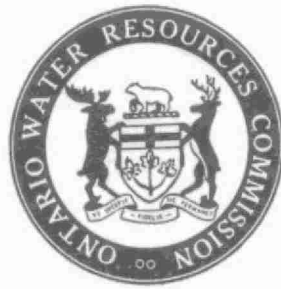


W.Q. LIB
ST. CLAIR R. (53)

O.W.R.C.
REPORT REFERRED TO
On file 2-13
Date of 2/13/63



THE ONTARIO WATER RESOURCES COMMISSION

AN EVALUATION OF THE QUALITY
OF
INDUSTRIAL WASTES DISCHARGED
FROM THE
DOW CHEMICAL COMPANY
TO THE
ST. CLAIR RIVER

November 1963

STANDARDS DEVELOPMENT BRANCH OFFICE
36936000010865

Rep. 88.

TD
897.8
.S73
1963
MOE

Copyright Provisions and Restrictions on Copying:

This Ontario Ministry of the Environment work is protected by Crown copyright (unless otherwise indicated), which is held by the Queen's Printer for Ontario. It may be reproduced for non-commercial purposes if credit is given and Crown copyright is acknowledged.

It may not be reproduced, in all or in part, for any commercial purpose except under a licence from the Queen's Printer for Ontario.

For information on reproducing Government of Ontario works, please contact ServiceOntario Publications at copyright@ontario.ca

TD
897.8
.S73
1963

An evaluation of the quality of
industrial wastes discharged
from the Dow Chemical
Company to the St. Clair river.

80891

AN EVALUATION OF THE QUALITY
OF
INDUSTRIAL WASTES DISCHARGED
FROM THE

DOW CHEMICAL COMPANY

TO THE
ST. CLAIR RIVER

November 1963

by

F. R. Phoenix,

Industrial Wastes Branch

Ontario Water Resources Commission

REPORT

Ontario Water Resources Commission

Municipality Sarnia **Date of Inspection** November 1963
Re: The Quality of Industrial Waste Discharges from the Dow Chemical Company
Field Inspection by F. R. Phoenix **Report by** F. R. Phoenix

As little current information was available on the quality of the effluents discharged to the St. Clair River by this industry, it was thought advisable to sample the outfalls and evaluate the various waste characteristics. The review and sampling programme was carried out on November 6, 1963.

SUMMARY

No new processes or units have been introduced since our last review in October 1962. The essential information on the plant is contained in a memorandum entitled "A Review Inspection of Dow Chemical Company - Sarnia" by A. J. Harris and R. Phoenix, dated November 22, 1962.

As that inspection was essentially visual and included no sampling, this current sampling programme was necessary to supplement the information already on hand.

Briefly, the analyses pointed up the following undesirable conditions. Three streams were found to have BOD levels and suspended solids contents in excess of OWRC objectives. Three streams had pH values above 9.5 and one of these also contained free ammonia, a toxic combination. Two samples were found to be very acidic. Free chlorine was encountered in one stream. There were four samples which contained excessive chlorides.

While the river undoubtedly has the ability to assimilate a good deal of BOD and adjust the pH, there are other constituents present such as suspended solids which tend to precipitate and chlorides which appear to be accumulating in Lake Erie.

No measurement of phenolics was made but in view of the rather considerable COD values found, high organic levels were indicated. Many organics are taste or odour producers in potable waters. Phenolic type materials may be generated through oxidation, hydrolysis or degradation of aromatic organic chemicals. The determination of phenolics will be included on the next sampling programme.

The estimated total waste loadings from all sources are tabulated below.

<u>Waste Constituent</u>	<u>Loading in Thousands of Pounds per Day</u>
BOD	31.5
Suspended solids	22.7
Chlorides as Cl	2,464. 7
Free ammonia	0.26

DETAILS OF SURVEY

On November 6, Messrs. Phoenix and Zachanko of the Industrial Wastes Branch interviewed Mr. F. Bremner, Pollution Control Officer, and talked with Mr. R. S. Mulholland.

