RKr./K-os./Tvh 11.3.1969

THE SAIMAA CANAL

I Deepwater channels and distances on the Saimaa water area

In summer 1968 there were 520 kilometres deepwater channels (4.20 metres) on the Saimaa water area. The network of channels is presented in Table 1.

Table 1. The network of deepwater channels on the Saimaa water area

Lauritsala - Lappeenranta	6 km
Lauritsala - Savonlinna	147 "
Savonlinna - Varkaus	75 "
Haukivesi - Joensuu	142 "
Dredged channels, total	370 km
Kaukopää channel	43 km
Ristiina "	50 "
Putikko "	57 "
Natural channels, total	150 km
Deepwater channels, total	520 km

In addition to this the deepwater channel from Varkaus to Kuopio (75 km) is under construction and will be open for traffic in summer 1972, at which time the length of the channel network will be nearly 600 km.

The total length of the Saimaa Canal is 43 km of which 19.6 km is on the Soviet side. The length of the approach channel from the Vysotski channel is 14.5 km, from Vysotski to the island of Malyj Vysotski 10.5 km and from there to the water border 55 km. The total length of the approach channel and connected sea channels is thus 80 km from the water border to the beginning of the Saimaa Canal (Brusnitchnoe).

In Table 2. are the distances and the estimated travel time to some ports of the Saimaa area from the beginning of the Canal presented.

Table 2. Distances and travel time from Brusnitchnoe to some Saimaa ports

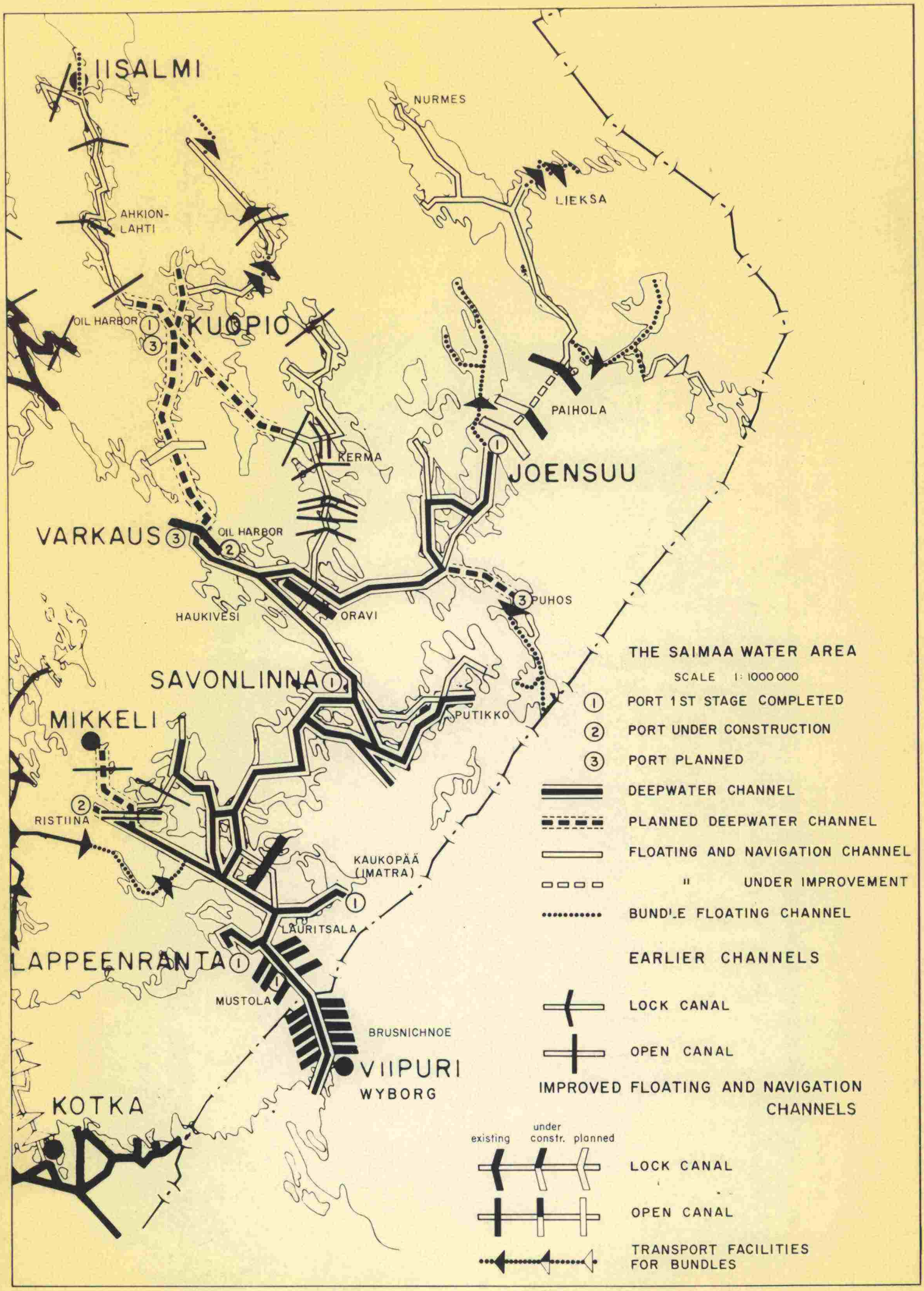
Port	Distance km	Travel time hours
Mustola	38	9
Lauritsala	47	11
Lappeenranta	49	11
Kaukopää	85	13
Ristiina	131	15
Savonlinna	194	19
Varkaus	278	24
Joensuu	389	31
Kuopio	353	29

