 "	186	"	"	"	"
1	"	"	30 "	188	"	"	"	"
		TOTAL	210 m³	1319.42	U.S. GAL.	BBLS		





LOCATION SKETCH

0 200 400 FEET
0 40 80 120 METERS

	LEGENDE		LEGEND
1	GARAGE	1	GARAGE
2	GASÖL-ABFÜLLSTELLE	2	GAS OIL FILLING HOUSE
3	ABFÜLLRAUM	3	FILLING ROOM
4	MINERALÖLE IN KLEINPACKUNGEN	4	CASED GOODS WAREHOUSE
5	ÖLMAGAZIN	5	OIL WAREHOUSE
6	LAGERWANNE FÜR 100 FÄSSER	6	FIRE BASIN FOR 100 BARRELS
7	LICHTMAST	7	SIGNAL TOWER
8	BEAMTE	8	OFFICIALS
9	LEITER	9	MANAGER
10	GARDEROBE	10	LOCKER ROOM
11	ARBEITER	11	WORKMEN
12	HEIZRAUM	12	FURNACE ROOM
13	REGISTRATUR	13	REGISTRY
14	PARTEIEN	14	LIVING QUARTERS
15	PUMPENWERKSTÄTTE	15	PUMP ROOM

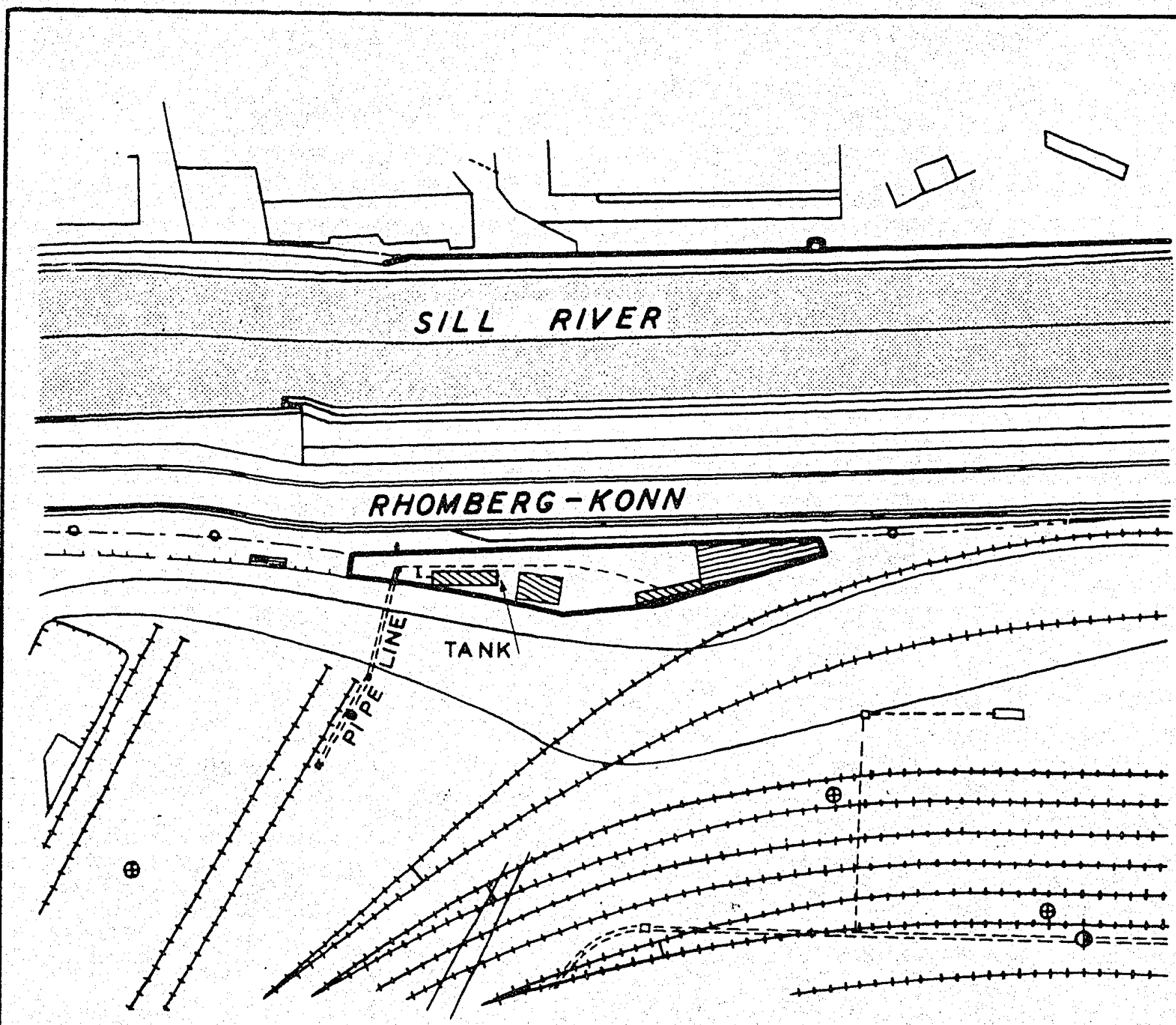
BULK PLANT

A.G. DER SHELL FLORIDSDORFER MINERALOEL-FABRIK

INNSBRUCK (TYROL) AUSTRIA

1936

0 50 75 100 125 FEET
0 10 20 30 40 METERS



BULK PLANT

VACUUM OIL COMPANY A.G.

BAHNHOFAUFFAHRTSSTRASSE
INNSBRUCK, TYROL
AUSTRIA

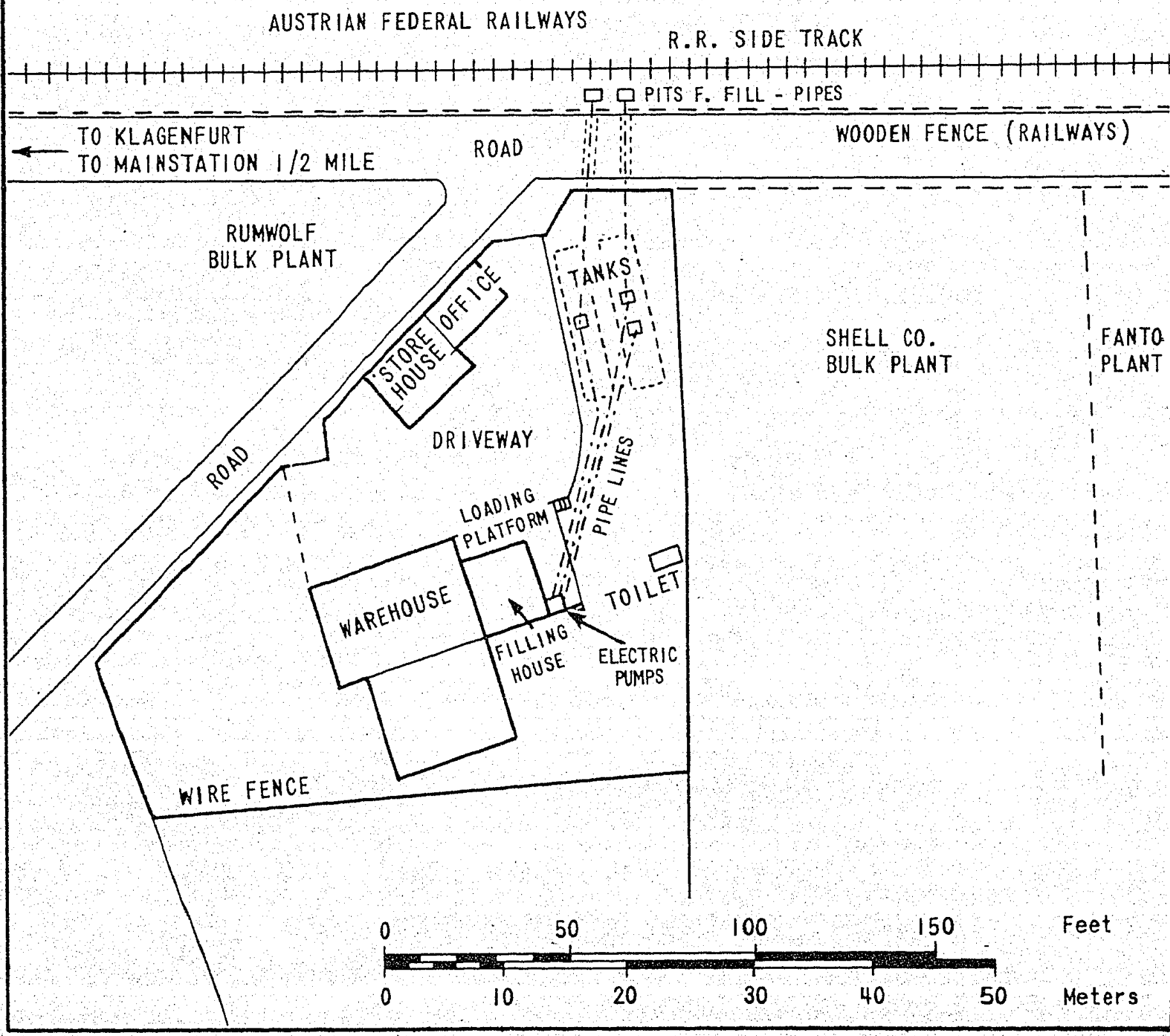
BULK PLANT

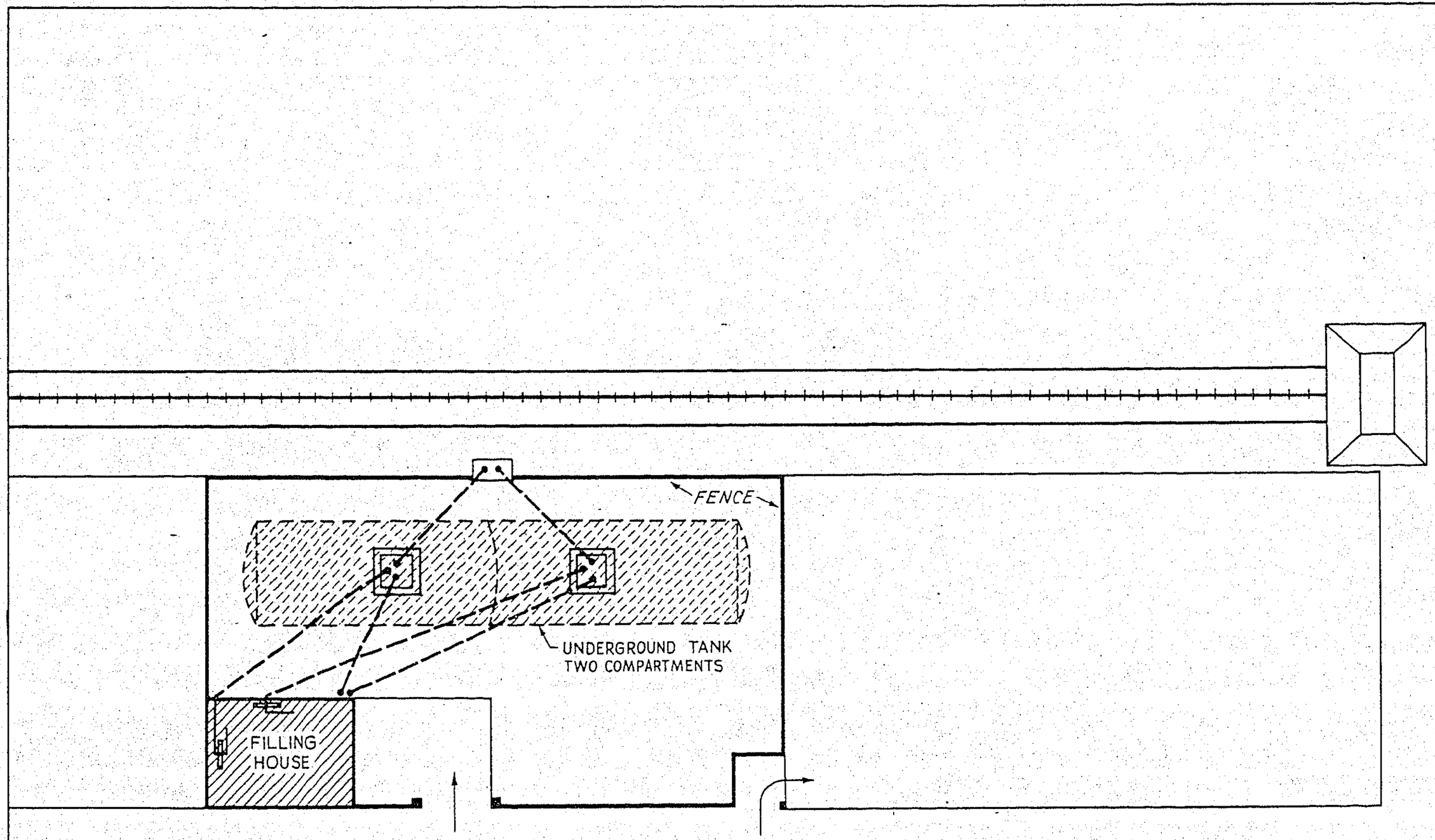
VACUUM OIL COMPANY, A.G.

