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Ontario Region

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Introduction:

In 1979, SCA services, a chemical waste disposal service company located in Porter, Niagara County, New York was given a mandate by New York D.E.C. to discharge treated liquid waste to the Niagara River. Under the SPDES permit issued April 7, 1978 (1) SCA was allowed to discharge 100,000 gallons of treated liquid waste to the Niagara River each day. This permit was modified and on January 14, 1980 a decision was rendered which allowed SCA to discharge 1 million gallons per day of treated waste to the Niagara River.

The discharge point is located at the border of Lewiston and Porter Towns on the U.S. side of the river in what is commonly known as "Peggy's Eddy", about 4.25 Km upstream of the Niagara on the Lake water intake. This location is characterized by the presence of eddies with an average velocity of 0.24m/sec. The current direction is mainly towards the south (upstream) within a lateral distance of about 150m from the U.S. shore (2).

The outfall diffuser extends about 48m from the U.S. shore of the Niagara River and is located in about 5.5m of water. The diffuserr is about 9m long, equipped with six ports each of 6.25cm diameter which are spaced 1.8m apart. The discharge from the ports is mainly parallel to the current.

Concerns:

Since this discharge is located upstream of the Niagara on the Lake water intake, a great deal of concern was expressed by the citizens of Niagara on the Lake, the Ontario Ministry of Environments, and Environment Canada, the Town of Niagara on the Lake and the Regional Municipality of Niagara. Citizen groups such as "Pollution Probe" and "Operation Clean" also voiced strong protests because of the danger of contamination of the Niagara on the Lake water supply and the additional input of pollutants to the river and Lake Ontario.

The Discharge:

Under the S.P.D.E.S. permit modified in January, 1980, SCA was permitted to discharge 1 million gallons per day. However, due to various technical problems including filter clogging and pump problems, this limit was rarely achieved. Actual volumes discharged, dates etc., are given in Table 2. The total volume discharged during this period was about 4.5 million gallons.

Results:

From the results of the E.P.S. Ontario Region samples collected in Facultative Pond #3 in April 1981, one would expect that if any effect is noticable at Niagara on the Lake it would most likely be an increase in conductivity or chloride concentrations. These data collected on June 26, 1981 given in Tables 3 and 4 do not indicate any cross-sectional variation or increases in either of these parameters at Niagara on the Lake during the discharge. This seems to be the case for other inorganic parameters measured at Niagara on the Lake as well. Values measured during the discharge do not show any evidence of an increase when compared to the 1980 yearly mean values or the June 1981 mean values.

Organic contaminants concentrations measured are given in Table 5. Listed in decreasing percentage of time detected, HCB, γ and α BHC, dieldrin and total PCB were detected in every sample. Aldrin and p-p-DDE were detected in more than 70% of the samples. Other organic contaminants were measured but such compounds as chlordanes, endosulfans, mirex, methoxychor, p-p-DDT, p-p-TDE, o-p-DDT and endrin were never detected during the discharge. These results seem to compare very well with the background concentrations observed previously during 1980-81 at Niagara on the Lake. This background data also shows that HCB, γ and α -BHC, dieldrin, total PCB and p-p-DDE are frequent contaminants found in the Niagara River. No explanation can be given for the increasing incidence of aldrin during the discharge.

For these reasons, this study was carried out by Water Quality Branch of the Inland Waters Directorate, Ontario Region during the discharge to monitor any deleterious effects which may be observed at the Niagara on the Lake water intake site. Results of this study are contained in this report and compared with background values observed at the same location.

In view of these concerns, E.P.S. Ontario Region (Environment Canada), undertook a sampling program of facultative pond #3 from which the pipeline discharge was taken before the discharge commenced. These results are given in Table 1. (3) From these data, dissolved solids, hardness, conductivity, chloride, sulphate, nickel, iron and aluminum appear to be high when compared to environmental samples.

Sampling:

Samples were taken at five stations on a range across the Lower Niagara River located at the Niagara on the Lake Water Treatment Plant Intake about 4.25 Km downstream of the SCA discharge. Sampling locations were the following shown in Figure 1.

Distance From Canadian Shore

A - 15 m from Canadian Shore in upstream current
B - 100 m from Canadian Shore
C - 200 m from Canadian Shore
D - 500 m from Canadian Shore
E - 600 m from Canadian Shore

At each of these stations, samples were taken at the 1m depth. In addition, samples were taken from approximately mid-depth at stations B, C and D.

All samples were taken using a March, Model 5CMD, magnetic drive submersible pump with all plastic impellar head and tygon plastic pump tubing. Both pump and plastic tube were flushed well before each sampling station.

