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REPORT ON
NIPPON OIL COMPANY
KUDAMATSU REFINERY

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I. INTRODUCTION

This report records and summarizes technical data on the Nippon Oil Co. (Nippon Sekiyu K.K.) refinery at KUDAMATSU, obtained by the Petroleum Section of Nav Tech Jap on 31 October 1945. The following Japanese personnel were interviewed and assisted in supplying the information presented herewith:

Mr. NISHINO - Vice-Superintendent of Refinery

Mr. MIYAHARA - Business Manager

This plant is a conventional crude oil refining installation with capacity of about 23,000 kl per month based on Kettleman Hill's crude. Facilities are available for thermal cracking and solvent refining of lube oil cuts.

II. HISTORY

This plant is owned and operated by Nippon Oil Co. which it was stated, also operated refineries at AMAGASAKI (near KOBE), YOKOHAMA, TSURUMI, AKITA, NIIGATA, KASHIWAZAKI, HOKKAIDO (near SAPPORO), and in Formosa. All of these installations are crude oil refineries.

The crude unit in the Kudamatsu refinery was built in 1929, and the refinery was laid out to process crudes from the United States. During the war, however, other sources of crude were utilized, especially Sumatra. The Government maintained control of the crude stocks and dictated the amount and type of crudes which could be processed. Table I(E) is interesting in this regard, showing the amounts and different types of crude stocks processed during the war.

The refinery suffered severe damage in three bombing raids, on 29 June, 15 and 22 July, 1945, and was completely shut down as a result.

The total number of employees before the end of the war was 385.

III. DESCRIPTION OF REFINERY

An overall flow sheet for the Kudamatsu Refinery is given by Figure 1(E). Crude oil was charged to Foster-type crude unit built in 1939, with capacity of 23,000 kl/month based on charging Kettleman Hill's crude. Crude gasoline was taken overhead, and kerosene and gas oil taken off as side cuts. The straight run gasoline was treated with Doctor solution, and the kerosene and light oil were washed with dilute caustic and H_2SO_4 . During the war, however, a shortage of both caustic and acid resulted in elimination of the treating steps for these products.

Reduced crude from the atmospheric crude tower was flashed in a vacuum tower operating at about 70mm Hg abs. and waxy oil side cut taken off. This oil could be de-waxed by chilling to $-12^{\circ}C$ and pressing. The capacity of the wax pressing system is 100 kl/day of oil charge or maximum wax production of 250 tons per month. The de-waxed oil was distilled and the light overhead sent to diesel, and the bottoms, after treating, to machine or engine oil.

A portion of the waxy oil side cut from the vacuum tower was also sent to the plant for making high quality lube oils constructed by Lumus in 1941. This plant consists of a 80 kl/day methyl-ethyl ketone de-waxing unit, a clay treating unit, and a 15 kl/day vacuum distillation unit. In the vacuum distillation unit the several viscosity cuts required for marine and automotive engine oils were prepared.

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Under normal conditions, crude heavy or light gas oils were charged to the two Cross units. These units, each of 200 kl/day charge capacity, were constructed by the M. W. Kellogg Co. in 1929 and 1930. During the war, however, the Japanese Government dictated the amount and type of stock, (viz. kerosene, light gas oil or heavy gas oil), which could be cracked. The Cross units produced bunker oil, and cracked gasoline which, before the war, was acid-treated and re-run in a 120 kl/day Smith-Leslie unit.

During the latter stages of the war, pine root oil was being batch distilled and the products blended with natural oils. Some blends of natural oils with vegetable oils, especially palm and soya bean oils, also were used for the manufacture of lube oils.

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Table I(8)
CRUDE OIL DISTILLED AT KUDAMATSU REFINERY, 1942

Month	California (Minda Brea)	Sumatra	California (San Joaquin)	Arabia	Mexico (Posarika)	California (Santa Fe)	Balkapapan (Sanga Sanga)	Mexico Iran	Total
Jan.	4,180,500	2,873,800							7,074,300
Feb.	206,000	4,998,242	1,871,411						7,045,655
Mar.	4,832,450	3,932,556		1,840,053	2,326,466				11,931,525
Apr.	4,384,099	900,072	1,179,360		2,782,756	466,169			9,712,456
May	5,066,990				3,244,708			8,484,394	8,311,298
June									
July									
Aug.							4,606,800		4,606,800
Sept.							22,759	7,017,441	7,040,200
Oct.					3,112,200				3,112,200
Nov.									
Dec.									
Total	18,669,641	11,724,670	3,050,771	1,840,053	11,466,130	466,169	4,629,559	15,501,895	67,348,828