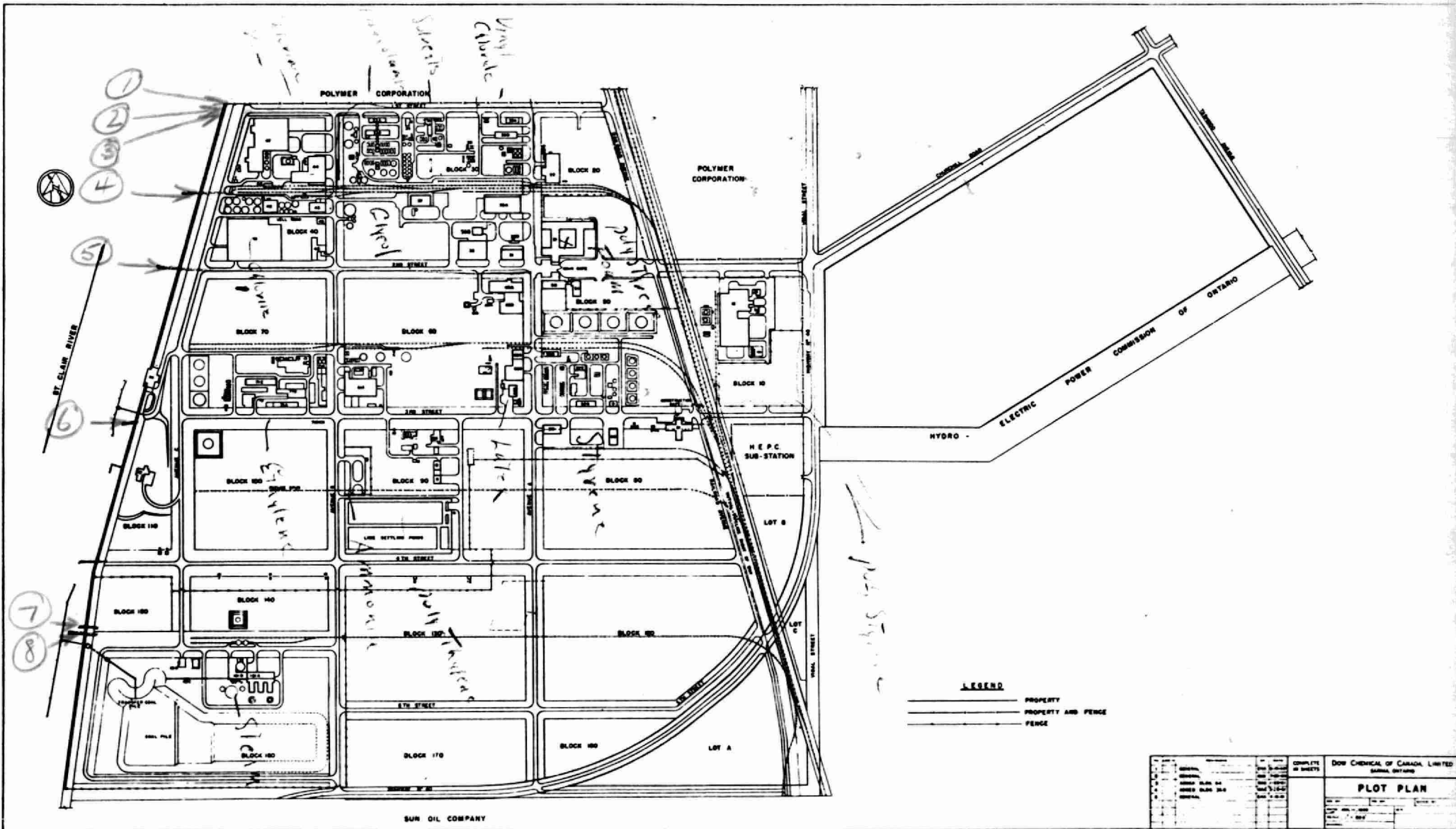
It was established that no new processes had come on stream and that production volume was essentially unchanged.

SAMPLING

Because of the continuous nature of most of the processes, a six-hour composite sample was considered adequate to represent the character of the effluents. All samples were obtained at the outfalls to the St. Clair River as shown on the attached sketch.