Loadings:

In Table 6 is presented a comparison of mean Niagara River loadings (4) and proposed S.C.A. loadings as calculated from their S.P.D.E.S. permit concentrations and assuming a discharge flow of 3780 m^3/day (5). These data indicate that the increased loading to the Niagara River and therefore Lake Ontario is usually three orders of magnitude lower than the present loadings to Lake Ontario by the Niagara River.

Conclusions and Recommendations:

1) No deleterious effects were observed to the Niagara on the Lake water supply during the June 1981 discharge from S.C.A.

2) Concentrations and loading increases to the Niagara River and therefore Lake Ontario were undetectable.

3) Although no increases were observed, caution must be observed in continually allowing new discharges to the environment. These discharges must be carefully monitored because for example although concentrations of PCB have been low, bioaccumulation in higher forms of biota probably including man continues to be a problem in the environment. As loadings continue to increase to the environment bioaccumulation will almost certainly increase as a problem.

References:

1) New York State Pollutant Discharge Elimination System (SPDES), Permit No. N.Y. 0072061.

2) M.O.E. memorandum to John Kinkead from Yousry Hamdy re Assessment of the S.C.A. Discharge at Lewiston, New York Date: August 17, 1979.

3) Unpublished data, EPS, Ontario Region, Environment Canada.

4) K.W. Kuntz, Unpublished report, Loadings to Lake Ontario by the Niagara River - 1980, Water Quality Branch - Inland Waters Directorate, Ontario Region.

5) Environment Canada, Review of the SCA, Chemical Waste Services, Inc., Proposed Discharge to the Niagara River, July 1980.

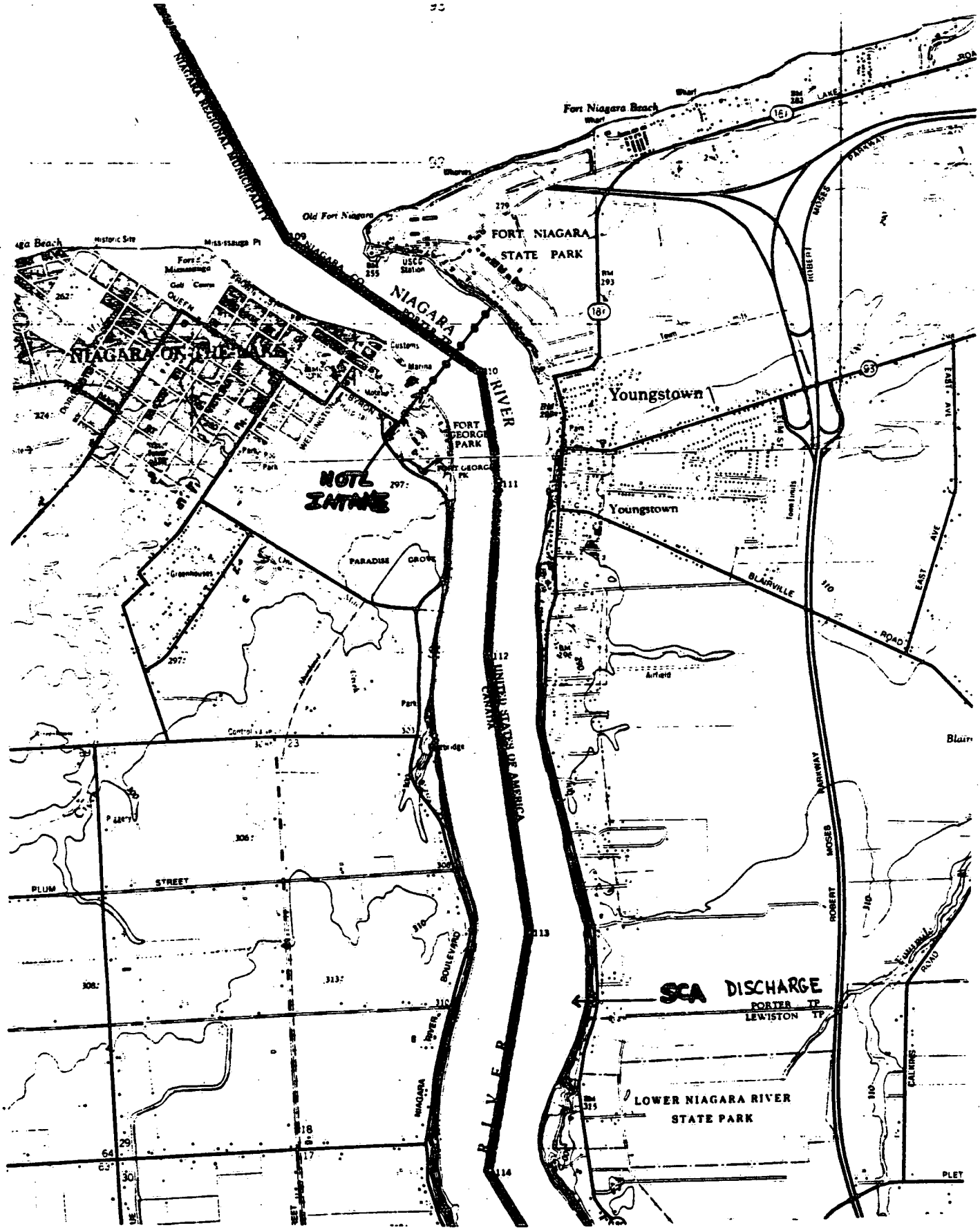
NIAGARA REGIONAL MUNICIPALITY
Fort Niagara Beach
Old Fort Niagara
FORT NIAGARA STATE PARK
NIAGARA ON THE LAKE
NIAGARA RIVER
Youngstown
FORT GEORGE PARK
HOTEL IMPINE
PARADISE GROVE
Youngstown
BLAIRVILLE ROAD
EAST AVE
UNITED STATES OF AMERICA
CANADA
PLUM STREET
NIAGARA BOULEVARD
MOSES PARKWAY
ROBERT
SCA DISCHARGE
PORTER TP
LEWISTON TP
LOWER NIAGARA RIVER STATE PARK
CALKINS ROAD