Table II(E)
CRUDE OIL DISTILLED AT KUDAMATSU REFINERY, 1942

Month	Sumatra	California (SanJoaquin)	Mexico (Pozarika)	Palembang (Ababu, Pantocho)	N. Borneo (Seria)	Total
Jan.		131,500			1,236,400	1,367,900
Feb.	4,058,960				1,889,580	5,948,540
Mar.	3,130,528			2,718,207	6,606	5,855,341
Apr.				8,451,296	1,562,050	10,013,346
May					997,714	997,714
June			589,546	8,135,154		8,724,700
July	3,409,717			4,047,483		7,457,200
Aug.					6,000,000	6,000,000
Sept.	1,425,600				5,046,100	6,471,700
Oct.	11,221,500				2,210,100	13,431,600
Nov.	6,381,583					6,381,583
Dec.	3,688,880				8,917,530	12,606,410
Total	33,316,768	131,500	589,546	23,352,140	27,866,080	85,256,034

Table III(E)
CRUDE OIL DISTILLED AT KUDAMATSU REFINERY, 1944

Month	Sumtrs	N. Borneo (Seria)	Total
Jan.	7,405,990	7,298,160	14,704,150
Feb.	12,525,540		12,525,540
Mar.		10,021,300	10,021,300
Apr.		5,540,340	5,540,340
May		4,507,330	4,507,330
June		6,939,410	6,939,410
July		696,660	696,660
Aug.		3,599,990	3,599,990
Sept.		9,468,560	9,468,560
Oct.		1,652,910	1,652,910
Nov.			
Dec.			
Total	19,931,530	49,724,660	69,656,190

Table IV(E)
CRUDE OIL DISTILLED AT KUDAMATSU REFINERY

January-June, 1945

Month	Soerabaya Palembang (Ababu)	N. Borneo (Seria)	Total
Jan.			
Feb.			
Mar.	5,350,050		5,350,050
Apr.	6,255,214	2,000,000	8,255,214
May	1,298,486	1,968,431	3,266,917
June	1,292,075		1,292,075
Total	14,195,825	3,968,431	18,164,256

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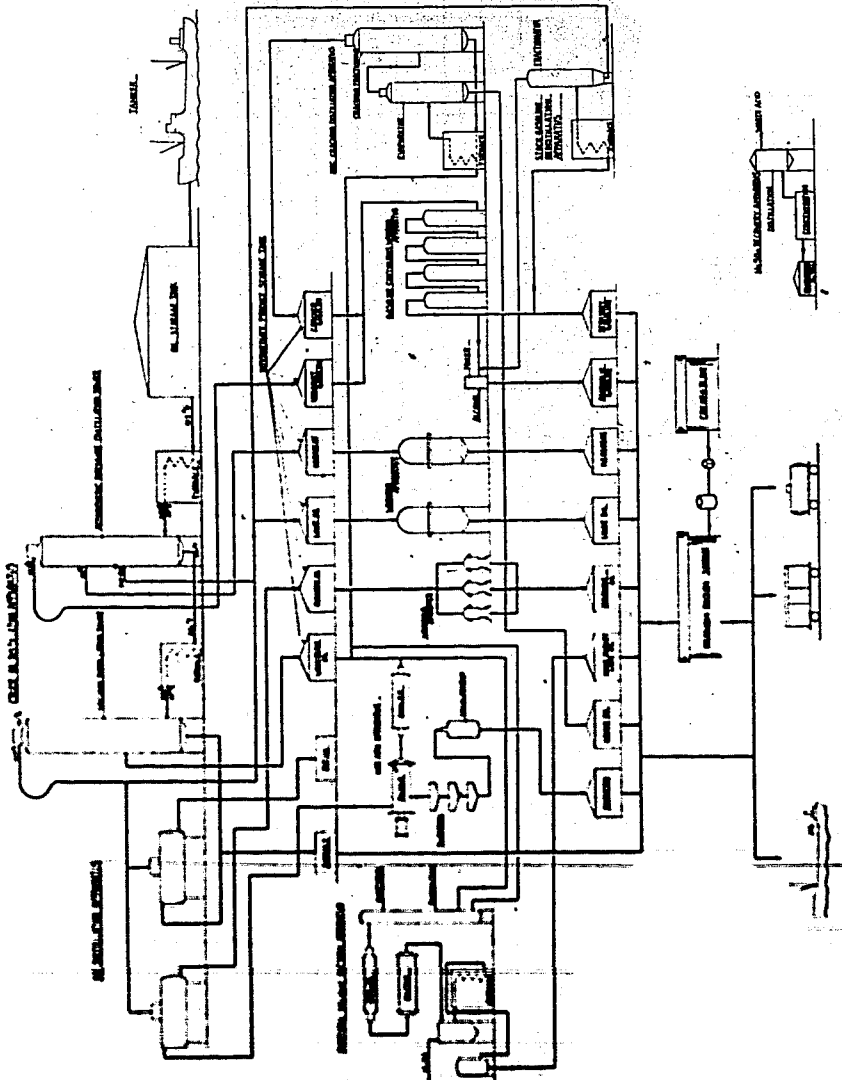


Figure 1(B)
GENERAL FLOOR SHEET