The travel time through the Saimaa Canal is estimated to 9-11 hours, in average 10 h. The maximum permissible speed on the Canal is 9 km/h (on lake sections 12 km/h). On the Saimaa waterways the speed is estimated to 18 km/h.

The effective dimensions of the Saimaa Canal locks are 85.0 m x 13.2 m x 5.2 m (length x width x depth). The largest permissible ship dimensions are 78.0 m x 11.0 m x 4.2 m x 24.5 m (length x beam x draught x height). The corresponding loading capacity ic c. 1600 tons.

The Saimaa deepwater channels are dimensioned for the same ship size as the Saimaa Canal. The normal dimensions are:

Open channels:	Width at the bottom	45 m
	technical depth	4.8 m
Open canals :	width at the bottom	28 m
	technical depth	5.2 m
Curve radius :	smallest normal	800 m
	smallest exceptional	450 m


IISALMI
NURMES
LIEKSA
AHKION-
LAHTI
OIL HARBOR
KUOPIO
PAIHOLA
KERMA
JOENSUU
VARKAUS
OIL HARBOR
PUHOS
HAUKIVESI
ORAVI
SAVONLINNA
PUTIKKO
MIKKELI
RISTIINA
KAUKOPÄÄ
(IMATRA)
LAURITSALA
LAPPEENRANTA
MUSTOLA
BRUSNICHNOE
VIIPURI
WYBORG
KOTKA
THE SAIMAA WATER AREA
SCALE 1:1000 000
PORT 1ST STAGE COMPLETED
PORT UNDER CONSTRUCTION
PORT PLANNED
DEEPWATER CHANNEL
PLANNED DEEPWATER CHANNEL
FLOATING AND NAVIGATION CHANNEL
" UNDER IMPROVEMENT
BUNDLE FLOATING CHANNEL
EARLIER CHANNELS
LOCK CANAL
OPEN CANAL
IMPROVED FLOATING AND NAVIGATION CHANNELS
existing
under constr.
planned
LOCK CANAL
OPEN CANAL
TRANSPORT FACILITIES FOR BUNDLES

II The possible volume of transports on the Saimaa Canal

The possible volume of transports on the Saimaa Canal has mainly been examined by Liiketaloustieteellinen Tutkimuslaitos LTT (Business Economic Research Insitute).

In 1964 the structure and direction of bulk goods was cleared up by hinterlands of separate ports of Saimaa area (LTT: Study about the possible Volume of Transports in Saimaa ports). On the basis of this an estimation for the early future was made concerning the possible volume of transoports in separate ports of the Saimaa area. The goods under consideration were divided into two main groups and ten subgroups as follows:

A. Goods that will be relatively certainly transported from/to the prots of the Saimaa area
   1. Sawn wood
   2. Mineral fuels
   3. Galuber salt

B. Goods that will be on certain conditions transported from/to the ports of the Saimaa area
   a. Goods that presuppose line shipping to the port in question (or change-over from the present line shipping to tramp shipping)
      4. Chemical wood pulp
      5. Paper
      6. Board
      7. Plywood etc., particle board
      8. Fibre board
   b. Goods that have other conditions
      9. Sulphur concentrate

Condition; that the export will continue on the present level

10. Liquid fuels

Condition; that the construction costs of needed new shoreline stores does not eliminate the savings achieved in transportation costs.