FIGURE 1

WATER QUALITY* FROM SCA-FACULTATIVE POND #3
April 14, 1981

Parameter	Fac Pond 3 (mg/l)	Permit Limit (mg/l)
Suspended Solids	60 (before filtration)	45
Dissolved Solids	8,440	16,000
Hardness	2,270	monitor only
Alkalinity	39.2	monitor only
Conductivity	9,800	monitor only
pH	8.3	between 6.5 and 8.5
Aluminum	0.75	4.0
Arsenic	0.003	0.1
Cadmiun	0.002	0.2
Chromium	0.037	1.0
Cobalt	0.006	0.04
Copper	0.031	0.4
Iron	0.750	4.0
Lead	0.010	0.7
Mercury	0.00015	0.002
Nickel	0.500	2.0
Selenium	0.005	0.1
Tir	0.002	0.005
Zinc	0.019	1.0
Nitrate - N	0.1	0.2
Ammonia - N	0.8	40
TKN	6.5	not specified
Chloride	2,950	8,000
Sulphate Sulphur	283	700
Total Phosphate	2.0	5.0
TOC	51	monitor only
Grease and Oil	1.0	15.0
Phenol	0.020	1.0

Organics

In addition to the above analyses, GC/MS investigations did not reveal any non-volatile organic species on EPA's priority list other than phthalate esters, and these were at levels no higher than 4.3 ppb (parts per billion).

*Sampled by Environment Canada - EPS-OR

TABLE 1

SCA DISCHARGE VOLUMES* TO THE NIAGARA RIVER - JUNE 1981

DATE	TIME	DISCHARGE VOLUME (gallons)	ACCUMULATED DISCHARGE VOLUME (gallons)
17-06-81		82,100	82,100
18-06-81		135,500	217,600
19-06-81	0845(19)-0700(20)	345,800	563,400
20-06-81	0700-1400	126,500	689,900
22-06-81		69,900	759,800
23-06-81	0930(23)-0700(24)	788,400	1,548,200
24-06-81	0700(24)-0700(25)	951,700	2,499,900
25-06-81	0700(25)-0700(26)	937,800	3,437,700
26-06-81	0700(26)-0700(27)	937,800	4,375,500
27-06-81	0700 (27)-1045(27)	156,000	4,531,500

*Data obtained from SCA services

TABLE 2

WATER QUALITY DATA* FOR RANGE 1.5 - JUNE 26, 1981 DURING SCA DISCHARGE AT NIAGARA ON THE LAKE (mg/L)