Gemeindeweg nach St. Ruprecht

KLAGENFURT, CARINTHIA

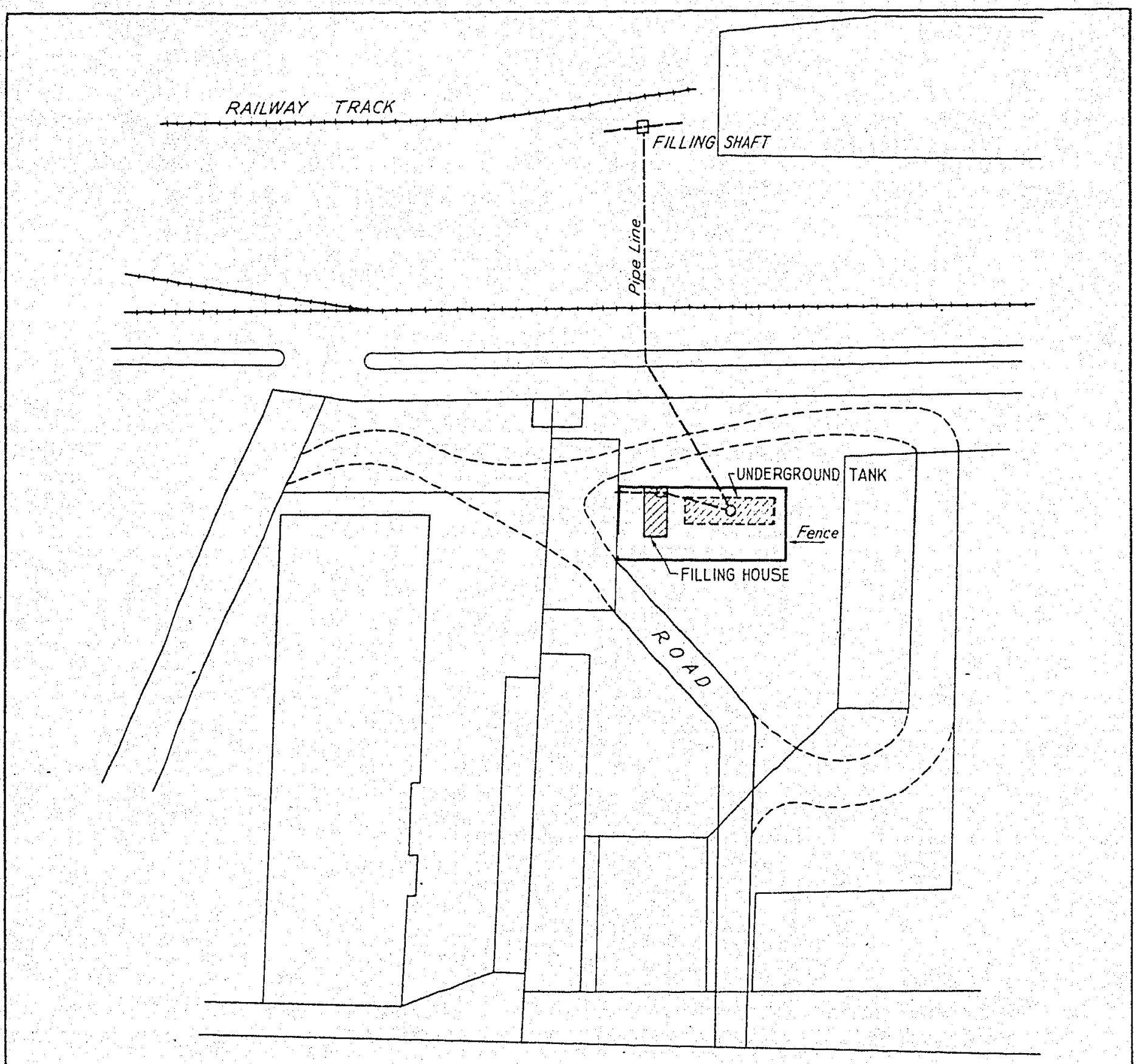
AUSTRIA





BULK PLANT
VACUUM OIL COMPANY, A.G.
MAIN RAILROAD STATION
KREMS, UNTER ÖSTERREICH
AUSTRIA

0 10 20 30 Feet
0 5 10 Meters



BULK PLANT
VACUUM OIL COMPANY, A. G.
REICHSSTRASSE
LAMBACH, OBER ÖSTERREICH
AUSTRIA

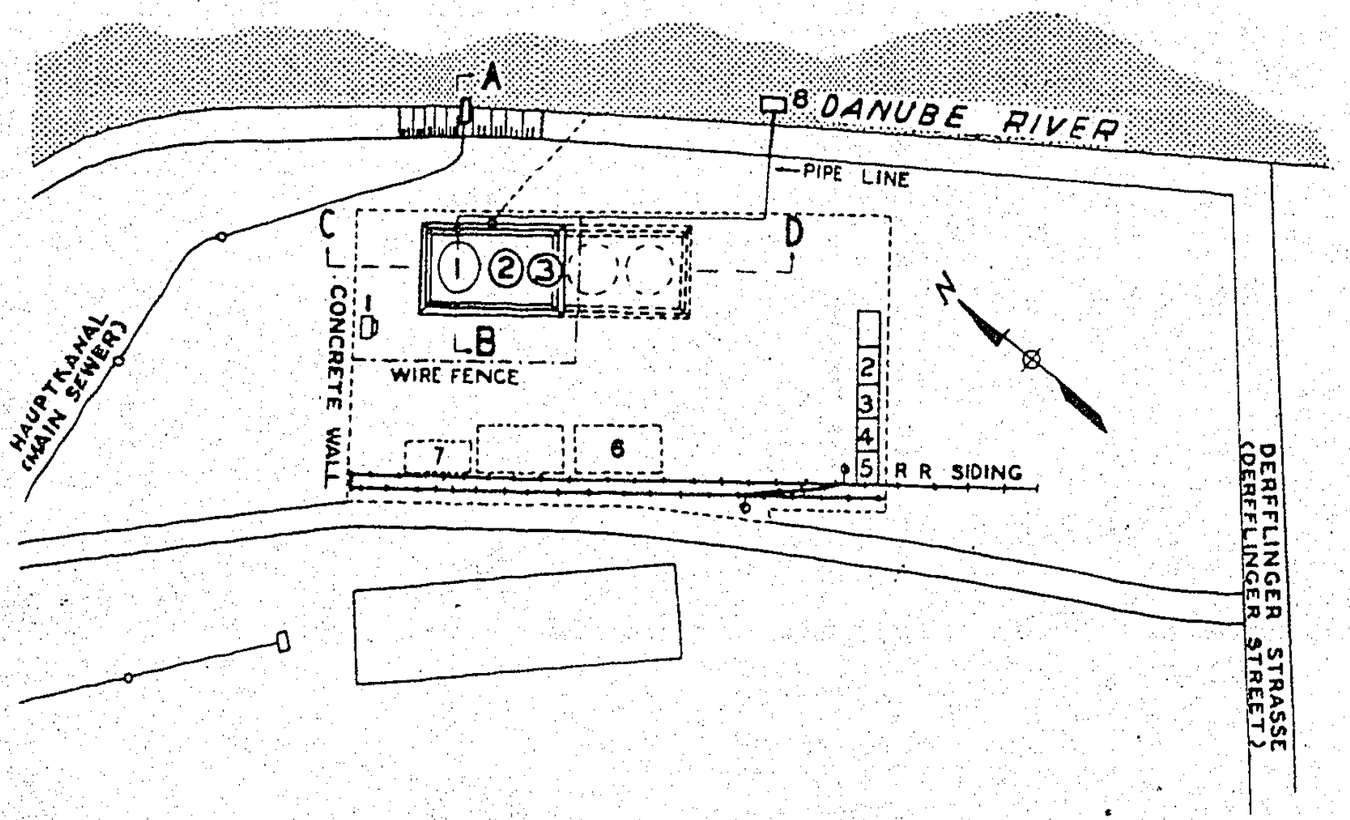
0 20 40 60 80 100 Feet
0 10 20 30 Meters

BULK PLANT

A.G.DER SHELL-FLORIDSDORFER MINERALÖLFABRIK

LINZ, AUSTRIA

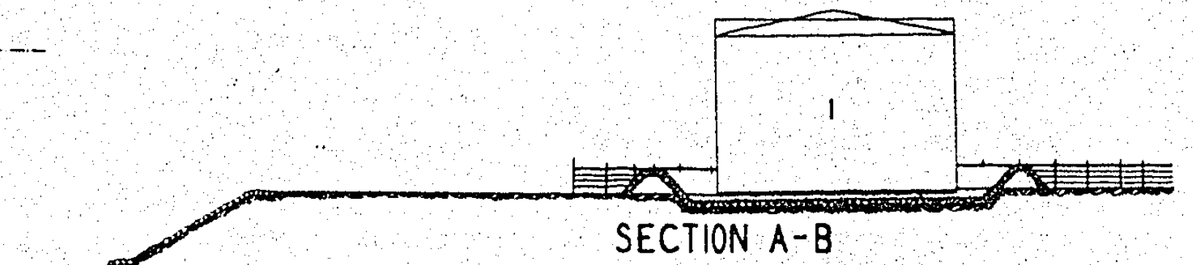
1930



0 100 200 300 400 500 600 FEET

0 50 100 150 200 METERS

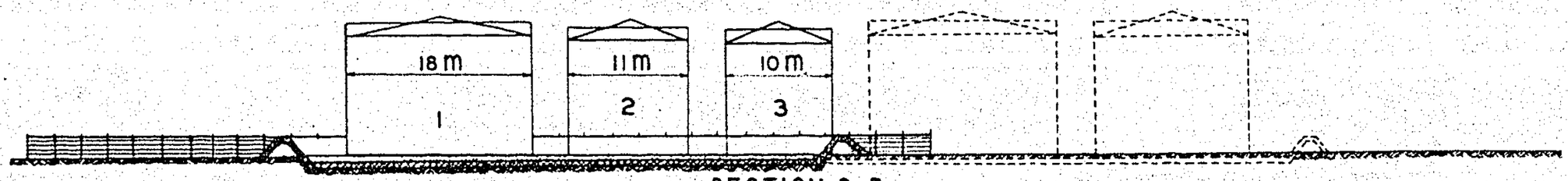
LEGENDE		LEGEND	
1	PUMPENHAUS	1	PUMP HOUSE
2	KANZLEIGEBÄUDE	2	OFFICE
3	PUMPEN-WERKSTÄTTE	3	PUMP-WORKSHOPS
4	GARAGE	4	GARAGE
5	TORWÄCHTERHÄUSCHEN	5	GATE KEEPER'S HOUSE
6	ÖL-MAGAZIN	6	OIL WAREHOUSE
7	ABFÜLLSCHUPPEN	7	FILLING SHED
8	PONTON	8	PONTOON AND LOADING POINT



SECTION A-B

0 20 40 60 80 100 FEET

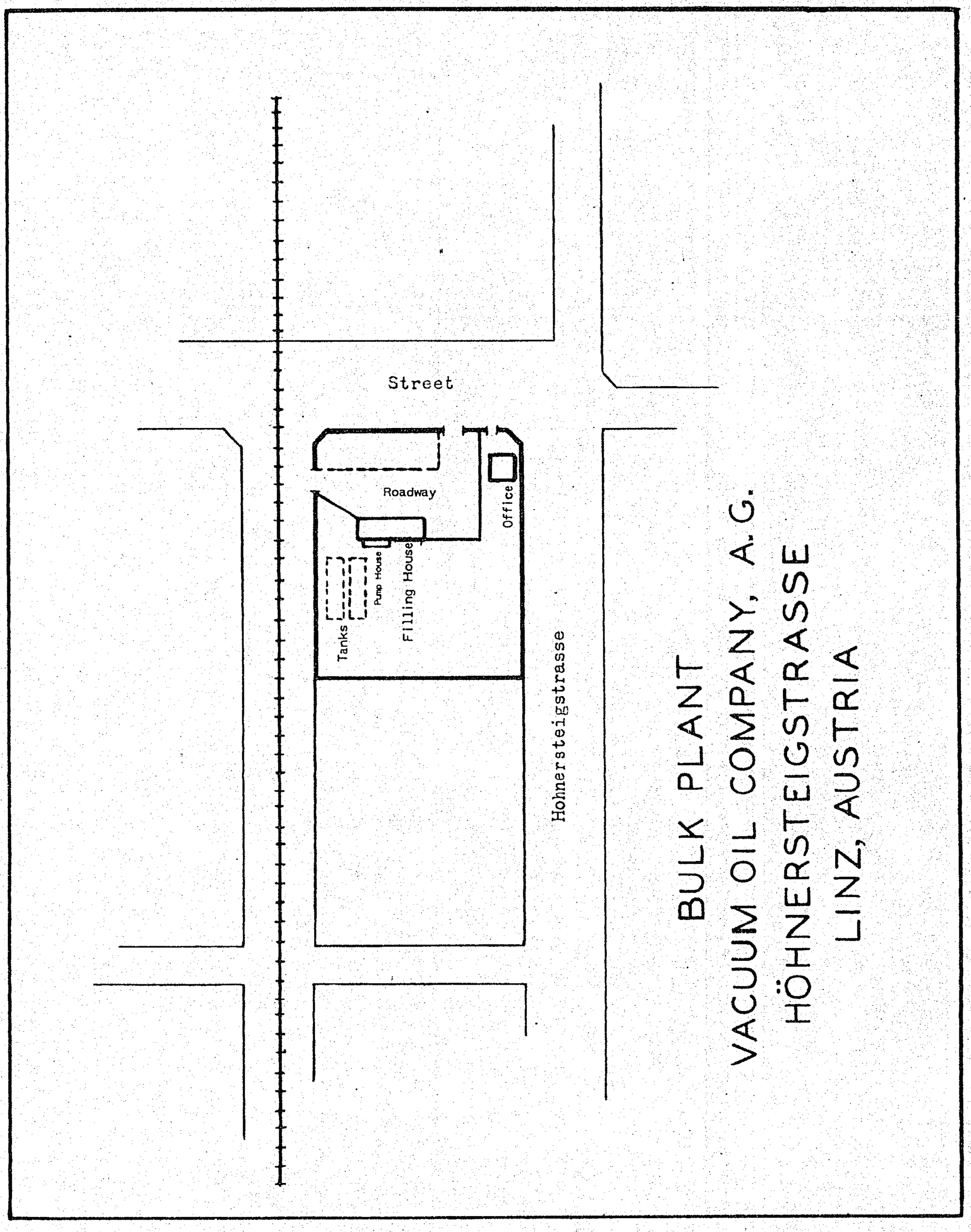
0 10 20 30 METERS

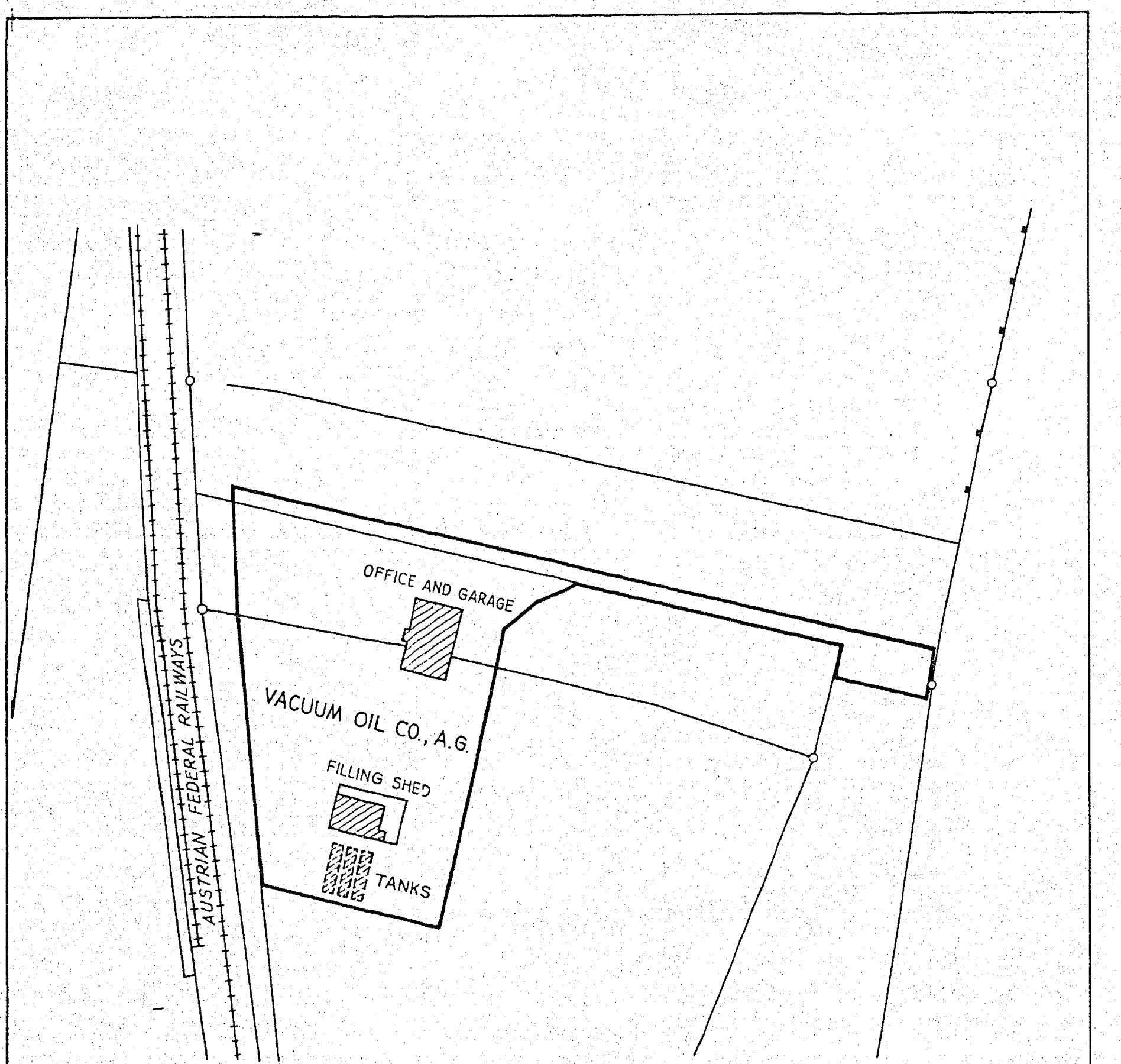


SECTION C-D

TANKS								
1.	1 ABOVE GROUND	CAPACITY	2603 M³	16400	42 U.S. GAL.	BBLS.
2.	1 " "	"	540 "	3400	" "	"	"
3.	1 " "	"	429 "	2700	" "	"	"
	3 UNDERGROUND (NOT SHOWN)		43 "	3X90 = 270	" "	"	"
			TOTAL	22770	" "	"	"