In addition to the goods mentioned the study includes: a) round wood, b) mechanical wood pulp, c) ores and concentrates (other than sulphur concentrate), d) fertilizers, e) fodder, f) scrap, g) corn and h) limestone and cement. The results of this study are presented in Table 3.

In 1967 the estimations of 1964 were verfied by LTT. This was carried out with an interview research which was addressed to such enterprises that have remarkable transportation needs on the hinterland of the Saimaa Canal (LTT: Interview Research about the possible Volume of Transports on the Saimaa Canal). Unfortunately the study results that are presented in Table 4. are not available by separate ports.

During the summer 1968 there was shipped 18 012 tons cargo on the Saimaa Canal (the official opening of the canal took place on the 5th of August). The distribution of goods by ports and cargo groups is presented in Table 5. (advance information from the Canal Statistics).

In export traffic (all vessels sailing down the canal) the mean tonnage of vessels was 263 NRT, 479 BRT. The mean tonnage of vessels sailing up the canal was 155 NRT, 287 BRT. The mean tonnage of all cargo ships on the Saimaa Canal in 1968 was 222 NRT, 406 BRT.

Table 3. The possible volume of transports from/to ports of Saimaa area (tons)

	Port								Total
	Joensuu	Kuopio	Varkaus	Ristiina (Mikkeli)	Savon-linna	Lappeen-ranta	Lauritsala (Mustola)	Imatra	
Group A									
1. Sawn wood	85 000	32 000	18 000	22 000	15 000	46 000	64 000	4 000	286 000
2. Mineral fuels	-	50 000	-	-	7 000	77 000	-	30 000	164 000
3. Glauber salt and sulphur	-	-	-	-	-	-	25 000	21 000	46 000
Group A. total	85 000	82 000	18 000	22 000	22 000	123 000	89 000	55 000	496 000
Group B									
4. Chemical wood pulp	10 500	22 500	16 500	-	-	-	101 000	25 500	176 000
5. Paper	-	-	39 000	-	-	-	-	4 500	43 500
6. Board	4 500	3 000	-	-	-	-	-	152 000	159 000
7. Plywood etc., particle board	4 500	10 000	7 500	16 500	9 000	6 000	6 000	-	59 500
8. Fibre board	-	7 000	-	-	9 000	-	-	-	16 000
9. Sulphur concentrate	45 000	-	-	-	-	-	-	-	45 000
10. Liquid fuels	31 000	38 000	19 500	16 500	10 500	44 000		74 000	233 500
Group B, total	95 500	80 500	82 500	33 000	28 500	6 000 44 000	107 000	256 000	732 500
Groups A+B, total	180 500	162 500	100 500	55 000	50 500	129 000 44 000	196 000	311 000	1 228 500

Table 4. The possible volume of transports on the Saimaa Canal (in tons)

1.	Sawn wood	79 000
2.	Mineral fuels	110 000
3.	Glauber salt and sulphur	6 500
4.	Chemical wood pulp	200 000
5.	Paper	10 000
6.	Board	40 000
7.	Plywood etc., particle board	24 000
8.	Fibre board	10 000
9.	Sulphur concentrate	-
10.	Liquid fuels	270 000
11.	Round wood (domestic transp.)	156 000
12.	Pig iron (domestic transp.)	27 000
	Total	932 500

Table 5. Goods transported in cargo ships on the Saimaa Canal in 1968 (tons)

Goods	Port					Total
	Joensuu	Kuopio	Lappeen-ranta (Kaukas)	Lauritsala (Mustola)	Imatra (Kaukopää)	
Round wood and other raw timber	828		447		300	1 575
Sawn wood				2 814		2 814
Mechanical and chemical wood pulp				669	1 571	2 240
Paper and board					9 284	9 284
Plywood, particle board etc.				131		131
Liquid fuels		1 465				1 465
Cement products		405				405
Other manufacturing products					98	98
Total	828	1 870	447	3 614	11 253	18 012

III The cargo handling in the ports of Saimaa area

A study is made concerning the utilization of the Saimaa Canal and the waterways connecting with it (Euro, Korhonen and Latvalahti: Tutkimus Saimaan kanavan ja siihen liittyvien vesireittien käyttömahdollisuuksista - Study about the Possibilities to utilize the Saimaa Canal and the Waterways in connection with it). In this study several modern cargo handling methods are examined in order to find the most suitable method for the ports of the Saimaa area. The cargo handling methods this study deals with are Ro-Ro, Lo-Lo, To-To and LASH methods.