Parameter	Mean	Max	Min	Std. Dev.
Spec. Cond 25°C (umhos)	294	295	293	0.7
NO_3+NO_2	.249	.254	.246	.002
NH_3	.052	.054	.049	.002
TKN	.276	.96	.260	.011
TP	.032	.035	.29	.002
Ca	35.4	35.8	35.1	0.21
Mg	8.0	8.1	7.8	0.1
Na	9.5	9.7	9.4	0.1
K	1.24	1.27	1.23	0.01
SO_4	21.6	21.7	21.3	0.2
Cl	18.0	17.9	18.2	0.1
SiO_2	.296	.303	.286	0.006
T-ALK	90.4	92.0	90.0	0.7
AL-EXT	.26	.35	.006	.11
Cd-T	L.001	L.001	L.001	-
Cr-T	L.001	L.001	L.001	-
Cu-T	.005	.017	L.001	.005
Fe-T	.47	.66	.21	.12
Pb-T	.001	.004	.001	.001
Ni-T	.003	.004	.002	.001
Zu-T	.007	.015	.004	.004
Hg-EXT (g/L)	L.05	L.05	L.05	-
AS	.0004	.0009	.0001	.0002
CN	.004	.005	.003	.001
Mn-T	.014	.021	L.010	.006

L = Less than detection limit
* Note: 8 samples Analysed

TABLE 3

BACKGROUND WATER QUALITY DATA (MG/L) AT NIAGARA ON THE LAKE

	1980 Mean Values			June 1981 Mean Values		
Parameter	N. OBS.	Mean	St. Dev.	N. OBS.	Mean	Std. Dev.
Spec. Cond 25°C (umhos)	328	299	18	25	295	2
NO_3+NO^2	327	.260	.095	25	.261	.030
NH_3-N	324	.023	.026	25	.019	.017
TKN	328	.260	.046	25	.262	.032
TP	328	.022	.017	25	.018	.007
Ca	51	35.1	3.0	4	35.55	0.54
Mg	51	8.1	0.2	4	7.9	0.2
Na	51	9.9	0.4	4	9.5	0.3
K	51	1.4	0.1	4	1.2	0.1
SO_4	51	24.7	0.9	4	23.4	1.3
Cl	51	19.7	1.2	4	18.3	0.4
SiO2	-	-	-	4	.150	.078
T-ALK	51	88.7	8.3	3	93.0	2.0
Al-EXT	30	.314	.247	-	-	-
Cd-TOT	61	L.001	-	4	L.001	-
Cr-TOT	62	.006	.015	4	L.001	-
Cu-TOT	62	.003	.002	4	.004	.001
Fe-TOT	55	.650	.581	4	.240	.180
Pb-TOT	62	.002	.001	4	.002	.001
Ni-TOT	62	.003	.002	4	.002	.001
Zn-TOT	62	.005	.003	4	.005	.002
Hg-EXT (ug/l)	40	L.05	-	4	L.05	-
As	-	-	-	4	.0005	.0004
CN	20	.003	.000	4	.003	.001
Mn-TOT	-	-	-	4	.010	.004
Discharge-CFS	365	232140	14140	30	232860	8302

TABLE 4

ORGANIC CONTAMINANTS MEASURED AT NIAGARA ON THE LAKE (ug/L)

	During SCA Discharge - June 26, 1982				1980-81 Samples (75)	
Parameter	Mean	Max	Min	% Detected	Mean	% Detected
HCB	.0004	.0007	.0002	100	.0008	95
α-BHC	.0091	.0111	.0073	100	.0105	100
γ-BHC	.0014	.0016	.0011	100	.0021	99
Dieldrin	.0008	.0015	.0005	100	.0006	93
T-PCB	.007	.015	.001	100	.020	97
p-p-DDE	.0003	.0005	L.0001	86	.0003	61
Aldrin	.0002	.0004	L.0001	71	L.0001	1
Heptachlor	L.0001	.0002	L.0001	29	L. 0001	0

TABLE 5

COMPARISON OF NIAGARA RIVER LOADINGS AND SCA LOADINGS

Parameter	Niagara River Loadings 1980* MT/Day	SCA Proposed Loading (1) MT/Day	SCA Loading as % of Total
T-P	12.3	.018	.15
TKN	148	-	-
NO_3+NO_2	149	$.757 \times 10^{-3}$	.0005
NH_3	12.9	.151	1.17
T-ALK	51023	-	-
Ca	20208	-	-
Na	5690	-	-
Mg	4678	-	-
Cl	11354	30.3	.27
SO_4	14228	2.649	.019
K	786	-	-
AL-EXT	114	-	-
Cr-T	2.2	3.78×10^{-3}	.17
Mn-T	14.8	7.6×10^{-3}	.051
Fe-T	324.1	15.1×10^{-3}	.005
Ni-T	1.5	7.6×10^{-3}	.47
Cu-T	1.6	1.1×10^{-3}	.069
Zn-T	3.0	3.78×10^{-3}	.126
Pb-T	1.1	0.76×10^{-3}	.069
Cd-T	0.6	$.76 \times 10^{-3}$	.127

* From Kuntz, 1982
(1) Environment Canada, July 1980

TABLE 6

9238