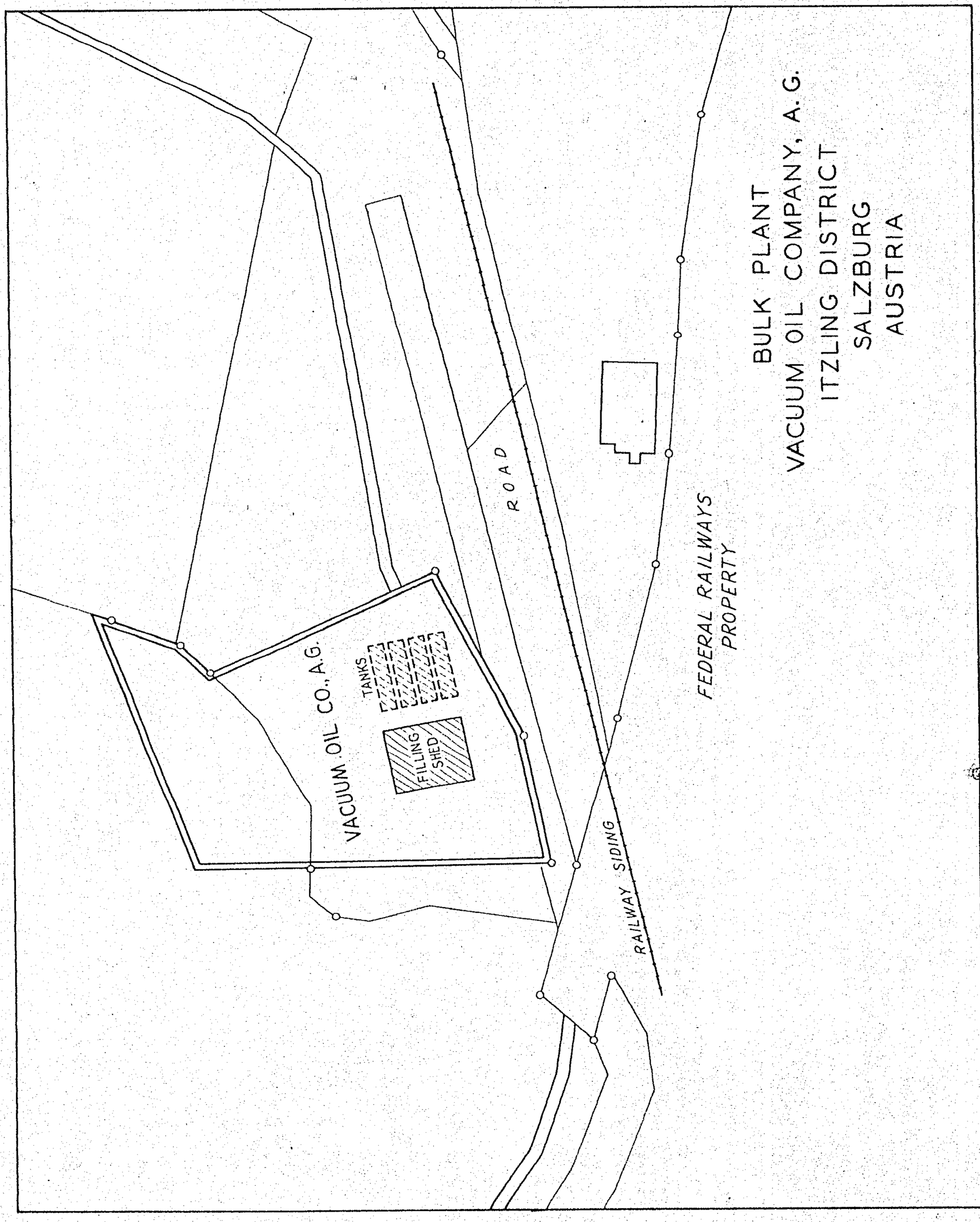
DISTRIBUTING - 145
Linz


Street
Roadway
Office
Pump House
Filling House
Tanks
Hohensteigstrasse
BULK PLANT
VACUUM OIL COMPANY, A. G.
HÖHNERSTEIGSTRASSE
LINZ, AUSTRIA



BULK PLANT
VACUUM OIL COMPANY, A.G.
TEUFELHOF DISTRICT
ST. PÖLTEN
UNTER ÖSTERREICH
AUSTRIA

0 50 100 150 Feet
0 10 20 30 40 50 Meters


BULK PLANT
VACUUM OIL COMPANY, A.G.
ITZLING DISTRICT
SALZBURG
AUSTRIA
ROAD
FEDERAL RAILWAYS
PROPERTY
VACUUM OIL CO., A.G.
TANKS
FILLING SHED
RAILWAY SIDING

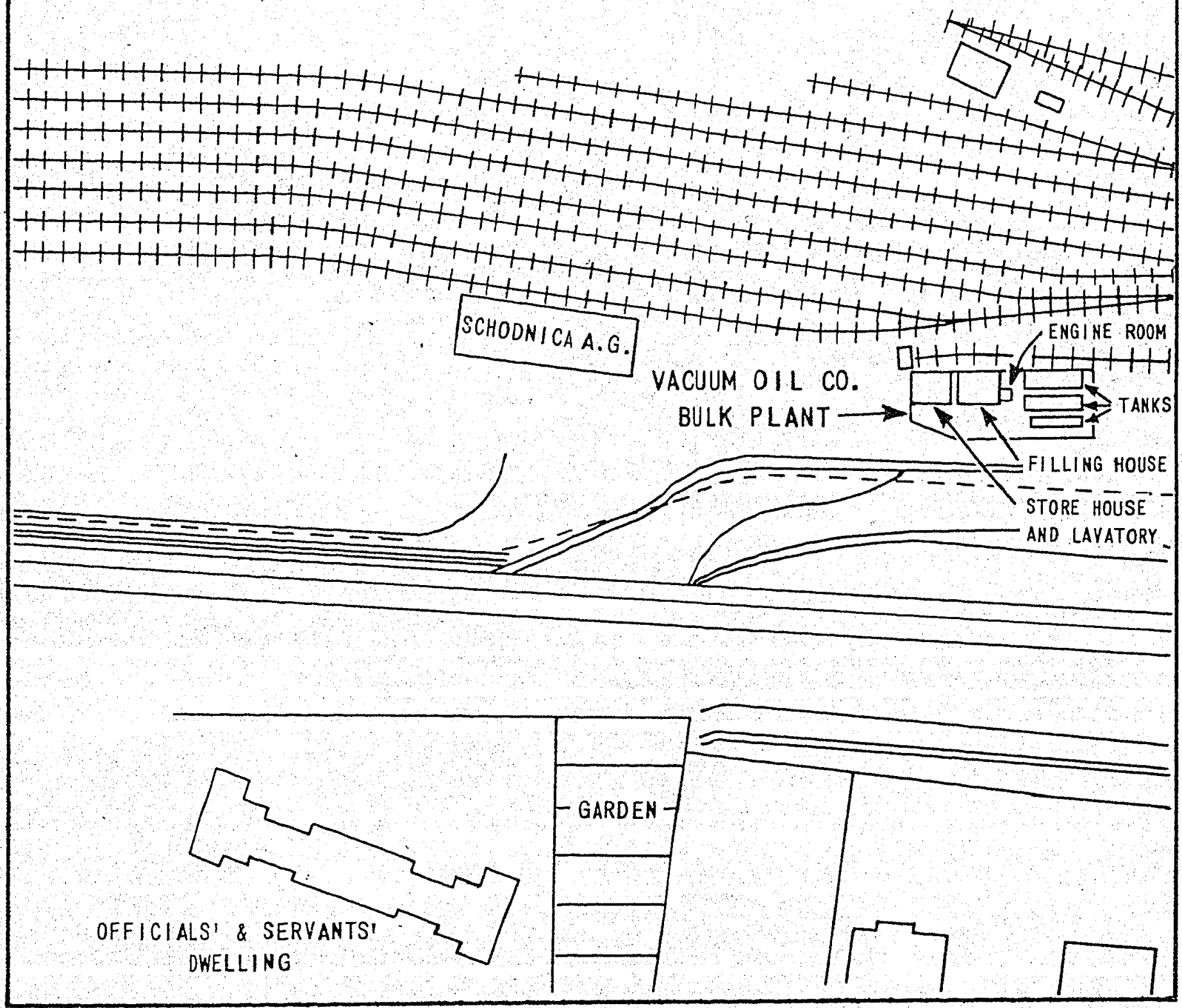
BULK PLANT

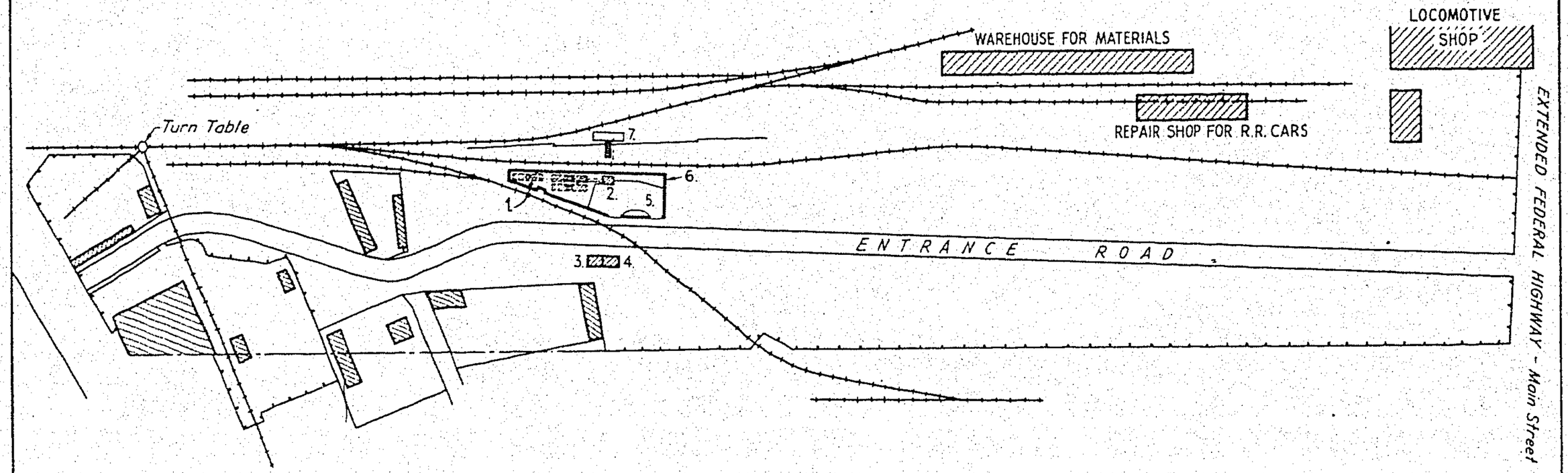
VACUUM OIL COMPANY, A.G.

Railroad Station

VILLACH, CARINTHIA

AUSTRIA

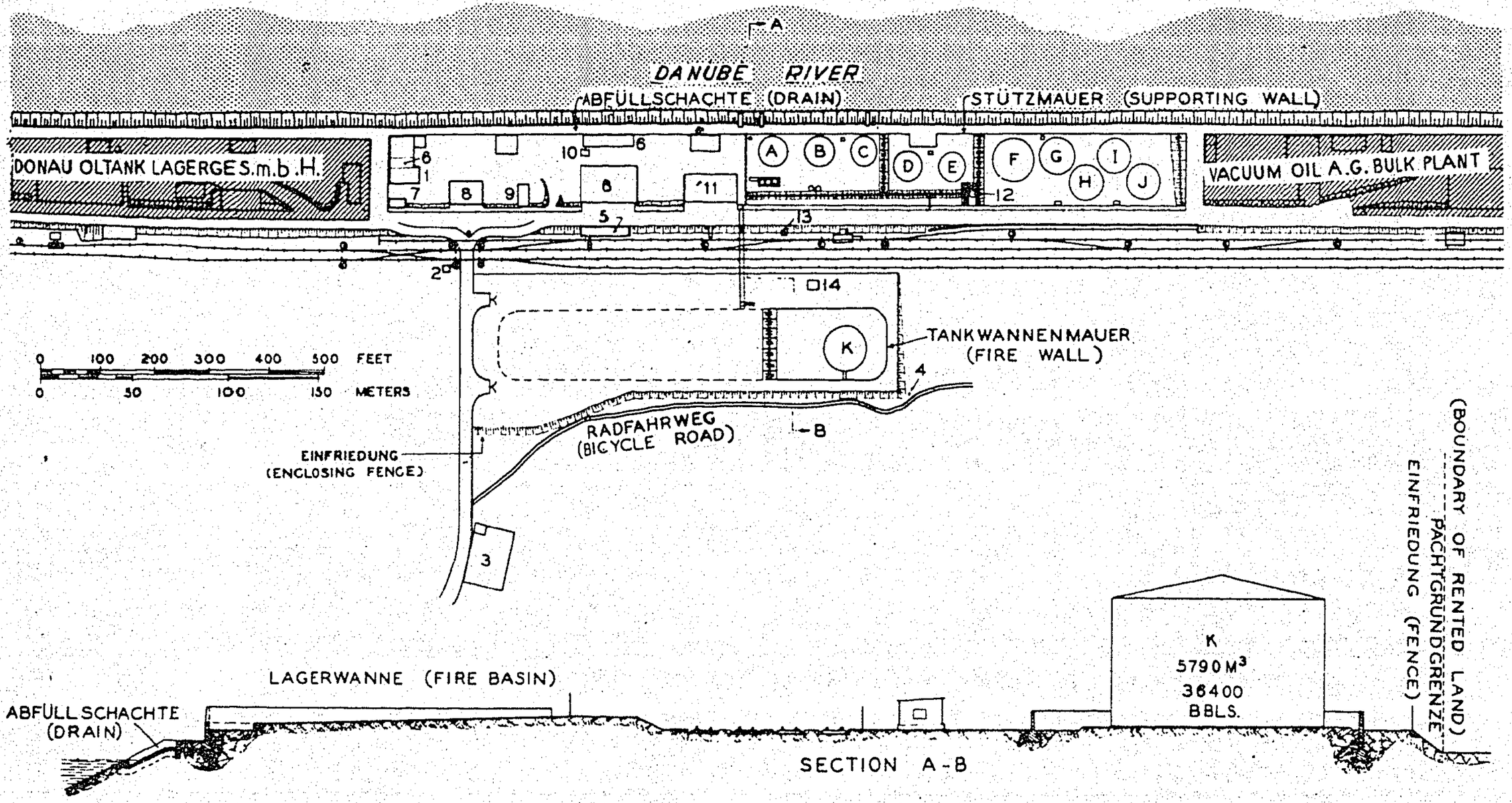




LEGEND

1. THREE UNDERGROUND TANKS
2. PUMPHOUSE
3. OFFICE
4. STORE ROOM FOR MATERIAL
5. ROAD
6. FENCE
7. LOADING RACK

BULK PLANT
VACUUM OIL COMPANY, A.G.
ASPANGSTRASSE 33
WIEN, AUSTRIA



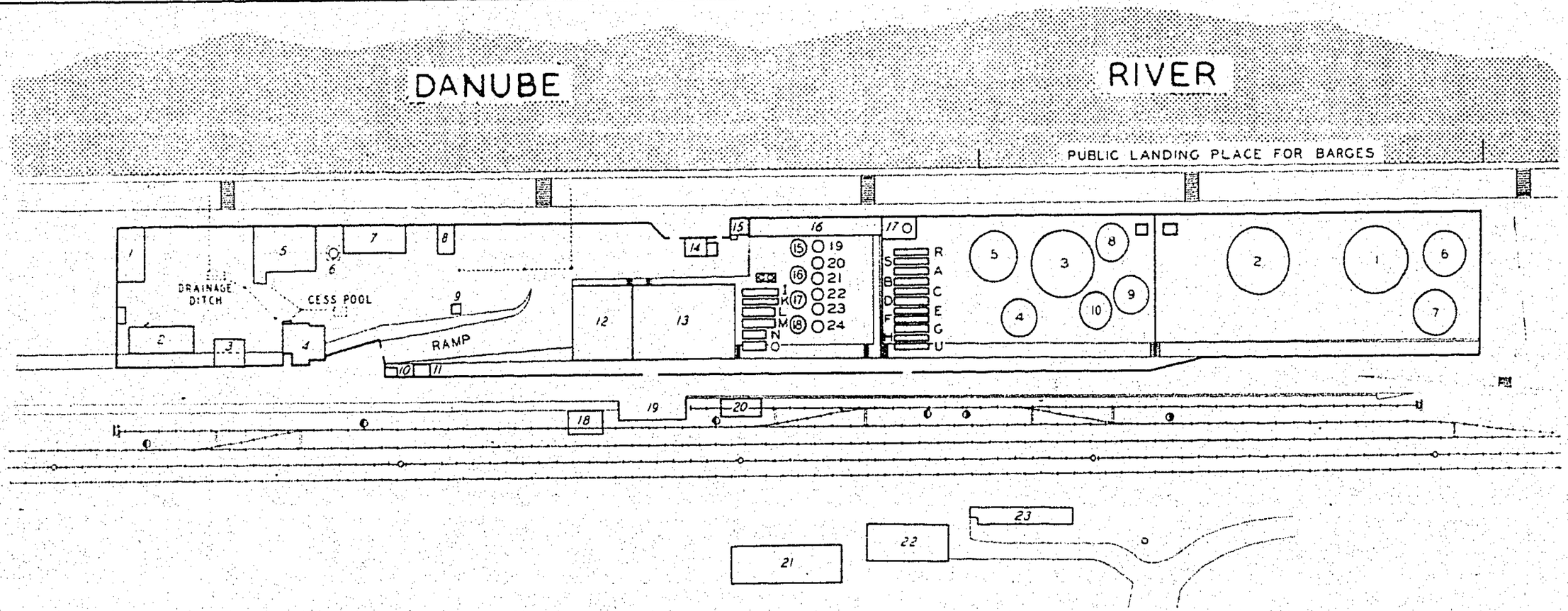
	LEGENDE		LEGEND
1	KESSELHAUS	1	BOILER HOUSE
2	STELLWERKSHAUS	2	SWITCH HOUSE
3	ARBEITER WOHNHAUS	3	WORKMEN'S HOUSE
4	TELEGRAFENMAST	4	PYLON
5	VERLADERAMPE	5	LOADING PLATFORM
6	MAGAZIN	6	STOREHOUSE
7	KOHLE	7	COAL
8	KANZLEI U. WOHNHAUS	8	OFFICE AND DWELLING
9	SENKGRUBE	9	CESS POOL
10	DRUCKENWAAGE	10	PLATFORM SCALE
11	ABFÜLLAGER U. LAGER FÜR HEIZÖL	11	FILLING ROOM AND FUEL OIL STORAGE
12	GASOMETER	12	GASOMETER
13	WINDENHAUS	13	WINCH HOUSE
14	PROVISOR PUMPENHAUS	14	TEMPORARY PUMP HOUSE