Conerning the Ro-Ro (Roll on - Roll off) method the study draws the conclusion that the general requirements; the need of space both in vessel and in port restrict the use of this method on the Saimaa area.

The To-To (Truck on - Truck off) method is rejected on basis of relative great wage costs and the limits of side gates of the vessel that cannot be constructed so broad as the sawn wood in packs requires.

The LASH (lighter abroad ship) method is rejected on the basis of the size of the needed vessels.

The Lo-Lo (Lift on-Lift Off) method is recommended as the most suitable method to handle the unit load in the ports of the Saimaa area. In this method the study recommends 7.4 tons to be the maximum weight of cargo units loaded with ship's own cranes. This means that a standardized container is out of the question if cargo handling is going to happen with ship's own cranes. As the main basis for the recommendation of this method is mentioned

the advantages that every part in the transportation process gains as result from the uniform cargo handling. However in this method the main difficulty is the unification of cargo; in this case the production of such units that in advance are prepared for loading by the freighter.

The study examines also the possibilities to use the push barge system on the Saimaa area. No general recommendation is given but there is stated that the system is under certain conditions (eg. over 50 per cent utilization ratio) competitive with other transport methods (railroad).

IV Open water and ice-bound time on the Saimaa area

On the basis of the ice observations made in 1930-60 the open water times of the Saimaa-area waterways are presented in Table 6. in temperate, average and severe winters. In Table 6. A = beginning of open water (date), B = formation of permanent ice-cover (date) and C = length of open water (days).

Table 6. Beginning, finishing and length of open water on the Saimaa area

Place of observation	Temperate winter			Severe winter			Average winter		
	A	B	C	A	B	C	A	B	C
Juustila	25.4	14.12	232	4.5	14.11	193	29.4	27.11	211
Lauritsala	30.4	9.12	222	10.5	19.11	192	5.5	29.11	207
Ristiina	27.4	2.12	218	11.5	15.11	187	5.5	24.11	202
Savonlinna	1.5	16.12	228	16.5	20.11	197	9.5	8.12	212
Oravi	6.5	14.12	221	17.5	26.11	192	11.5	5.12	207
Varkaus	1.5	29.11	211	12.5	16.11	187	7.5	21.11	197
Kuopio	7.5	5.12	211	18.5	21.11	186	13.5	29.11	199
Joensuu	25.4	5.12	223	6.5	16.11	193	1.5	26.11	198
Mikkeli	30.4	30.11	213	6.5	13.11	190	4.5	22.11	201
Kerma	5.5	15.12	223	17.5	28.11	194	11.5	7.12	209
Paihola	29.4	27.11	211	9.5	13.11	187	5.5	21.11	199
Nurmes	6.5	26.11	203	18.5	6.11	171	11.5	16.11	188
Ahkionlahti	2.5	26.11	207	16.5	10.11	177	9.5	20.11	194

The length of open water on Saimaa deepwater channels varies in temperate winters by observation place between 211 and 232 days, in severe winter between 186 and 197 days and in average winter between 197 and 212 days. According to this the open water of the Saimaa Canal and the Waterways connecting to it may be estimated in average to 200 days or about seven months.

The thickness of ice-cover on the Saimaa area is presented in Table 7. by observation place, the quality of winter and the observation point of time.

Table 7. Thickness of ice-cover on the Saimaa area (centimetres)

Place of observation	Date of observation				
	30.11	30.12	30.3	15.4	1.5
Temperate winter					
Lauritsala		11	49	36	
Savonlinna		14	47	38	
Oravi		16	48	42	
Kuopio		14	40	42	
Nurmes		23	57	56	
Average winter					
Lauritsala		17	52	47	23
Savonlinna		24	55	49	29
Oravi		23	53	53	40
Kuopio		22	49	47	25
Nurmes		30	61	61	36
Severe winter					
Lauritsala	8	22	62	63	44
Savonlinna	8	26	56	60	38
Oravi	8	28	58	62	56
Kuopio	12	36	56	54	38
Nurmes	20	32	68	70	58

(Observations made in 1949-61)

According to Table 7. the thickness of ice-cover varies on the Saimaa deepwater channels by place at the end of December in temperate winter between 11 and 16.

centimetres, in average winter between 17 and 24 cm and in severe winter between 22 and 36 cm. At the middle of April the thickness of ice-cover is in temperate winter between 36 and 42 cm, in average winter between 47 and 53 cm and in severe winter between 54 and 63 cm. In severe winter there is in addition an ice-cover between 8 and 12 cm at the end of November and between 38 and 56 cm at the beginning of May.