TANK	CAPACITY IN BBLS
A	11.400
B	11.400
C	11.400
D	11.400
E	11.400
F	33.400
G	18.100
H	18.100
I	18.100
J	18.100
K	

RIVER BULK TERMINAL
A.G.DER SHELL FLORIDSDORFER MINERALÖLFABRIK
WIEN – PRATERSPITZ
AUSTRIA
1936

0 50 100 150 FEET
0 25 50 METERS

DISTRIBUTING
Wien



TANKAGE			
TANK NO.	PRODUCT	CAPACITY M³	CAPACITY BARRELS
1	WHITE	2,600	16,380
2	"	2,600	16,380
6	"	650	4,095
7	"	980	6,174
9	"	780	4,914
10	"	780	4,914
A	"	50	315
B	"	50	315
C	"	50	315
D	"	50	315
E	"	38	239
F	"	38	239
G	"	38	239
H	"	38	239
R	"	50	315
S	"	50	315
U	"	38	239
	TOTAL	8,880	55,942

TANKAGE			
TANK NO.	PRODUCT	CAPACITY M³	CAPACITY BARRELS
15	LUBRICANTS	100	630
16	"	100	630
17	"	100	630
18	"	100	630
19	"	50	315
20	"	50	315
21	"	50	315
22	"	50	315
23	"	50	315
24	"	50	315
I	"	50	315
K	"	50	315
L	"	60	378
M	"	60	378
N	"	46	290
O	"	46	290
	TOTAL	1,012	6,376

TANKAGE			
TANK NO.	PRODUCT	CAPACITY M³	CAPACITY BARRELS
3	BLACK	2,600	16,380
4	"	630	3,969
5	"	650	4,095
8	"	780	4,914
	TOTAL	4,660	29,358

BARGE DISCHARGE: PIPE LINE DIAMETER 8"; PUMPS, 5 WORTHING, DUPLEX, 400 GAL. PER MINUTE - STEAM DRIVEN

TANK CAR AND TRUCK LOADING: PIPE LINE DIAMETER 3"; PUMPS, 5 MONSKEY & WEISS PISTON, 300 GAL. PER MINUTE - STEAM DRIVEN

RIVER BULK TERMINAL

VACUUM OIL COMPANY A.G.

PRATERSPITZ

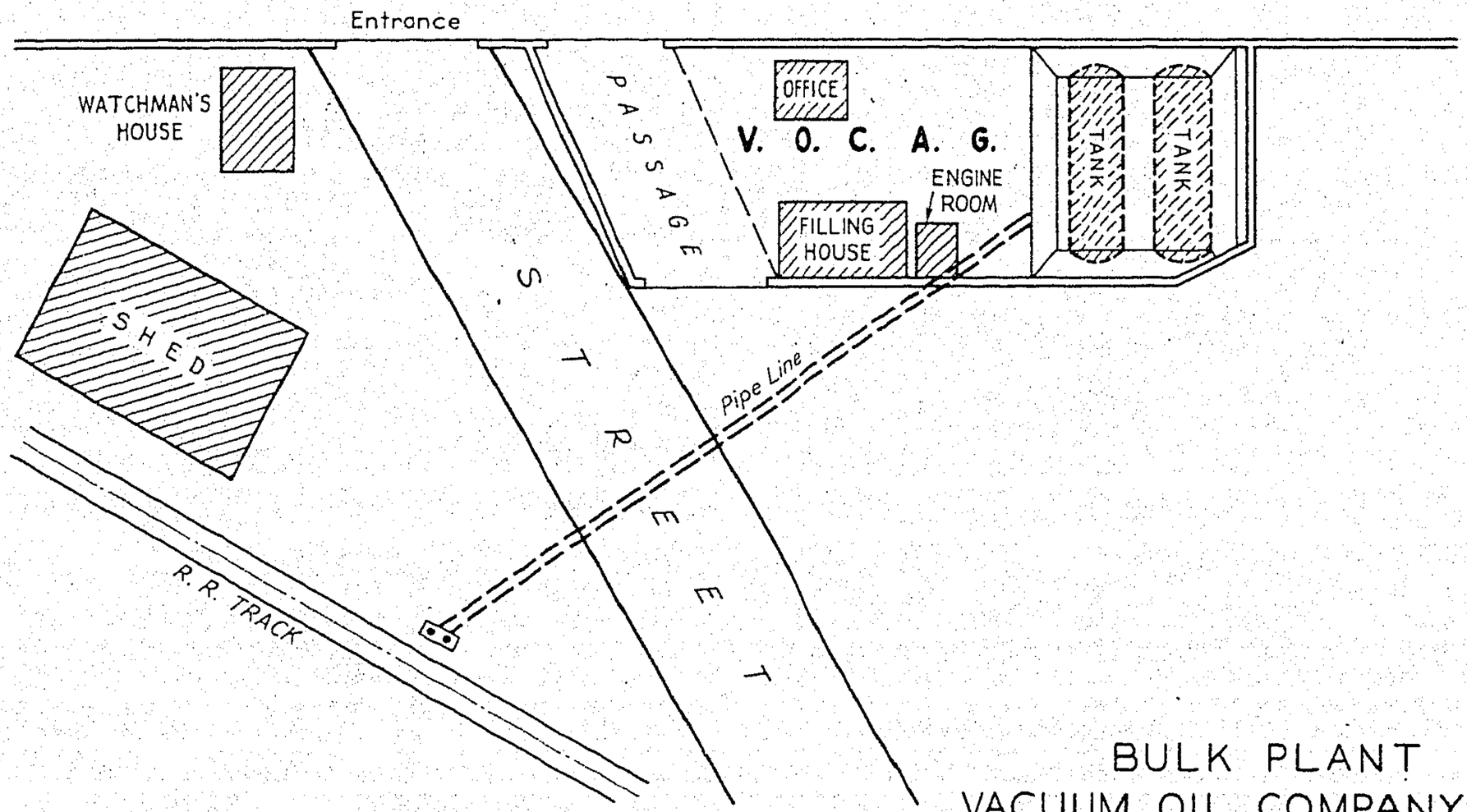
WIEN, AUSTRIA

0 100 200 300 400 FEET

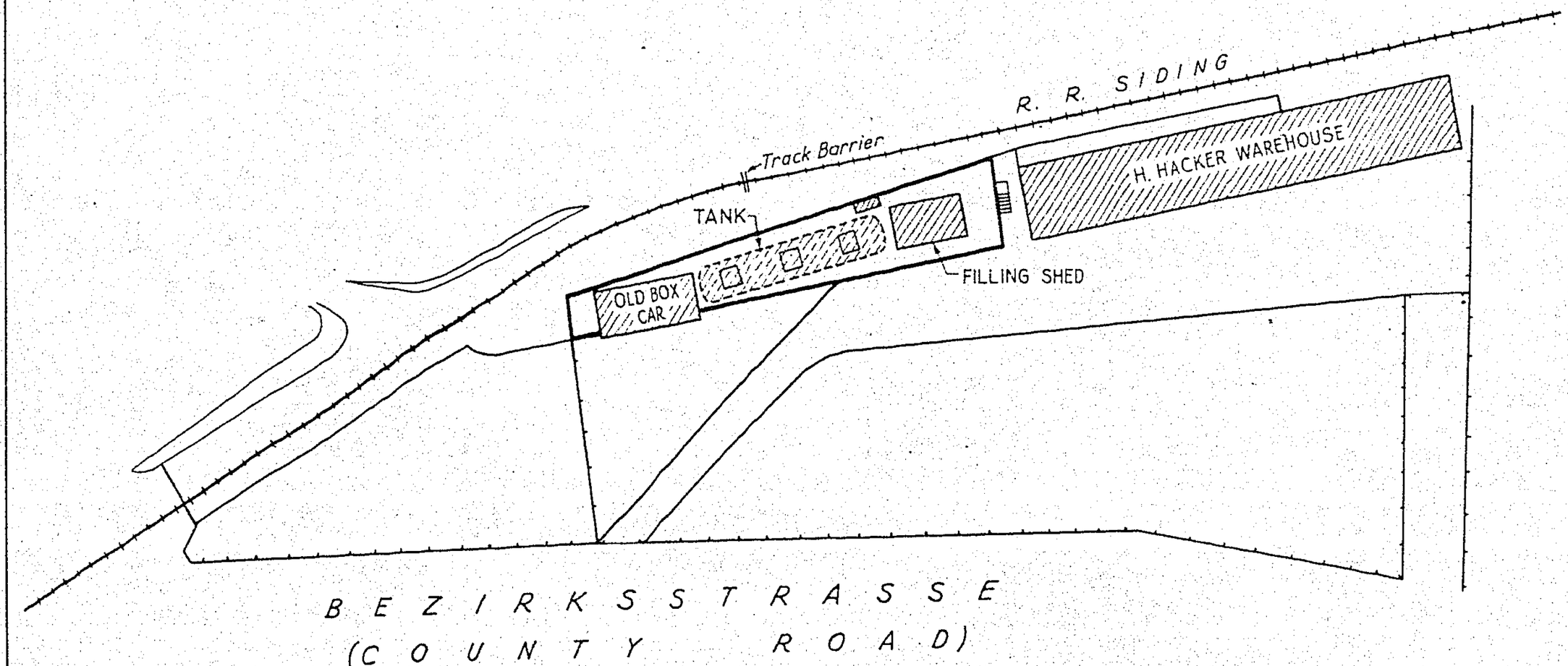
0 25 50 75 100 125 METERS

LEGEND	
1	WORKSHOP
2	TOOL SHED
3	COAL BIN
4	DWELLING & OFFICE BUILDING
5	BOILER HOUSE
6	SMOKESTACK
7	AUTOGARAGE
8	COACH HOUSE
9	FIRE-FIGHTING EQUIPMENT SHED
10	PORTER
11	TRANSFORMER HOUSE
12	GASOLINE & KEROSINE FILLING SHED
13	LUBRICATING OIL SHED
14	SHED
15	PUMPHOUSE
16	LUBE OIL BARREL STORAGE
17	GASOMETER
18	TRACK SCALE
19	LOADING PLATFORM
20	WARM-UP HOUSE
21	HARBOR OFFICE
22	TOOL SHED
23	PRATERSPITZ R.R. STATION

G R A B N E R R I N G



BULK PLANT
VACUUM OIL COMPANY, A. G.
GRABNERRING
WIENER NEUSTADT
UNTER ÖSTERREICH
AUSTRIA



BULK PLANT
VACUUM OIL COMPANY, A.G.
ZELTWEG, STYRIA
AUSTRIA

A P P E N D I X I

CONVERSION FACTORS USED IN THIS REPORT

The conversion factors used in this report are as follows:

Basis.- One metric ton of 1,000 kilograms is divided by the volume of one barrel (159 liters) multiplied by the denisty of the oil at 60° F. (15.5° C.), this reduces to the factor of 6.3 divided by the density of the oil.

Product	Bbls/Metric Ton
Propane	12.4
Butane	11.0
Natural Gasoline	9.16
Aviation Gasoline	8.5
Motor Gasoline	8.5
Light Aromatics (Benzol, Toluol, and Zylenes)	7.2
Ethyl Alcohol	8.0
Methyl Alcohol	8.0
Kerosine	7.9
Diesel Oil)	7.2
Gas Oil)	
Lubricants	7.0
Residual Fuel Oil	6.5
Paraffin Wax	7.5
Asphalts	6.0
Synthetics (average)	8.0
All Products (average)	7.5
Crude Oils	
Albania	6.6
Austria	6.8
Czechoslovakia	6.8
Estonia (Shale Oil)	7.0
France	7.0
Germany	7.0
Hungary	7.7
Italy	7.7
Poland	7.4
Rumania	7.5
Russia	7.28
Crude Oils (Locality unspecified)	7.0
Shale Oils (Locality unspecified)	7.0

Conversion factors are of necessity subject to variations from time to time and from place to place. If meticulous accuracy is necessary, conversion factors must be derived from actual specifications.

A P P E N D I X 2

DOCUMENTS AND DECREES, AUSTRIAN MINING RIGHTS

Document 1: Exploration and Exploitation
2: General Features, Mining Law
3: Petroleum Regulations
4: Petroleum Regulations (Federal Law Decree for Austria)

Document (1) Exploration and Exploitation

Austrian Oil and Gas Rights
Preliminary Formality. Non-Exclusive Search Permit.

Acquisition.. Granted to approved persons on application. Anyone eligible.
Area..... An administrative region of Mines Department.
Period..... One year, renewable yearly if work proceeding.
Cost..... Nil.
Obligation... Continuance of prospecting or mining.

1st Stage. Freischurf

Acquisition.. Immediately upon application by holder of a permit
Unit Area.... Circle with 425 meter radius (effective rectangular size of about 36 ha.).
Aggregate.... Unlimited.
Period..... As long as Search Permit continues valid.
Cost..... 5 Schillings(roughly $ 0.90) yearly per Freischurf (say 2 1/2¢ per effective hectare).
Obligation... Continuous operation to satisfaction of Government and submission of progress reports. (In practice, requirements on several claims may be fulfilled on one).

2nd Stage. Concession.

Acquisition.. Permit-holder entitled to concession upon discovering exploitable substance.
Unit Area.... 45,116 square meters (roughly 4 1/2 ha.) in rectangle with shortest side at least 106 m. Eight such units, roughly whole area of a Freischurf, obtainable on strength of one well 94 meters deep.
Aggregate.... No limitation.
Period..... No limit, subject to yearly renewal of Search Permit.
Rent..... 6 Schillings yearly per unit, or 48 Schillings per group of 8 units, (roughly 1 1/3 Schillings-say $0.24 - per hectare per year).
Royalty..... None
Obligation... Continuous operation to satisfaction of Government. Law leaves authorities wide discretion.

Document (2) General Features, Mining Law

1. The general features of the Austrian mining law which also covers crude oil and natural gas are:

First, the miner has to obtain a general permit (Schurfbewilligung), which is good for one year and can be extended from year to year.

Mining rights

Whoever intends to go into exploration of a territory obtains the exclusive right to do this by announcing to the mining office the so-called "Freischurf". Each "Freischurf" grants the right for exploration and/or drilling in an area forming a circle with a diameter (a) of 425 meters (1,394 feet).

The "Freischurf" right, however, does not yet give the right to exploit the minerals found in the mentioned "Freischurf" because the minerals themselves are considered property of the state. The right of exploitation has to be granted to the Freischurf owner when he proves that he has found a mineral in quantities and qualities worth exploiting. This right is granted (Verleihung) generally for an area comprising 45,116 M^2 (einfaches Grubenmass).

For each crude oil discovery eight of such Grubenmasse are allotted.

It is up to the applicant to fix the location of the Grubenmasse. The form of a Grubenmass has to be a quadrangle (b), of which the shorter side must not measure less than one hundred and six meters (347 feet).

The above general rules have to be kept in mind in connection with the answers given under II.

II Questions:

(a) What substances are covered along with petroleum.

The Grubenmasse is allotted for all minerals which are reserved to the state. The Freischurf gives the exclusive right to seek for the minerals reserved to the state. (The minerals reserved to the state are: minerals containing metals, sulphur, alaun, vitriol, salt, cement waters, graphite, all kinds of hard and soft coal, bitumens in gas form, liquid or concrete, especially earthwax, asphalt, crude oil, earthgas, and stones containing bitumens).

(b) Successive stages involved in acquiring rights.

First the Freischurf has to be announced; after crude oil or natural gas has been found in commercial quantities, immediately the "Verleihung", i.e., the actual right to exploit and to acquire the mineral and/or gas, can be applied for and must be granted.

(c) The possible duration of each stage.

The Grubenmasse once acquired are good in perpetuity, if the governmental conditions, prescribed by the "Verleihung" and by the law, are fulfilled.

(d) The size of individual and aggregate areas on which rights may be obtained under each stage, and the limitations thereof:

The single Freischurf is a circle with a diameter (a) of 425 meters.

The single Grubenmasse amounts to 45,116 M^2 of which eight are allotted for each discovery.

These rights can be acquired without limitation under the legal prescriptions and insofar as no rights of third parties are affected.

(e) What steps would be followed in practice in acquiring exclusive rights over large unified areas, for long tenure.

(a) "Radius" according to Art. 31 of law, and reaffirmed in Art. 50 of amendment of July 1925.

(b) A rectangle (Rechteck)

The greatest difficulty arising in this connection is the mining activity which according to law is to be prescribed by the mining office for the "Freischürfe" announced or acquired. It is in the discretion of the authorities to fix this activity. If the land is not proved at all, then they will be satisfied with geological or geophysical searches or shallow drillings. If the land is proved, they will request deep drilling. It is practically impossible to secure terms for this activity for a longer period, unless the tax exemption is granted. When the tax exemption is granted, the extent of this activity is also fixed by the authorities for the period of this exemption.

The requirement of activity according to the law can also be fulfilled for a greater number of adjoining Freischürfe through adequate activity on one or more Freischürfe.

However, satisfactorily arranging the above matters is largely one of arranging the necessary contacts with the government.

(f) What working obligations must be fulfilled in each stage.

The mining law of 1854, with subsequent amendments, is quite general in this connection. It speaks only of obligatory permanent operations, eight hours work and the necessary number of workmen to be employed, thus leaving the final decision to the discretion of the mining authorities.

In case the prescriptions are not fulfilled the mining rights can be cancelled or transferred to another who takes over the obligation to carry them out.

(g) The rents and other forms of participation due to the state.

The state has no participation. Only the yearly fees have to be paid to the state amounting to:

5 Austrian Schillings yearly for each Freischurf
6 Austrian Schillings yearly for each Grubenmasse

(h) The degree to which an operator holding permits enjoys an assurance of obtaining subsecuent rights and the fruits of his work.

Subsequent rights can be obtained under the above procedure only by placing new "Freischürfe", where this is possible, by obtaining "Grubenmasse", or by purchasing "Freischürfe" or "Grubenmasse". The obtaining of the fruits of the work is secured by law. It is to be kept in mind that the general attitude of the authorities is very favorably disposed towards the operators so that unfair treatment is unlikely.

(i) Any special reservations made by the state that might be burdensome.

Practically the only burden is the obligation to keep the mining activity in permant operation according to the prescriptions of the authorities.

(j) Any special encouragement offered to oil operators in the way of tax exemption or otherwise.

By a special law the following favours can be granted to the operator for a specific plot of land if the drilling for crude oil and/or gas is started before the end of 1937:

(a) Exemption from corporation tax for the period of 6 yesrs from the first commercial discovery.

(b) Exemption from all stampfees for contracts, of fees for foundation

of companies, capital increases, fees for purchases of immovable property, etc. for a period up to 2 years from the first commercial discovery.

(c) Exemption of Freischurf fees for the same time.

These favors are made dependent upon fulfilling of certain drilling obligations, and upon other conditions, e.g., domestic materials are used as far as obtainable, etc.

Document (3) Petroleum Regulations

Promulgated in April 1938

The Austrian Government has decreed that:

No. 1

(1) The Ministry for Trade and Traffic (Supreme Mining Authority) is entitled to impose special prescriptions regarding kind and extent of operation on the granted mining and exploration rights, and is entitled to request proof and guarantee from the mining firm, of their having the necessary means for the fulfilment of the prescriptions.

(2) Should the mining firm not have sufficient means for the carrying out of the prescribed operations, the Ministry for Trade and Traffic (Supreme Mining Authority) is entitled to demand that the respective mining firm should admit to a certain extent and under certain conditions, public or private capital into their concern.

No. 2

(1) If a mining firm does not fulfill the prescriptions imposed according to No. 1, the Ministry for Trade and Traffic (Supreme Mining Authority) is to(a) deprive them of their mining and exploration rights, as well as of all equipment pertaining to the maintenance of operations (254 and 260 a.B.G.), and to allot this mining property unencumbered to the state mining authorities, or to such private concerns as can give full guarantee for the fulfillment of the prescribed operations. Expenditures which, in the authorities' opinion, appear useful for further carrying on of operations, are to be reasonably reimbursed by the party ascertained on a basis of the railroad expropriation law R.G.BI. Nr. 30/1878, and is to be paid to the claimant.

(2) The same provisions can be applied by the Ministry for Trade and Traffic (Supreme Mining Authority) to mining firms who disregard the mining law regulations (170 ff a.B.G.).

(3) The competent courts for the keeping of mining- and exploration- rights registers are to be informed of decisions taken in line with 1 and 2 by the Ministry.

No. 3

This law becomes valid on the day it is decreed. The Austrian Ministry for Trade and Traffic is charged with the carrying out of the above regulations.

Document (4) Petroleum Regulations, Federal Law Decree for Austria

Published August 12, 1937. (TRANSLATION)

278. Decree of the Federal Ministry for Trade and Traffic regarding General Mining Police Regulations for Plants prospecting for, and

(a) May

exploiting crude oil and natural gas.
(Crude Mining Law Regulations)

Based on No. 221 (3) of the General Mining Law, R.G.Bl.No. 146/1854, in the wording of article 50 of the Administration Relief Law, B.G. Bl.No.277/1925, the following Mining Police Regulations are ordained for plants operated for the purpose of prospecting for, and exploiting of crude oil and natural gas by means of drilling.

1. OPERATING PROGRAM

#1. (1) An operating program in duplicate must be submitted to the District Mining Authorities, besides applying for the necessary permit in accordance with Nos. 19 and 173 ABG, before starting operations.

(2) The operating program must state the following particulars:

a.) Name and address of mining firm holding permit.

b.) Name and address of drilling firm, if drilling is not carried out by the mining firm.

c.) Name of well.

d.) Purpose of drilling.

e.) Designation of well location by submission of a sketch on a land-register scale comprising at least 100 meters circumference around the well location. The sketch must give: Administrative District, Assessment District, number and name of land plot, distance of well from the mining permit or mining field boundary. Distance of well from neighboring wells, from roads, localities, railroads, and other overground things, such as water conducts, buildings, woods, water wells, water courses, ponds, the damage of which might endanger public safety.

f.) Description of the drilling method with statement of the intended casing program.

g.) Kind and location of driving power.

h.) Probable depth of well.

i.) Formations to be penetrated and their probable depths.

k.) Intended measures to be taken against water intrusion.

l.) Precautionary measures against gas and oil blow-outs.

m.) Guaranty for possible future plugging of well (No. 83(4)).

n.) All other particulars necessary to form an opinion of the plant, such as: lighting, water supply fire precautions, piping of crude and gas, cleaning of waste water, etc.

#2. Alterations of operating program, the setting in production and the deepening of a well which has already been productive or has been standing idle for longer than three months, has to be reported to the District Mining Office.

#3. If it appears necessary in connection with the intended drilling method, the Mining Authorities are entitled, when giving their consent to the drilling program, to ordain special measures in line with the results of a local investigation, for the ascertainment of the water and oil bearing horizons to be penetrated, as well as precautionary measures for prevention of water intrusion in the oil bearing horizons.

#4. The Mining Authorities are entitled, when giving consent for the drilling program, to ordain at the same time a certain performance within the limit of this drilling program.

#5. The opinion of the Geologische Bundesanstalt is to be requested when drilling in geologically unknown districts. The same applies to cases where knowledge of the geological conditions might be insufficient.

II. SURFACE

Fencing and accessability of plant

#6. (1) If, and insofar as it is necessary from the public safety point of view, the drilling outfit is to be fenced in. However, a sufficient number of safety exits must be provided for the workmen. Excavations within a radius of 10 m of the derrick are to be secured in such a way that they do not hinder escape.

(2) Trespassing is not allowed. Attention is to be called to this interdiction, with reference to the Mining Police Regulations, by notice boards.

Designation of well.

#7. (1) Every drilling and exploitation outfit is to be designated by a notice board giving name of the mining firm, or of the drilling firm, as the case may be, and the name of the well.

(2) Wells no longer in operation, but not plugged, must be so designated.

Plugging of wells.

#8. Wells which are not being operated have to be plugged.

Disposal of mud and rubbish.

#9. Drilling mud, rubbish of every kind, and settlings from crude tanks (No. 23) and crude resulting from blow outs must be stored in special pits.

Water drainage.

#10. Accumulation of precipitation within the drilling area must be avoided.

Protection of neighboring territory and waters.

#11. (1) Neighboring territories and water courses are not to be polluted by drilling mud, rubbish and crude. The building of weirs in water courses for the purpose of accumulating oil is allowed only with permission of the authorities.

(2) Waste water mixed with, or polluted by, crude will be allowed to flow into the natural water course only after sufficient cleansing in separators or by other adequate means.

(3) Separators and crude oil tanks in the vicinity of rivers and creeks are to be installated in such a manner as to prevent pollution of the water course at times of high water.

III. DERRICKS AND ACCESSORY BUILDINGS

#12. (1) The derricks are to be built according to the board of work's regulations, and are to be maintained in good condition.

(2) The safety of movement on the derrick floor must be provided.

(3) The beams of the safety platform leading to the fingerboard must be secured in such a way that they are not in danger of falling.

(4) The stairs leading to the boards must be kept in good condition. They must either be fixed to the sides of the derrick or to the floors. They must project 1 meter beyond the boards, if no hand rails are fitted at this level for going up and down. The stairs are to have safety platforms at intervals of 10 meters at most. The rungs have to be at least 15 cm from the derrick and the wooden stairs have to be mortise-joined or lapped.

(5) For every closed platform a safety window has to be provided, which opens outwards, and from which the ground can easily be reached by means of a rope, a slide rail or a ladder outside of the derrick. Wire ropes are only to be used for this purpose if provided with special devices for safe gliding (derrick slides, elevators, etc.,). A special slide is to be installed for this purpose from the upper derrick floor.

(6) The escaping of gas is to be made possible by sufficient openings in the derrick and machine sheds.

#13. (1) The derricks are not to be locked during working hours, but are, however, to be safely locked while no work is being done, if not specially guarded.

(2) The doors of the derrick are to be easily opened towards the outside and are to be secured against the possibility of automatic closing.

#14. Provision is to be made in the derrick and the attached buildings for the warming of the workmen during the cold season. Similar arrangements are to be made on the floor from which the drill pipe is controlled if the derrick is not completely protected by planking. A special control room is allowed in the derrick.

#15. The buildings containing drilling rig and prime movers are to be spacious enough to allow easy and secure access to all working points.

#16. Only those buildings are to be directly connected with the derrick which contain drilling rig, pumping equipment and the prime movers.

#17. The above buildings are to be dismantled when the wells are finally abandoned.

IV. STORAGE OF CRUDE AND GAS.

Piping of crude and gas.

#18. (1) Crude oil and gas are to be piped from the hole and derrick in such a manner that danger of fire or ignition is avoided.

(2) If the crude is not conducted in closed pipes beyond the derrick, ditches or subsurface drains are to be provided for the crude.

(3) Temporarily closed down wells with gas production must have the top orifice plugged, unless the gas is piped off in such a manner as to exclude all danger. It is forbidden to allow the gas to escape into the air.

(4) If commercial use is made of the gas produced from oil wells, this gas is to be conducted into gas tanks or gas separators. Exceptions can only be allowed with permission of the District Mining Office.

(5) Pipes for gas and oil must be grounded in order to permit the escape of electrical currents created by means of friction.

Crude tanks

#19. (1) Crude pits and tanks must be covered and secured against unintentional access.

(2) Wooden reservoirs which are not dug into the earth must either be insulated by a layer of earth reaching to the top, or must be surrounded by an earth bank high enough to hold the entire contents of the tank. The roof of the reservoir must be strong and fire-proof.

(3) Steel reservoirs are to be surrounded by strong earth banks large enough to hold at least half of the reservoir contents. Absolute cleanliness has to be maintained within the earth banks.

(4) The roofs of the reservoirs are to be provided with ventilation valves unless the gas is piped off in some other way. The ventilation valves are to be secured by wire netting of at least 144 nets per square contimeter. The diameter or side length of these openings is not to exceed 25 cm. Wire thickness 0.35 mm.

(5) Crude pits and low oil reservoirs are to be provided with a fire proof channel for the conduct of gas, with an orifice at least 2 m above ground. This orifice must be fitted with a wire net as described in the former paragraph.

(6) The taps and valves on reservoirs with a capacity of more than 200 m3 must be of cast steel or metal. Wooden reservoirs coated with earth have to have the taps and valves secured by fireproof small locking devices.

(7) Stairs are not allowed in the inside of reservoirs of more than 200 m3.

(8) Steel reservoirs exceeding 5 m in height must be provided on the outside with iron ladders. The access from the ladders to the man holes in reservoirs with vaulted roofs must be secured by railings.

Gas accumulators and separators.

#20. (1) Size and design of the gas accumulators and separators must be suited to the pressure and amount of gas and are to be provided with safety valves to prevent the gas pressure from exceeding the permissible limit. The effective cross section of the safety valve is not to be smaller than the cross section of the joint lines between well and separator.

(2) The gas accumulator is to be fitted with a device indicating at all times the pressure.

(3) The lines running into the gas accumulators and separators must have stop valves both at the accumulators and separators as well as near to the well. These must be closed before the connection between well and gas accumulator is cut off.

Drawing off from reservoirs.

#21. Crude is to be piped from the reservoirs within the drilling area only in such a way that none of it is spilt on the ground. Earth saturated with crude is to be removed or sufficiently covered with dry earth.

Heat ng of oil.

#22. Congealed crude is to be heated by steam or hot water only.

Cleaning of crude reservoirs.

#23. (1) Each crude pit of more than 200 m3 capacity is to be provided with a suitable device, easy of access and easy to handle, which enables complete emptying of the reservoirs.

(2) After emptying, wooden reservoirs must be uncovered and must either be aired for at least 24 hours or steamed out.

(3) Steel crude reservoirs must have man holes at the bottom and outlets in the roof for airing pruposes. The airing and steaming process in bigger reservoirs must be kept up until a workman can enter the reservoir without danger.

(4) Only one workman is to be allowed inside the reservoir while cleaning. The workman is to be secured by a rope and is to be constantly watched by one supervisor and a second workman. The workman cleaning the inside of the reservoir is to be allowed to interrupt work and come out into the fresh air, as often as this may be necessary for the sake of health.

(5) Oil pits can be cleaned from several points after they have been well aired. Each cleaning workman is to be watched from the bank by two men. Workmen cleaning in pits of more than 2 m depth must be secured by ropes.

V. BOILERS.

Location of boiler house.

#24. (1) When installating the boilers, the prevalent directions of wind is to be taken into account, in order to avoid ignition of the gases emanating from the well through the boiler equipment.

(2) The boiler houses are to be situated higher than the derrick and oil reservoirs if possible. In those cases in which this is not possible owing to the condition of the territory, the boiler houses are to be safe-guarded against oil inflow by earth banks.

(3) It is forbidden to cut trenches or groves in the direction towards the boiler houses, in which oil might flow from the derrick, from the crude reservoirs or slush pits.

Equipment of boiler houses.

#25. (1) The walls of the boiler houses must be air-tight. Wooden wall parts, facing the hearth within a distance of 4 m. must be protected by sheet metal.

(2) The boiler house must be large enough to allow easy and safe access to all parts of the boiler. A free space of at least 2 m must be provided between that side of the boiler where the hearth is and the opposite wall.

(3) Each boiler house must have at least one other door leading out as safety exit, beside the main door. Other rooms connected with the boiler house must also be provided with such a door. If the boilers are situated at a distance of less than 60 m from the derrick, the doors of the boiler house and the stoke hole must face in the opposite direction to the derrick. The doors of the boiler houses must open outward.

(4) The floor of the boiler house is not to consist of wood.

(5) The roof of the boiler house is to be made fire proof within a radius of 50 cm around the chimneys.

Heating.

#26. (1) It must be possible to shut off tightly the fire-box and the fire pipe.

(2) Cinders and ashes from the fire must be properly extinguished before being removed from the boiler house.

(3) The chimneys of the boiler house are to be provided with spark catchers. Soot is to be removed from both as often as necessary.

Heating with Gas.

#27. (1) If gas is used for heating the boilers, this gas must be free of oil.

(2) The gas conduits must be kept in good condition, and are to be provided with check valves, as well as with drain taps.