At the bottom of Gulf of Finland the ice-cover not packed follows approximately the observations made at Lauritsala in temperate and average winters.

On the water area of Lake Saimaa the ices are not particularly moving during winter. During the breaking up of the ice this is naturally occuring especially on the open channels. On the other hand at the bottom of Gulf of Finland in early spring there appears very powerful packing of ice. At that time because of the prevailing southwest winds the ice may drift into pack of many metres thick and as an extensive belt blocks up the entrance into the Gulf of Wyborg.

V The canal toll and other fees on the Saimaa Canal

Canal toll

The canal toll is collected on the Saimaa Canal in the case that the vessel is passing the border between the USSR and Finland. The present temporary canal toll is:

A.	Registered vessels	
	1. Passenger ships	0.75 Fmk/NRT
	2. Cargo ships	1.25 "
	3. Tug and tow boats, barges, towed vessels and equipment and other registered vessels	1.25 "
B.	Not registered vessels	
	Tug and tow boats, barges, towed vessels and equipment, motor and other boats and other unregistered vessels	1.00 Fmk/length metre
C.	Timber raft	0.60 Fmk/solid cu.m.

Pilotage fees

Pilotage on Soviet territorial waters from Vihrevoi pilot station to Brusnitchnoe takes place by Soviet pilots. The pilotage fee is 0.2 kop./NRT x nautical mileage. As the passage on the Soviet side is 21 naut. miles and as the fee is collected according to at least 500 NRT the smallest pilotage fee is 21 Rbls i.e. about 100 Fmk. In addition to this the Inflot, the agent organization of the USSR, has collected in payment of activities connecting to pilot servise totally about 10 Rbls i.e. about 50 Fmk agent and other fees.

The Finnish pilotage fees consist of the pilotage rates, daily fees and return travel costs. The amount of daily fee depends

on the time spent in pilotage and the point of day so the daily fee is not equal for same trips. In the following the pilotage fees are estimated under normal circumstances on the Saimaa Canal and deepwater channels.

Pilotage on the Saimaa Canal takes place by the Finnish Canal pilots and the pilotage fees are presented in Table 8.

Table 8. Pilotage fees on the Saimaa Canal

Tonnage NRT	Pilotage rate Fmk	Daily fee Fmk	Travel costs Fmk	Total Fmk
0 - 100	11.30	26.00	18.40	55.70
100 - 200	27.50	26.00	18.40	71.90
x) 200 - 300	38.10	26.00	18.40	82.50
300 - 400	46.40	26.00	18.40	90.70
400 - 500	53.40	26.00	18.40	97.80
500 - 600	59.50	26.00	18.40	103.90
600 - 700	65.00	26.00	18.40	109.40
700 - 800	70.10	26.00	18.40	114.50

x) The largest permissible ship sizes on the Canal is normally c. 270 NRT

Pilotage fees on the Saimaa deepwater channels are presented in Table 9.

Table 9. Pilotage fees on the Saimaa deepwater channels

From the Canal to	Naut. miles	Size of vessel/pilotage rate				Daily fee Fmk	Travel costs Fmk
		200NRT	300NRT	400NRT	500NRT		
Kaukopää	25	27.50	38.10	46.30	53.40	23.00	20.00
Savonlinna	83	77.10	106.80	130.10	149.70	46.00	66.40
Varkaus	125	117.10	162.20	197.60	227.40	69.00	100.00
Joensuu	187	164.80	228.30	278.20	320.10	92.00	149.60

In addition to the foregoing the following payments are collected by Finnish authority of ships in foreign traffic:

The lighthouse fee is collected for the maintenance of navigation safety equipment. Its amount is 0.60 Fmk/NRT per trip however at most for ten trips/year.

The last fee is collected for the social interests of sailors and for the sea rescue activity. The amount is 0.08 Fmk/NRT once a year.

The ice clearing fee is collected between Dec. 1st. and Apr. 30th. Its amount is 0.225 - 0.900 Fmk/NRT depending on the ice class of the vessel. The class "Super IA" is exempted from this payment.