(3) The last external piece of conduit is to be provided with two safety nets fitted at 10 mm from each other in a special enclosure, with a netting of 144 to the square cm and a wire thickness of 0.35 mm. The enclosure must be so made that the nets are easily accessible. Stop valves must be fitted in the conduits on both sides of the enclosure. The wire nets are to be frequently thoroughly cleaned.

Heating with crude.

#28. (1) If crude oil or crude oil distillates are used for heating purposes, measures are to be taken for smokeless burning.

(2) In general liquid fuel must be kept outside of the boiler house in well-closed steel containers. A daily supply of heavy oils and crude distillates may be stored inside the boiler house. In this case the containers must be placed on the side opposite to the fire box.

(3) The inside containers may only be fed with liquid fuel through a conduit.

Insulation of pipe lines.

#29. Inflamable insulation is not to be used for pipe lines within a circumference of 30 m around the well. The insulation of steam conduits must be suited to the degree of heat of the steam.

Fire tending.

#30. (1) The tending of the boilers is to be entrusted only to experienced stokers more than 21 years of age.

(2) The stokers are not to be charged with duties which prevent them from taking proper care of the boilers.

VI. INTERNAL COMBUSTION ENGINES

#31. The regulations for steam engines are to be applied judiciously also to the internal combustion engines.

Erection and disposition.

#32. (1) Internal combustion engines with external danger of ignition may only be erected within a radius of 30 m of the well crude and gas containers, if they conform with the conditions named sub. No. 36 (2) a-d.

(2) Internal combustion engines erected in the derrick or within a radius of 30 m from the well, crude and gas containers must conform to the following conditions.

a.) They must have internal ignition.

b.) The temperature during work is not be be so great (more than 200° C) as to ignite gas mixtures.

c.) All openings on the machine are to be secured in such a manner as to avoid ignition of existent gas mixtures.

d.) The suction conduit must be properly fixed. The suction orifice must be outside of the engine hut and at least 30 m from the bore hole.

e.) A safety net is to be fitted into the suction line as near to the suction orifice of the motor as possible.

f.) A flap is to be fitted in the suction conduit to enable a quick and safe shutting off against the motor. It must be possible to handle this valve by remote control from the derrick as well as the machine itself, and must be fixed by a spring, weight or other device to prevent unintentional opening.

g.) The exhaust box must be safely fixed in such a way as not to become pervious through vibration.

h.) The exhaust pipes are to be cooled with water on those parts where a heat of more than 200°C might develop.

i.) An exhaust box is to be fitted into the exhaust pipe to prevent flames from getting outside.

k.) The exhaust pipe is to lead out into the free air. The outlet must be at least 30 m from the well, crude oil and gas containers.

l.) Exhaust pipe and box must be kept clean.

m.) Safety valves, out of which flames or sparks might be ejected when blowing off, are to be covered.

These covers are either to be directly connected with the exhaust pipe or are to be provided with spark extinguishers (gravel pots, etc.).

n.) Gauge cocks are to be avoided. Where on hand, they are to be shut off with sealed plugs, to prevent unauthorized persons from handling them.

o.) Kindling by means of a spill lighted at an open fire is forbidden. Kindling by means of electrical heated igniting apparatus is only allowed if this apparatus conforms to the regulation for vapor-proof equipment.

p.) In as far as compressed air is used for starting, care has to be taken to use only such lubricants for the air cylinders and slide valves, as have a flash point above 200° C.

#33. Internal combustion engines must be minutely controlled in all their parts by authorized experts at least once a year and before being put into operation. The report of the experts is to be entered in a special book.

VII. ELECTRICAL EQUIPMENT.

Erection of machines and equipment.

#34. Electrical machines and switch boards are to be erected in such a way that no oil can penetrate in the machines or equipment even during unexpected strong oil blow outs.

Vapor-proof installation

#35. High-power electric current equipment in the derrick and connected buildings must be vapor-proof.

Non vapor-proof installations.

#36. Non vapor-proof high power electrical equipment is only allowed at a distance of at least 30 m from the well and from the crude and gas containers.

(1) The District Mining Office will allow non vapor-proof equipment at a smaller distance only under the following conditions.

a.) They must be disposed in gas proof cases or buildings.

b.) The buildings mentioned (in sub. a.) must be separated from the derrick and the attached rooms by a distance of at least 2 meters permitting a free passage of fresh air.

c.) The walls of the buildings mentioned (in sub. a.) must be air-tight. Fissures in walls and doors must be covered by slats. Only the shafting for power transmission and distributing apparatus may project from the wall facing the derrick if air tight.

d.) No windows or doors are allowed in the walls of the building mentioned sub a.) on the side facing the derrick. The door of the machine house must be on the side facing away from the derrick.

Blank lines.

#37. Blank lines are only allowed at a distance of at least 30 m from the derrick, the connected buildings and the crude and gas containers. The electric conducts to the machine houses and derricks must consist of cables or must be enclosed in grounded iron or steel pipes.

Pauses in operations.

#38. (1) All electrical current, with the exception of the current needed for lighting purposes, is to be switched off, as long as work is at a standstill.

(2) Only licensed personnel and supervisors are allowed to handle the electric currents, machines and insulators.

Control.

#39. Electrical high power currents must be controlled in all parts at least once a year by an authorized expert. The report of the export is to be entered in a special book.

VIII. OPERATION OF EQUIPMENT.

#40. All workmen in cuestion must be informed of the starting and stopping of machines, the working of the wire line or drill pipe, by the driller or foreman, or they are to be notified by a special signal.

(2) Machines and drill pipe are not to be handled without special orders and expert supervision, when dangerous work is to be done.

IX. HANDLING OF CONDENSED AND LIQUIFIED GASES

#41. The regulations of the decree B.G. BL. No.227/1927, regarding boilers, steam containers, pressure tanks, and steam driven machines are to be applied to the handling of condensed and liquified gases.

X. LIGHTING

#42. In addition to the plant lighting provided in No. 10 of the General Mining Police Regulations the derricks, machine houses, workshops and working places with insufficient daylight are to be lighted according to the following regulations.

Electrical lighting.

#43. As a rule electrical lighting is to be used. Other lighting means can also be used with the consent of the District Mining Authorities.

Installation of electric lighting.

#44. (1) The lamps in the derrick, and in the connected building as well as at the crude and gas containers and in a radius of 30 m from the above equipment, must be fitted with tightly closing safety glasses and nets.

(2) Furthermore only unbreakable material is to be used for the lighting equipment (except the lamps and protective glasses) in the derricks.

(3) The switches for the lamps are not to be mounted on the lamp themselves.

(4) It must be possible to switch off all lamps in the derrick and connected buildings from a safe place, protected from blow-outs.

(5) Lamps are only to be changed when the current is cut off.

(6) The lighting conduits are to consist of either cable or grounded iron or steel pipes.

Emergency Lighting.

#45. At least two vapor-proof flash lights are to be provided in each derrick for the event of the electric current breaking down.

XI. HEATING.

#46. Derricks and the connected buildings are only to be warmed by remote heating. Only such heating apparatuses are to be chosen which cannot be heated to more than 200° C. Other heating apparatuses are only allowed with the special consent of the Mining Authorities.

XII. FIRE PREVENTION.

Interdiction of actions leading to danger of fire.

#47. It is forbidden to light fires, carry open light, ignition or inflammable material, to smoke, shoot with fire weapons or handle glowing substance within a radius of 30 m of the well, crude and gas containers, as well as all places where crude, gas or other inflammable stuff is kept. This interdiction is to be posted at visible places.

#48. A fire extinguishing plan is to be made with the advice of a fire expert and is to be submitted to the District Mining Office. This plan is to indicate, which of the employees is to act as fireman and his substitute. A cooporation with the fire brigade is to be taken into account. The District Mining Office is to be taken into account. The District Mining Office is to determine the quantity of water mentioned sub #49 (1), when giving consent to the submitted plan.

Fire extinguishing equipment.

#49. (1) A sufficient quantity of water is to be kept on hand, if derrick and other buildings are of wood. This water provision may be substituted by connection with a strong and reliable water or steam conduit.

(2) A sufficiently strong extinguisher must be on hand. Every derrick is to be provided with at least two portable extinguishers, suited also for extinguishing electrical equipment fires.

(3) Special extinguishing apparatuses are to be provided for crude and gas storing and treatment equipment. This equipment can only be put into operation after the Mining Authorities have checked the fire extinguishing installations.

(4) Sufficient spare parts and refills are to be kept on hand for the extinguishing apparatuses.

(5) According to location, kind and size of plant, sufficient fire suits, helmets, gas protectors, spades, shovels, clamps, hatchets, buckets, hoses, sand, etc., have to be kept on hand.

(6) Posters are to show where the nearest fire extinguishing equipment is kept.

(7) The entire extinguishing equipment is to be examined twice a year. If thought necessary by the District Mining Office, this will be done by a fire expert.

Firemen crew.

#50. (1) Each drilling plant has to have several men trained as firemen. In order to keep up a certain degree of preparedness, the men are to be drilled at least once a month, and the conditions presented must be as near to facts as possible. Records are to be kept of the training of the firemen and the fire alarm practices.

(2) Agreements are to be made with local fire brigades of the neighboring villages regarding cooperation in case of fire.

(3) It is possible to provide, with the Mining Office's authorization, joint fire equipment and crews for several drilling plants.

Giving alarm in case of fire.

#51 (1) The local fire brigade and the Mining Office are to be immediately notified of the breaking out of fire.

(2) Furthermore the neighboring drilling plants are to be notified of the breaking out of fire without delay, if possible by specially agreed signals, so that measures can be taken to prevent the fire from spreading to their equipment.

Extinguishing of burning crude containers with water.

#52. (1) Burning crude containers are only to be extinguished with water if proper equipment is used for this purpose.

(2) Small containers can be covered with wet covers.

XIII. SAFETY DISTANCE.

a.) Wells.

#53. (1) Wells must be situated at least 30 m from every point of the Freischurf or mining field boundary, and from other wells belonging to the same mining firm. The Mining Office is entitled to prescribe an increase in this distance, if the conditions of the oil zone make it appear advisable... The well must be situated at least 15 m from public roads, localities, traffic points, water wells, water courses and ponds.

(2) The distance from huts and buildings with fire places (boiler houses, forges, huts, etc.) within the drilling plant must amount to at least 30 m.

(3) The wells must be situated at least 30 m from woods. In certain cases the Mining Office can allow a reduction of this distance.

(4) Shrubs and dry grass are to be removed within a radius of 30 m from the well.

(5) Multiple wells are considered in this connection as one well.

b.) Crude containers.

#54. (1) Crude containers and pits with a capacity of more than 300 m3 must be located at least 40 m from the well and from all buildings in which there is heating, and from public roads. The distance for smaller containers and pits has to be at least 20 m.

(2) The Mining Office can allow the above distances to be reduced for crude containers and pits of less than 300 m3 under certain circumstances.

c.) Gas accumulators.

#55. Gas accumulators and separators must be located at least 30 m from wells in operation, and from all buildings in which there is heating, as well as from the public roads. If the capacity is smaller than 10 m3 they can be located at a smaller distance from the wells.

d.) Oil pump stations.

#56. Pump stations have to be located at least 15 m from inhabited houses, forges, boiler houses and public roads.

e.) Internal combustion engines.

#57. The regulations of #52 are to be applied for the distances to be maintained from internal combustion engines to wells and to oil and crude containers.

f.) Electrical equipment.

#58. The regulations of #36 are valid for the distance to be maintained between electrical equipment and wells, crude and gas containers.

g.) Habitations.

#59. The wells must be drilled at least 100 m from any house.

XIV. DRILLING OPERATIONS.

#60. (1) The wells are to be drilled as straight as the technical equipment will allow. A special consent of the Mining Authorities is necessary for offset drilling.

(2) The mining authorities are entitled to control the well direction, and to ordain measures for the protection of the rights of other parties, and for drilling in the intended direction. The Mining Office is entitled to demand that the drilling method be changed to this purpose.

Presence of field superintendent and driller.

#61. (1) The field superintendent or his assistant appointed according to #8 of the executive regulations attached to mining field superintending law, N.G. Bl.No.75/1894, must be constantly present or must keep within reach. Difficult or dangerous work must be personally supervised.

(2) The driller or his assistant are not to absent themselves either from the derrick without special reason during operations or from the drilling plant during shift time.

Control of safety measures.

#62. The driller or his assistant must convince himself before drilling work is started, that the drilling equipment such as rig lines, crown block, pulleys etc. are in good order.

Securing of hoists and detachable connecting pieces.

#63. (1) The mechanically operated winches and hoists used for the lifting and lowering of heavy pieces of drilling equipment are not to have a lock wheel.

(2) All material connected with the drilling equipment, such as bolts,

THIS PAGE IS UNCLASSIFIED

straps, shakles, lifting caps and similar easily detachable things must be secured as far as possible against unintentional loosening or falling by suitable devices such as safety chains and pegs, etc.

Protection against sparks from brakes.

#64. The brakes on rigs and drives in the derrick must be built in such a way that no sparks are emitted while handling or cleaning.

Protection against falling or dropping objects.

#65. (1) The danger of slipping has to be guarded against in a suitable manner.

(2) The workmen must be secured by firmly attached safety belts while carrying out dangerous work in the upper part of the derrick.

(3) It is forbidden to leave objects lying around on the working boards.

(4) The wearing of clogs on the working boards of the derrick is not allowed.

Evacuation of the derrick.

#66. (1) Workmen not needed are to leave the derrick while any work which puts an unusual strain on the derrick is being carried out.

(2) Work is to be interrupted during storms and the workmen are to leave the derrick.

XV. PRECAUTIONS AGAINST OVERLOOKING OIL BEARING HORIZONS WHILE DRILLING AND AGAINST WATER INTRUSION.

Conductor.

#67. The head of the well is to be secured by a properly built-in conductor. In those wells in which there are water bearing beds near the surface, the conductor is to be run to the water impervious formation, unless other casing is provided.

Exploration wells.

#68. The drilling method in exploration wells must enable one to establish with certainty minor crude and gas shows while work is being carried on.

Drilling with and without drilling mud.

#69. (1) Provision must be made while drilling flush wells to meter the drilling mud.

(2) If salt beds are penetrated, only such drilling mud is to be used as will not dissolve the salt.

(3) If unusual loss of drilling mud is noticeable, the cause is to be ascertained, and an attempt is to be made to find suitable preventive measures. Should it be impossible to keep up the circulation, then drilling is to be stopped, and the District Mining Office is to be informed. The necessary work is to be carried out in compliance with the Mining Office's orders, and drilling is to be resumed only with their consent.

Encountering of water bearing formations.

#70. The Mining Office is to be informed instantly of the encountering of water bearing horizons.

Coring.

#71. (1) A record is to be made of the petrographic and geological formations penetrated. The Mining Office is entitled to demand the taking of cores in order to test possible oil shows. They can furthermore demand that the samples of certain formations to be tested be currently examined by ultra violet rays for oil shows, at a predetermined research laboratory.

(2) The Mining Office can ordain that the formations be determined by electrical logging, or other suitable means.

Casing.

#72. (1) In tested areas, drilling is to be stopped before reaching the first oil bearing formation, casing is to be run in and set to shut off water. In untested areas this water shut off is to be carried out at latest, as soon as it becomes evident that the well has penetrated oil bearing formation. Exceptions need special permission of the Mining Office.

(2) Only such casing is to be run in the well as is consistent with the general standards, valid all over the world.

(3) Water shut off casing is neither to be pulled, nor to be carried further down while drilling, without permission of the Mining Office. Applications for removal of casing are to have a formation profile attached, in line with the regulations of #80, giving furthermore the diameter and the present as well as future depth of the casing run in.

Shutting off water.

#73. (1) Subsurface water must be tightly shut off in such a way as not to penetrate or come into contact with oil bearing formations.

(2) The Mining Office is to be advised every time and without delay of forthcoming plugging off of water. At the same time the method is to be indicated. These operations are only to be carried out in the presence of a Mining official.

(3) Operations are only to be resumed after the Mining Office has made sure of the effectiveness of the water shut off. The Mining Office is to be informed when this control can take place. If this control is not carried out within three days of the date the information was given, drilling work can be resumed.

(4) In order to test the effectiveness of the water shut off, drilling is first to be done below the shoe of the casing which was set to shut off water, in the same diameter as the casing size. This drill out part of the hole is to be left open. The liquid level is then to be lowered in the well to the depth of the last water bearing formation. The water shut off is only to be acknowledged as perfect if the lowered liquid level remains unaltered for at least 24 hours.

(5) Besides the method of bailing, the effectiveness of the water shut off can also be tested by putting on pressure or any other reliable method.

Calling neighbors during the control of water shut offs.

#74. The mining authorities are free to call in neighboring mining firms for the official water control, in order to give them the opportunity of raising objections if well founded.