The customs inspection fee is collected only in the case taht the inspection takes place outside the office hours. The amount in the Saimaa Canal traffic varies from 7.00 to 30.00 Fmk depending on the number of customs officials and the point of day.

The compensation to the customs about guarding is not collected if the guarding takes place during office hours but the guarding outside the office hours costs 6.30 Fmk/h.

The harbour dues are collected by the authority or establishment that governs the port. In e.g. Lappeenranta the harbour due for vessels sailing direct to or from foreign port is 0.50 Fmk/NRT. In addition to this the harbours collect certain payments for harbour pilotage, towage, mooring and unmooring, rent for storage area, rates for cranes etc.

VI Some facts about the industry of the influence area of the Saimaa Canal

In the following list are the most important manufacturing plants presented by kind of product. In the same list is the annual capacity, annual output or export presented. The figures before the name of the factory refer to the map enclosed, in which the location of factories is presented.

WOOD PULP MILLS		CAPACITY	OUTPUT IN 1967
1 Joutseno-Pulp Oy Joutseno	a	245 000 tn	191 523 tn
2 Enso-Gutzeit Oy, Kaukopää	a	450 000 "	381 983 "
3 Enso-Gutzeit Oy, Tainionkoski	a	200 000 "	181 575 "
4 Enso-Gutzeit Oy, Uimaharju	a	104 000 "	29 913 "
5 Oy Kaukas Ab, Kaukas	a	170 000 "	197 929 "
Oy Kaukas Ab, Kaukas	i	70 000 "	
6 A. Ahlström Oy, Varkaus	i	121 000 "	102 723 "

a = sulphate pulp mill
i = sulphite pulp mill

PAPER MILLS	CAPACITY	EXPORT IN 1966
7 A. Ahlström, Varkaus	220 000 tn	174 000 tn
8 Enso-Gutzeit Oy, Tainionkoski	100 000 "	..
9 Yhtyneet Paperitehtaat Oy, Simpele	24 000 "	10 000 "

BOARD MILLS	CAPASITY	EXPORT IN 1966
10 Enso-Gutzeit Oy, Pankakoski	45 000 tn	18 900 tn
11 Enso-Gutzeit Oy, Kaukopää	450 000 "	436 800 "
12 Yhtyneet Paperitehtaat Oy, Simpele	13 000 "	5 600 "
13 Kymin Osakeyhtiö, Juankoski	14 000 "	12 500 "

14	A. Ahlström Oy, Varkaus	30 000 tn (1970)	..
15	Savon Sellu Oy, Kuopio	150 000 " (1970)	..

PLYWOOD AND BLOCKBOARD MILLS	CAPACITY
16 A. Ahlström Oy, Varkaus	45 000 cu.m
17 Oy Grahn Ltd, Mikkeli	30 000 "
18 Oy Kaukas Ab, Kaukas	35 000 "
19 Savo Oy, Kuopio	30 000 "
20 Viipurin Vaneritehdas Oy, L:ranta	42 000 "
21 Pellos Oy, Ristiina	38 000 "
22 Oy Wilh. Schauman, Savonlinna	67 000 "
23 Oy Wilh. Schauman, Joensuu	70 000 "
24 Osuuskunta Metsäliitto, Lappeenranta	40 000 "
25 H. Saastamoinen Oy, Kuopio	33 000 "

MECHANICAL PULP MILLS	CAPACITY	FOR OWN USE
26 Enso-Gutzeit Oy, Pankakoski	25 000 tn	25 000 tn

SPOOL FACTORIES	CAPACITY
27 Oy Kaukas Ab, Kaukas	600 000 gross

PARTICLE BOARD MILLS	CAPACITY	
28 Pellos Oy, Ristiina	75 000 cu.m	
29 Hackman & Co, Joutseno	30 000 "	(1970)
30 Pellos Oy, Kitee	120 000 "	(1970)
31 Oy Wilh. Schauman, Joensuu	50 000 "	(under construction)

WALLBOARD MILLS	CAPACITY
32 Hackman & Co, Joutseno	14 000 tn
33 Savo Oy, Kuopio	40 000 "
34 Oy Wilh. Schauman, Savonlinna	50 000 "