Interposition of Mining Office in cases of water intrusion.

#75. If the Mining Office becomes cognizant of water intrusion in a region through a well, they can carry out a local control, jointly with the neighboring mining firms and experts, and may then order the necessary precautions to be taken.

XVI. PRODUCTION

Production string.

#76. A special production string is to be run in before starting regular production in order to protect the casing shutting off the water. Exceptions must have official permission.

Alterations of casing.

#77. Changes are only to be carried out in the casing of wells with the permission of the Mining Office. The same applies to the slotting or shooting of casing, if not already previously conceded in the operation plan.

Water encroachment during production.

#78. (1) If water intrusion is noticed during production operations, the Mining Office is to be immediately informed of this occurrence.

(2) If the Mining Office becomes cognizant of such water intrusion, they are entitled to demand the taking of samples, which are to be submitted to a testing laboratory. The result of this analysis is to be immediately imparted to the Mining Office.

(3) If the oil well is in danger from water intrusion, the Mining Office is entitled to order the mining firm to take precautions, or to plug the well at their expense.

Preservation of gas pressure.

#79. (1) Continuous production of gas is only allowed with the consent of the Mining Office. Consent is only given if the gas bearing horizons are proven to contain no oil.

(2) The flowing out of gas must be regulated during the entire period of crude production in such a way that the exploitation of the oil horizon is not impaired.

Shooting.

#80. Shooting with torpedos, etc., in wells is only allowed with the Mining Office's permission.

XVII. EXPLOITATION OF CASES OR VERY GASEOUS OIL.

#81. All precautionary measures (such as fitting of master gate on casing with remote control) must be taken as soon as gas is noticeable in the well, at latest, in any case, before reaching the oil bearing formation which will permit the shutting off of the well in case of a blow-out, and the subsequent safe piping of oil and gas.

(2) Exemption from this rule can be granted by the Mining Office for those oil areas which are already well known and in which there is very little gas. A master gate is, however, to be kept handy at the well and is immediately to be installed if the well encounters unexpected oil or gas bearing formations.

(3) The use of oil for circulation purposes while drilling is only allowed with the Mining Office's consent.

(4) Precautions are to be taken if an oil horizon is penetrated to avoid causing a sudden pressure decrease by pulling the drill pipe and thereby lowering the level of the drilling mud. The drilling mud, therefore, is to be replenished while the drill pipe is being pulled.

Procedure in case of blow-outs.

#82.(1) If gas or gaseous crude flows out of the hole in such quantities as to make further work dangerous, the Mining Office is immediately to be informed of the fact, if possible by telephone, with mention of the measures which are intended to be taken. Pending a decision from the Mining Office, efforts are to be made to shut off the well. Further operations need the consent of the Mining Office. If no control is given within 3 days, operations can be resumed.

(2) Furthermore, following measures are to be taken in case of a blow-out.

a.) All those machines in the derrick which are not absolutely necessary for the safety of the well are to be stopped.

b.) The dispensable workmer are to leave the derrick and connected buildings.

c.) If gas has penetrated into the derrick and the connected buildings, these localities are to be well aired.

d.) Any work which might cause sparks has to be avoided.

e.) The stoker has to close the ventilations and ash-pans of the boilers and has to shut the door of the boiler house, and has to put out any open lights that may be in the boiler house. The raking out of the fire or extinguishing with water is not allowed. In the cases of gas-heating, the gas is immediately to be turned off.

f.) If houses in the vicinity appear to be in danger, the inhabitants are to be warned.

XVIII. Plugging and packing of well.

#83. (1) Finally, abandoned wells must be plugged or packed. The Mining Office is to be informed of the abandoning of a well before work for the abandoning is started, and a cross section of the hole as well as a plugging or packing program are to be submitted at the same time. The Mining Office is entitled to control with the aid of an expert the expediency of the intended abandoning. They can also demand that the plugging or packing of the wells which are to be abandoned be carried out within a certain period.

(2) If the shut off casing are pulled the well is to be filled with suitable material, either before or simultaneously with the pulling of the casing.

(3) Open holes which did not encounter any oil or gas bearing formations must be plugged when abandoned. The same applies to cased holes which did not encounter oil or gas bearing formations, if the casing is pulled.

(4) The Mining Office is entitled to demand that an adequate amount be deposited before drilling is started, covering the expenses of a possible future plugging or packing.

#84. The plugging or packing can furthermore be ordained by the Mining Office, if this measure appears necessary for obtaining and maintaining of the greatest possible yield from the oil horizons. In this case the opinion of all neighboring firms in question is to be heard.

XIX. DRILLING RECORDS, SAMPLES AND GRAPHIC RECORDS.

Drilling records.

#85. The current entries in the drilling records are to give the following data:

a.) Depth, thickness, age and pecularity of the penetrated formation, specially of the water, oil and gas bearing formations.

b.) Casing and water shut-offs with confirmation of the official control for the last mentioned.

c.) Depths at which the cores were taken.

d.) Depths of deviation surveys, and degree of deviation.

Samples.

#86. The samples of the penetrated formations, specially core samples and fossils must be kept until the end of the drilling work. After the well has been abandoned, the Mining Office can demand that part of the samples be handed over to a public society of their denomination.

Maps and cross sections.

#87. The following sketches are to be made and kept up to date.

a.) A situation map.

b.) A cross section for every hole.

#88. (1) The situation map is to be drawn on a 1:1000 scale, and has to show the entire surface, location of well, of crude containers and workshops, pits and main conducts, the boundary of the plant, buildings, roads, places, railways, water courses, water wells, ponds, and woods.

(2) A copy of this map is to be submitted to the Mining Office and supplemented at their request at latest three months after starting operations.

#89. (1) The cross section of the well is to give a chromatic picture of the penetrated formations, the water, oil and gas bearing formations based on the drilling records and the samples obtained, the casing size and water shut offs, and other important data, with legible description.

(2) Two copies are to be submitted to the Mining Office within 4 weeks of the termination of drilling work.

#90. The location map and cross section are to conceal nothing and are to give all facts as mentioned above.

XX. WORKMEN.

Appointing of workmen.

#91. (1) Only reliable male workers over 18 years of age are to be engaged for drilling work. Those workers tending machines and other responsible work are to be over 21 years of age.

(2) Every workman has to be instructed by the superintendent or a person charged by him, when starting work, of the dangers and results of igniting the crude oil and gases, as well as of the precautionary measures to be taken.

(3) Flight to safety is to be practised at least once a month by the entire crew.

Order during operations.

92. (1) The serving, and drinking of alcoholic drinks during working hours is forbidden. The same applies to carrying of matches, lighters, tobacco and pipes in the area mentioned sub No. 47. In order to control the observance of this rule, the superintendent is entitled to carry out an occasional personal inspection.

(3) It is forbidden to sleep in the derrick or the adjoining buildings.

Workmen's quarters.

#93. Two sufficiently big and warmed rooms are to be held at the disposal of the workmen; one for dressing and washing, one for resting, warming and taking their meals.

XXI. FIRST AID.

#94. (1) Provision is to be made in every drilling plant for the rendering of first aid in case of accident or sudden illness.

(2) These provisions include:

a.) The keeping on hand of at least one stretcher as well as suitable equipment for the transportation of wounded or sick persons.

b.) A portable dressing-case with the necessary instruments and bandages;

c.) Equipping of the head driller and superintendent with bandaging material as well as storing of bandages at suitable places on the plant.

d.) Instruction of a proper number of persons in first aid for wounded or sick cases.

(3) The above precautions can be taken for several drilling plants jointly, if the wells are not far apart.

XXI. MISCELLANEOUS

Posting of these Mining Police Regulations.

#95. (1) These regulations are to be posted at a suitable place.

(2) The employees charged with the instruction of the workmen are to be given a copy of these regulations on starting work, the workmen are to have an excerpt of these regulations in form of a pamphlet, containing the following subjects.

#6 (2), 9, 11(1), 13(1), 19(3), 21,22,23(4)(5), 26 (2) (3), 30, 38, 40, 44(5), 47, 52, 63(2), 65, 66 82(2), 91, 92, 93.

Exceptions.

#96. (1) The granting of exceptions from the regulations and terms provided in these regulations is reserved to the Ministry for Trade and Traffic, in those cases in which the above regulations do not indicate the Mining Office as being competent.

(2) In cases of immediate danger for life or health of human beings or for the existence of the drilling plant, it is permissible to disregard as far as necessary these regulations without special permission from the Mining Office.

General Mining Police Regulations.

#97. In as far as not otherwise provided in these regulations, the laws of the General Mining Police regulations are valid.

/MP TAUCHER.

I N D E X

Achau prospect, 92.
Aderklaa prospect, 90.
Adolf Hitler (Klodnitz) canal, 131.
Aktiengesellschaft der Shell-Floridsdorfer Mineralöl Fabrik, 9; 11; T-12; 13; 105; L-108-109; T-130; 133; 136; L-140; L-145; 151.
Alt-Lichtenwarth (Pioneer) prospect, 90.
Asphaltic vs. paraffinous crudes, Wien Basin, T-122.
Austria, Consumption of petroleum products, T-11.
See also Imports.
Austria, Customs regulations, Pre-war, 7.
Austria, Petroleum facilities, M-6; 7; T-8; 9.
Austria, Petroleum production. Tables: (1932-44), 8; (1934-1943, 1944), 87; 89.
Gaiselberg, 70-71; 76
Gbely, 29; T-92-94.
Hodonin, T-94.
Kreuzfeld, 87.
Neusiedl, T-67.
Products, T-137.
St. Ulrich-Prinzendorf, T-82-83.
Zistersdorf, (1939, 1943, 1944), 52; (1943-1944), 62; 63.
Austrian Basins, 17; M-18; 19; 21; 23; 27; 29.

Bad Hall area, 21.
Bamberg, 132.
Barge transportation, 7; M-128; 131-132;
See also Danube, Elbe, Main, March Canal, Oder, Rhine, Vistula.
Bavarian Basin, 19; 21; M-18.
Crude oil, 19; 21.
Natural gas, 21.
Production, 19; 21.
Prospects, 19; 21.
Benzin und Oel Industrie A.G. "Kagran" T-12; 13; L-14-15; 105; 110.
Benzol-Verband G.m.b.h., T-12; T-130.
Benzol-Vertrieb der Reichswerke "Herman Göring", T-12
Blank lines, (Law), 168.
Boilers and boiler houses, (Law), 165; 166.
Bombardment. Wells, installations, transportation, etc. 17; 107; 129.
Also See Strategic considerations.
Bratislava refinery, 95; 131.
Breslau, 131.
Budafapuszta Field, Hungary, 21.
Buildings, Accessory (Law), 161.
Bulk plants, M-6; M-104; 131; 132-133.
Feldkirch, (Vacuum Oil Co. A.G.), L-138.
Gratz, (Vacuum Oil Co. A.G.), L-139.
Innsbruck, (A.G. Shell-Floridsdorf), L-140.
Innsbruck, (Vacuum Oil Co. A.G.), L-141.
Klagenfurt, (Vacuum Oil Co. A.G.), L-142.
Krems, (Vacuum Oil Co. A.G.), L-143
Bulk plants (continued)
Lambach, (Vacuum Oil Co. A.G.), L-144
Linz, A.G. (Shell-Floridsdorf), L-145
Linz, (Vacuum Oil Co. A.G.), L-146.
St. Polten, (Vacuum Oil Co. A.G.), L-147.
Salzburg, (Vacuum Oil Co. A.G.), L-148.
Villach, (Vacuum Oil Co. A.G.),L-149.
Wien, (Vacuum Oil Co., A.G.), L-150.
Wiener Neustadt, (Vacuum Oil Co., A. G.), L-153.
Zeltweg, (Vacuum Oil Co., A.G.), L-154.
See also Inland storage facilities River bulk terminals.
Bulk terminals.
See Bulk plants, Inland storage facilities, River bulk terminals.

Casing, (Law), 173.
Cement for concrete for tanks, Estim. 100.
Companies operating in Austria,
Distributing, T-130; T-136.
Holdings, 102-103.
Identification, 11; T-12; 13-14.
Concessions, (Law), 157.
Consumptions of petroleum products, Austria, T-11.
Conversion factors used in this report, 7n; T-155-156.
Coring(Law), 173.
Creditul Minier Österreichisch Rumanische Petroleum-Vertriebsgesellschaft, m.b.h. 11; T-12; 105.
Refinery at Korneuberg, 105-110; P-111; T-130; L-113; 136.
Cross-sections of wells, (Law), 176.
Crude oil.
Analysis, 119; 121; T-122-127.
Artificial, Imports, 7; 9.
Bavarian Basin, 19; 21.
Consumption (1937), T-11.
Evaluation, See Analysis above.
Export to Czechoslovakia, 7.
Imports, Pre-war, 7; 9; T-10.
Production, Estimated (1934-1937), T-87; (1943-1944), T-89; (1932-1944), T-8.
See also names of fields.
Reserves, Gaiselberg, 68; 76; T-75; 78; Kreuzfeld, 87; St. Ulrich-Prinzendorf, 82; Zistersdorf, T-56; 57; 61.
Rumanian, 9; T-10.
Storage (Law), 163.
Supplies, 7; 107.
True-boiling distillation (Zistersdorf), T-127.
Wien Basin, 29-84.
Wildcat wells, 19; 21; M-20; 30; T-86.
Customs regulations, Austria, Pre-war, 7.

Czechoslovakia Wien Basin Fields, 92-95; with T-'s.

D.P.A.G., See Deutsche Petroleum-Aktiengesellschaft.
Danube River, Barge transp. 7; 9; 95n; 129; 131; 132.
Denial operations, 15; 17; 129.
Derricks, (Law), 161.
Designation of well (Law), 161.
Deutsche Erdöl-Aktiengesellschaft, T-12.
Deutsche Petroleum Aktiengesellschaft, T-12; 79; 81; 102.
Distributing, 9; 11; M-104; M-128.
  Barge transportation, 7; M-128; 129; 131-132.
    See also Danube; Elbe, March Canal, Oder, Rhein, Vistula.
  *Bulk plants, M-104; 131-133
    Layouts, 138-150; 153-154.
  Companies, Identification, T-130.
  Denial operations, 129.
  Inland storage facilities, 133.
    Layouts, 138-149; 152-154.
  *Pipe lines, See under that heading.
  Railways, M-6; M-128; 129; 131; 132.
  *River bulk terminals, M-104; M-108; 131-133.
    Layouts, 145; 151-152.
  Sabotage, See Strategic considerations.
  Storage facilities, 9; 129; T-134-135.
    See also Bulk plants; River bulk terminals.
  Strategic considerations, 129.
  Tank cars, T-132.
  Tank wagons, 137.
Distributing companies operating in Austria, Identification, T-130.
Donau Öltanklagergesellschaft, 9; 132.
Drilling operations (Law), 171-172.
Drilling records (Law), 175-176.
Drosing "Nova refinery", 105; 118.

Eichhorn prospect, M-16; 92.
Elbe river, 95.
Electrical equipment (Law), 167-169.
Elwerath, See Gewerkschaft Elwerath.
Enemy denial operations, See Denial operations.
Engines, Internal combustion (Law), 166-167.
Enzersdorf prospect, 27; 91.
Erdöl, See Erdölproduktions Gesellschaft m.b.H.
Erdölproduktions Gesellschaft m.b.H. 11; T-12; 29; 31.
Euragasco, See European Gas and Electric Company
European Gas and Electric Co., T-12; 21; 90; 91.
Everth and Co., A.G. T-12; T-130; 133; 136.
Exemptions (Law), 159-160.
Exploitation rights, 101.
Exploration permits, (Freischurfe), 100-101.
Exploration precautions (Law), 172.
Exports, Austria, 9.

Facilities, Petroleum, Austria, M-6; 7; T-8; 9.
Fanto, See Österreichische Fanto, A.G.
Fanto-Gallia, See Maatschappij voor Beheer van Effecten, (Fanto holding).
Fault structure, M-88
Feldkirch bulk plant, L-138.
Fencing of plants (Law), 161.
Fires and fire-fighting, 17; 129; (Law), 169-170.
First aid (Law), 177.
Fiume, Imports of products from, 9.
Floridsdorf refinery, 95; 105; 107; L-108-109.
Floridsdorfer, See Atkiengesellschaft der Shell-Floridsdorfer Mineralöl-fabrik.
France, Oil supplies, 132.
Freischurfe, (Law), 100-101; 157-160.