SAWMILLS	CAPACITY
35 A. Ahlström Oy, Varkaus	34 000 std
36 Enso-Gutzeit Oy, Uimaharju	35 000 "
37 Hackman & Co, Joutseno	30 000 "
38 Oy Kaukas Ab, Kaukas	45 000 "
39 Osuuskunta Metsäliitto, Lappeenranta	20 000 "
40 Otavan Saha Oy, Otava	11 000 "
41 Rauma-Repola Oy, Joensuu	36 000 "
42 Rauma-Repola Oy, Lappeenranta	23 000 "
43 Rauma-Repola Oy, Lappeenranta	10 000 "
44 H. Saastamoinen Oy, Kuopio	15 000 "
45 Veitsiluoto Oy, Lieksa	15 000 "
46 Nurmeksen Saha Oy, Nurmes	7 000 "
47 Ukkola Oy, Joensuu	7 500 "
48 Iisalmen Sahat Oy, Peltosalmi	6 500 "
49 Soinlahti Oy, Iisalmi	6 000 "
50 And. Auvinen Oy, Putikko	4 500 "
51 Ylä-Savon Saha Oy, Iisalmi	4 000 "
52 Nikkarilan Saha Oy, Pieksämäki	3 000 "
53 Vapo, Mikkelin saha, Mikkeli	2 000 "
54 Joroisten Puutavara Oy, Joroinen	1 500 "

55	Rajan Saha Oy, Imatra	1 500 std
56	Kaakon Sahat Oy, Parikkala	1 500 - 2 000 "
57	Oy Wilh. Schauman, Savonlinna	10 000 " (later 14 000)
58	Kokkosenlahden Saha, Anttola	..

	ORE MINES	ORE EXCAVATED IN 1968
1	Outokumpu Oy, Outokumpu	516 826 tn
2	Outokumpu Oy, Leppävirta	446 330 "
3	Outokumpu Oy, Virtasalmi	216 945 "
4	Outokumpu Oy, Vuonos	(500 000 " planned)
5	Malmikaivos Oy, Luikonlahti	(500 000 " planned)

	LIMESTONE MINES AND QUARRIES	EXCAVATED IN 1966
6	Paraisten Kalkkivuori Oy, Virtasalmi	186 754 tn
7	Paraisten Kalkkivuori Oy, L:ranta	741 504 "
8	Ruskealan Marmori Oy, Kerimäki	184 707 "

	OTHER MINERAL MINES AND QUARRIES	EXCAVATED IN 1966
9	Lohjan Kalkkitehdas Oy, Nilsiä	44 000 tn
10	Lohjan Kalkkitehdas Oy, Siilinjärvi	1 000 " (planned)
11	Paraisten Kalkkivuori Oy, Tuusniemi	~262 936 "

CHALK AND CEMENT FACTORIES

12 Paraisten Kalkkivuori Oy, Pieksämäen mlk.

13 Ruskealan Marmori Oy, Louhen Kalkkitehdas, Kerimäki

13 Savon Kalkkitehdas, Virtasalmi

BASIC IRON AND STEEL WORK INDUSTRIES	OUTPUT IN 1964
1 Vuoksenniska Oy, Imatra	432 000 tn
2 Wärtsilä-Yhtymä Oy, Tohmajärvi	..

ENGINEERING WORKS

3 A. Ahlström Oy, Varkaus

4 Metallitehdas Alsa Oy, Kuopio

5 Wärtsilän Lukkotehdas, Joensuu

6 Savonlinnan Konepaja, Savonlinna (under planning)

7 Enso-Gutzeit Oy Lypsyniemen Konepaja, Savonlinna

8 Rauma-Repola Oy, Rääskyniemen Konepaja ja Telakka, Savonlinna

MILLS

9 Vaasan Höyrymylly Oy, Kuopio

INORGANIC CHEMICAL MANUFACTURERS	CAPACITY
10 Rikkihappo Oy, Siilinjärvi	230 000 tn sulph. acid
	75 000 " phosph. acid
	120 000 " monoammom-phosphate

MOST IMPORTANT MANUFACTURING PLANTS OF THE SAIMAA WATER AREA

- WOODWORKING INDUSTRY
- MINES, QUARRIES AND STONE INDUSTRY
- OTHER MANUFACTURING INDUSTRY
- UNDER PLANNING

Valtakunnanraja Riksgräns	State boundary
Läänirаja Länsgräns	County boundary
Kunnanraja Kommungräns	Commune boundary
Kaupunki Stad	Towns
Kauppala Köping	Boroughs

0 50

1:1000 000