Gaiselberg Field, M-30; 67-78.
  Crude, Analysis, T-124.
  Exploitation program (1938-1943), 74 with T.
  Geology, 68.
  Oil-bearing horizons, T-69.
  Operations, (1938-1939), 68.
  Production, 15; Rate, T-74; Probable (1939-42), T-76-77; Anticipated (1944), T-77; Total known and estimated (1943), T-77-78. Production status, T-70-71.
  Reserves, 68; 74; T-75-78.
  Schlumberger reports T-72; T-73.
  Well completion data, T-71.
Gallia Mineralöl-Handels, A.G., T-12; refinery, 105.
"Galtol" Mineralöl-Handels, A.G., T-12; 136.
Gas, See Natural gas.
Gasoline, Retail marketing, 133; 137.
Gbely Fields, Oil and New, Czechoslovakia, 29; Production, T's 92-94.
Geology, Austria, 7; M-18; 19; 21; M-22; 23; 27; T-28; 29; 31; M-32; T-36; 48; T-49; 50; T-51; 57; 64; 68; T-69; 78; 79; 84; 85; T-86; M-88; 89-92; 119-121.
  See also Graphic logs, List of maps and figures, p. 4; Tables, p. 5, and under names of fields.
Germany, Southwestern, Transportation, 131-132.
Gewerkschaft Elwerath, 11; T-12; 102; 103; 107; 119; L-120.
Gleiwitz, 131.
Göding Field; See Hodonin Field.
Gösting wells, M-30; 31.
  Development, T-37.

* For details see these subjects.

Gösting wells (continued)
Graphic logs, 33; 34; 40; 60.
History, 57.
Graphic logs.
Gaiselberg, 41; 58-59.
Gösting, 33; 34; 60.
R.A.G. 35; 60.
Wien Basin, 24-26.
Zistersdorf, 26; 33; 34; 35; 41; 60.
Gratz bulk plant, L-139.
Great Hungarian Basin in Austria, M-16; 21.
Grubenmass, (Law), 158-159.
Gunskirchen prospect, 21.

Heating, (Law), 169.
Hitler, Adolf (Klodnitz) canal, 131.
Hodonin Field, Czechoslovakia, 7; 27;
Production and estimate, Prospect, 94 with T.
Hohenruppersdorf prospect, 89-90.
Holdings in fields, 102-103, M-16.
Hungarian basin, M-18; 19; 21.

I. G. Farbenindustrie A. G., T-12; 119.
Imports, T-137.
Articicial crudes, 7; 9.
Crude, 9; T-10.
Pre-war, 7.
Refined products, 9; 132; T-137.
Inland storage facilities, 133.
Bulk plants, Layouts; Feldkirch, 138; Graz, 139; Innsbruck, 140-141; Klagenfurt, 142; Krems, 143; Lambach, 144; Linz, 145-146; St. Polten, 147; Salzburg, 148; Villach, 149; Wien, 150; Wiener Neustadt, 153; Zeltweg, 154.
See also River bulk terminals.
Inner Wien Basin, Development, Prospects, 19; M-16.
Innsbruck bulk plants, L-140-141.
Installations, Petroleum, M-104.
Internal combustion engines, (Law), 166-167.
Iron and steel for pipe lines, 97; 100.

"Kagran", See Benzin und Oel Industrie A. G. Kagran.
Kagran refinery, 105; 110; P-115.
Kerosine, Retail marketing, 133; 137.
Klagenfurt bulk plant, L-142.
Klodnitz Canal, Adolf Hitler (Klodnitz) Canal, 131.
Kolin, Czechoslovakia, pipe line to, 95, 105.
Korneuburg refinery, 95; 105; 110; P-111; L-113.
Korneuburger Mineralölraffinerie A.G., T-12.
Krems bulk plant, L-143.
Kreuzfeld Field, 15; 29; M-30; 84-85; T-87.
Drilling rates, 85.
Geology, 85.
Kreuzfeld Field (continued)
Production, 15; T-87.
Reserves, 87.

Labor.
First aid, (Law), 177.

Lambach bulk plant, L-144.
Law.
Austria, 100-102.
Documents and decrees, Austria, 157-177.
See also specific subjects.
Lighting, Electric (Law), 168-169.
Linz, Bulk plant and river terminal, L-145-146.
Lobau, Elwerath-Wintershall refinery, 107; 119.
Lovaszi field, Hungary, 21.
Lower Austria, See Unter Österreich.
Lumber for equipment, 100.

Maatschappij voor Beheer van Effecten (Fanto Holding), T-12.
Main River, Transportation, 132.
Manufactured petroleum products and imports, Austria, T-137.
Maps and cross-section of wells, (Law), 176.
March Canal, M-128; 131.
Marketing Companies, Marketing postion, Austria, T-136; 137.
Mediterranean facies, 23.
Mineralöl-Transport und Allgemeine Handels-Aktiengesellschaft, T-12.
Mining Law, Austria, 100-102, 157-177.
See also special subjects.
Montan-Union A.G., 9; T-12; T-130; 136.
Mud and rubbish disposal, (Law), 161.
Musil and Co., Steinberg Rohol Ges., m.b.H., T-12.

Naphtha, See Steinberg Naphtha, A.G.
Natural gas.
Accumulators and separators, (Law), 164.
Bad Hall, 21.
Bavarian Basin projects, 21.
Blow-outs, (Law), 174; 175.
Podersdorf, 21.
Piping (Law), 163.
Production (Law), 174.
Separators, (Law), 164.
Shooting wells (Law), 174.
Storage (Law), 163; 164.
Tanks and reservoirs (Law), 163-165.
Vacenovice Field, 27; 94; T-95.
Wels, 21.
Wien Basin, 19; 27.
Neusiedl Field, 15; 64; 65; M-30.
Drilling 64; 67.
Geology, 64.
Production, 64; T-67.
New Gbely Field, See Gbely Fields.

Niedersulz prospect, 89.
Non-ferrous metals for pipe lines, 100.
Northwestern Upper Austria, Geologic structure, M-22.
"Nova" refinery, Drösing, 105; 118.
"Nova" Öl und Brennstoff-gesellschaft, A.G., 9; T-12; 105; 117; 118.
Nürnberg, 132.

Ober Österreich, Northwestern, Geologic structure, M-22.
Oberlaa prospect, 91.
Oder River, 131.
Odertal, 131.
Oesterreichische Bohr-und Schurf-Gesellschaft, Ges. m.b.H., T-12.
Oesterreichische Fanto A.G., T-12; 105; L-118; 119; T-130; 133; T-136.
Oil fields, Wien Basin, M-30.
Oil Trading Co., See Standard Oil Trading Co.
Old Gbely Field, See Gbely Fields.
Olex Deutsche Benzin und Petroleum G.m.b.H., T-12.
Outer Alpine Basin of Wien, 21.
Outer Wien Basin, Prospects, 19.
Operating program, Filing (Law), 162-163.

Packing of Wells, (Law), 175.
Paraffinous vs. Asphaltic crudes, Wien Basin, T-122.
Passau, 131.
Personnel of companies, 13-14.
Phoenix Oil Products Co., Ltd., T-12;T-130.
Petroleum Facilities, Austria, M-6; 7; T-8; 9.
Petroleum laws, See Law, and specific subjects.
Petroleum production, See Austria, Petroleum production, Crude oil, and under names of fields.
Pioneer (Alt-Lichtenwarth), prospect, 90.
Pipe lines, 95; M-96; 97; M-128; 130-131.
  Floridsdorf-Zistersdorf, Proposed, 97; M-98; Profile, 99; 100.
  Gaiselberg-Zistersdorf, M-96.
  History, 95; 97.
  Iron and steel for, 97; 100.
  Kolin-Zistersdorf, Reported line, 95; 97; 101; 130-131; ext. to Melnik, 130-131.
  Korneuberg, 110.
  Law, 163.
  Lumber for, 100
  Non-ferrous metals for, 100.
  Pumping stations, 130.
Plugging and packing of wells, (Law), 175.
Podersdorf prospect, M-16; 21; 92.
Police regulations, Posting (Law), 177.
Preussag, See Preussische Bergwerks- und Hütten A.G.
Preussische Bergwerks-und Hütten A.G. 11; T-12; 102; 103.
Prinzendorf, See St. Ulrich-Prinzendorf Field.
Probstdorf prospect, M-16; 92.
Production from wells (Law), 174-177.
Program, Recommended, 1.
Prospects, M-16; M-18; 89-95.
  Achau, 91
  Aderklaa, 90.
  Alt-Lichtenwarth, 90.
  Bavarian Basin, 19; 21.
  Eichorn, 91.
  Enzersdorf, 27, 91.
  Gbely fields, 92-94.
  Great Hungarian Basin, 21.
  Gunskirchen, 21.
  Hodonin, 94.
  Hohenruppersodrf, 89.
  Inner Wien Basin, 19.
  Niedersulz, 89.
  Oberlaa, 90-91.
  Outer Wien Basin, 19.
  Pioneer, 90.
  Podersdorf, 21; 91.
  Probstdorf, 91.
  Seefeld, 19.
  Tertiary Basins, M-16.
  Vacenovice gas field, 27; 94; T-95.
  Wien Basin, 26; 89-95.
  Windisch-Baumgarten, 90.
Pumps for retail sales, 137.

RAG, See Rohöl-Gewinnungs, A.G.
RAG wells, 31.
  Development, T-38.
  Graphic logs, 35; 60.
Railway transportation, M-6; M-128; 129; 131-132.
Raky-Danubia, (firm), 29; 31.
"Redeventza" Österreichish-Rumanische Petroleum-Handels-und Industrie A.G., T-12; T-130.
Refineries, M-6; 9; 105; M-104; T-106.
  Bratislava, 95; 131.
  Capacities, 9; 105; T-106; 107.
  Crude supplies, 105.
  Drosing, 105; 118.
  Equipment, 105.
  Extensions, 105.
  Floridsdorf, 95; 105; 107; L-108-109.
  History, 105.
  Kagran, 95.
  Kolin, 95; 105.
  Korneuburg; 105; 110; P-111; L-113.
  Lobau, 119
  Schwechat, 105; 110; 118; L-117.
  Statistical summary, T-106.
  Strategic considerations, 107.
  Summary, 197.
  Vösendorf Fanto, See Wien below.
  War value, 107.
  Wien, 95; 118 with T; 119.
Regensburg, 132.
Regulations, See Law.
Rents (Law), 159.
Reserves, See Crude oil.

THIS PAGE IS UNCLASSIFIED

Reservoirs, See Tanks and reservoirs.
Retail marketing, Gasoline, Kerosine, 133; 137.
River bulk terminals, M-104; M-128; 131-133.
Linz, L-145.
Wien, L-151-152.
See also Inland storage facilities, Bulk plants.
Roads, M-6
Rohoel-Gewinnungs, A.G. 11; T-12; 14; 29; 31; 61; M-69; 74; 78; 91; 95.
Holdings, 102; 103.
Rothneusiedl well No. 1, 91.
Royal Dutch Shell group, T-12; 102; 105; T-130.
Rubbish disposal (Law), 161.
Rumania, Imports from, 7; 9; 13.
Russian front, Oil supplies for, 132.

Sabotage operations, 17; 107; 129.
Safety distances (Law), 170-171.
St. Polten bulk plant, L-147.
St. Ulrich-Prinzendorf Field, 15; 29; M-30.
Barriers between wells, 79.
Casing records, 81.
Conclusions, 190.
Drilling program, Estimated(1939-1944), T-83-84.
Gasoline content, 81.
Geology, 79; 81.
Pressure, 79; 81.
Production, 15; 79; T-82-84. Anticipated, T-84; Probable monthly T-82-83.
Wells 1 and 2; 81.
Reserves; 82.
Schlumberger electrical log, T-80.
Well completion data, 79; 81- 84.
Salzberg bulk plant, L-148.
Sarmatian formation, T-37-38; T-56; T-75.
Schlesien, Transportation, T-131.
Schlumberger electrical logs.
Gaiselberg well 2; 72.
Gaiselberg well 3a; 73.
RAG well, 35.
St. Ulrich well, 80.
Zistersdorf, RAG well 10, 39.
Gosting, 33-34; 40; 60.
Schurfbewilligung (Law), 100-101; 157.
Seefeld prospect, M-16; 19.
Shell, See Royal Dutch Shell and Aktiengesellschaft der Shell Floridsdorfer.
Shell-Floridsdorf bulk plant, Linz, L-145.
Shell-Floridsdorf refinery, 107; L-108; 109.
Shell-Floridsdorfer Mineralöl Fabrik, 9; 11; T-12; 133.
Shutting off wells, (Law), 161.
Silesia, See Schlesien
"Société" Française Industrielle et Commerciale des Pétroles, T-12.
Socony, See Socony-Vacuum Oil Co. and Royal Dutch Shell group, jointly.
Socony-Vacuum Oil Co. T-12; T-130.
Socony-Vacuum Oil Co., Inc. 11; T-12; 102; 105.
SONJ, See Standard Oil Co. (N.J.).
Standard Oil Co. (N.J.), T-12; T-130.
Standard Oil Trading Co., T-12; 97; T-130.
"Steaua" Flussige Brennstoff A.G. T-12; 136.
Steel requirements, Proposed pipe line, 97.
Steinberg formation, 29; M-30; 31; 78-79; 81.
Cross-section, 36.
Geological section, 32.
Steinberg Naphtha A.G., T-12; 64; 67.
Storage facilities, 9; 29; T-134-135; For details See Bulk plants, Inland storage facilities, River bulk terminals.
Storage, Oil and gas (Law), 163-165.
Strategic considerations, 2; 15; 17; 19; 21; 107; 129.
Stratigraphic classification, Austria, T-28.
Sudetenland, Transportation, 131.

Tank cars, T-132.
Tank wagons, Horse-drawn, 137.
Tankage, Retail, 137.
Tanks and reservoirs, Law, 163-165.
Cement and concrete for, 100.
Tertiary sedimentary basins, Oil possibilities, M-18.
Transportation, M-6; M-128; 129-133.
See also Barge transportation, Bulk terminals, Development materials, Routes to Austria. Pipe lines, Railway transportation, River bulk terminals, Tank cars, Tank wagons.
Trieste, Imports from, 9.
True-boiling distillation.

Ulm river terminal, 132.
Unirea, T-130.
Upper Austria, See Ober Österreich.

Vacenovice gas field, 27; 94; T-95.
Vacuum, See Vacuum Oil Co., A.G.
Vacuum Oil Co., A. G., 11; T-12; 13; 110, T-130; 133; 136; 137-139; 142-144; 146-150; 152-154.
Van Sickle wells, 1-3; 79.
Vienna, See Wien.
Villach bulk plant, L-149.
Vistula river, 131.
Vösendorf-Fanto (Wien) refinery, 118, with L; 119.

Wartime use, See Strategic considerations.
Water Drainage (Law), 161.
Wells, See Crude oil, Natural gas.

Wells, Natural gas, 21.
Wien Basin, M-16; 19; 21-87.
Analysis, 119; 121; T-122-127.
Exploration, 27; 29.
Geography, M-18.
Geology, Maps and figures, 18; T-28; 32; 36; 49; 69; 88; and under names of fields.
Graphic logs, See Maps and figures, 4, for list.
History, 27; 29.
Production forecast, T-122.
For details see specific subjects, and names of fields: Gaiselberg, Gbely, Kreuzfeld, Neusiedl, St. Ulrich-Prinzendorf, Zistersdorf.
Prospects, See that subject.
Wien Basin in Czechoslovakia, 92-94 with T's.
Wien bulk plant (VOC), L-150.
Wien refineries, L-118; 119; L-120.
Wien river bulk terminals, 132-133; L-151; L-152.
Wien-Linz railway, 132.
Wiener Neustadt bulk plant, L-153.
Wildcat wells, 19; 21; M-20; 30; T-86; 92.
Willing prospect, 21.
Windisch-Baumgarten prospect, 90.
Wintershall Aktiengesellschaft in Berlin, T-12; 119.
Workman (Law), 176-177. Also see Labor.
Working obligations (Law), 159.

Zeltweg bulk plant (VOC), L-154.
Zistersdorf Field, 7; 15; 50; 57; 61; 62-63; M-30; P-65.
Analyses of crude, T-121-T-125.
Development, 15; T-37; T-38.
Drilling (1943), T-61.
Evaluation of crude, T-126.
Exploration, 7; 29; 31.
Geologic sections, 32; 36.
Geology, 31; 48.
Gösting wells, 31; T-37; T-38; T-40; 57.
Graphic logs, 26; 33; 34; 35; 60.
History, 7; 29; 31.
Oil bearing horizons, M-49.
Production, 15; Estimated (1940-1943), T-63; (1944), T-62; (1939-1944), T-52-53.
RAG wells, T-38.
Reserves, (1938), T-56; 57; 61.
Sarmatian horizons, Development, T-37-38.
Schlumberger electrical logs, See Table, 4.
Topography, 31.
True-boiling distillation, T-127.
Well completion data, T-54-55.