ANALYSES

Composite samples obtained were shipped immediately by express to the OWRC Laboratories for analysis. The tests, which were chosen to characterize the wastes according to the processes from which they originated, were conducted according to the "Standard Methods" of the A. P. H. A. The Industrial Waste Analysis report which follows, contains the results obtained. Based on these analyses, a tabulation was made which shows the volumes, plant areas involved and the waste loadings contributed at each outfall.



ONTARIO WATER RESOURCES COMMISSION
CHEMICAL LABORATORIES

All analysis except pH reported in
p.p.m. unless otherwise indicated

INDUSTRIAL WASTE ANALYSIS

1 p.p.m. = 1 mgm. / litre
= 1 lb./100,000 Imp. Gals.

Municipality: Sarnia		Report to: R. Phoenix *		c.c.									
Source: Dow Chemical		Date Sampled: Nov. 6/63		by: R.P. & M.Z.									
Lab. No.	5-Day B.O.D.	Solids			Chlorides as Cl	Total Alkalinity as CaCO ₃	Acidity as CaCO ₃	Free Ammonia as NH ₃	C.O.D.	pH at Lab.	Free Chlorine	Calcium as Ca**	Sodium as Na
		Total	Susp.	Diss.									
T-1154	96.	6532	23	6509	3400	276	---	.82	260	11.1	---	---	---
T-1155	1.6	11724	224	11500	5550	420	---	---	200	11.6	---	---	---
T-1156	62.	10542	13	10529	5200	---	1112	---	300	2.1	tr.	1060	540
T-1157	16.	54596	126	54470	29200	364	---	---	3175	11.3	20.	152	22000
T-1158	38	646	9	637	100	88	---	.32	105	7.9	---	32	---
T-1159	16	454	12	442	135	84	---	.29	50	7.8	---	40	---
T-1160	8.0	498	138	360	86	84	---	---	35	7.4	---	40	66
T-1161	4.4	448	1	447	350	---	412	---	25	2.2	---	32	53
** on supernatant only													
T-1154	1.	1/2 hourly composite sample (0930-1330 hrs.) 42" Concrete Sewer.											
T-1155	2.	1/2 hourly composite sample (0930-1330 hrs.) 1st st. tile Sewer.											
T-1156	3.	1/2 hourly composite sample (0930-1330 hrs.) 1st st. Sluice.											
T-1157	4.	1/2 hourly composite sample 20" Chlorine & Caustic Sewer.											
T-1158	5.	1/2 hourly composite sample 2nd st. Sewer.											
T-1159	6.	1/2 hourly composite sample 3rd st. Sewer.											
T-1160	7.	1/2 hourly composite sample large steam plant sewer.											
T-1161	8.	1/2 hourly composite sample small steam plant sewer.											

WASTE LOADINGS

ON THE BASIS OF THE ANALYSES AND FLOW FIGURES THE FOLLOWING GROSS LOADINGS WERE ESTIMATED

LOADINGS IN THOUSANDS OF LBS. PER DAY

Out-Fall	Sewer	Area Served	Volume M.G.D.	BOD	Susp. Solids	Chlorides	NH ₃
1	New 42" concrete	Vinyl chloride, glycol, and ethanolamine plants	20.9	20.1	4.8	710	0.17
2	1st street sewer	Solvent plant	3.0	0.05	6.7	167	-
3	1st street sluice	Glycol, caustic evapn. and No. 2 caustic chlorine plants	8.3	5.15	1.1	432	-
4	20" chlorine-caustic sewer	No's. 1 and 2 chlorine plants, tank car washing, Brine plant	3.8	0.61	4.8	1,110	-
5	2nd street sewer	Polystyrene and foam plants	1.2	0.46	0.11	1.2	-
6	3rd street sewer	Styrene, polyethylene, ethylene, ammonia and latex plants	32.0	5.1	3.8	43.2	0.09
7	Steam plant-north	Steam plant cooling and softener	1.0	0.08	1.4	0.86	-
8	Steam plant-south	Regeneration	<0.1	-	-	0.35	-
Totals -			70.3	31.6	22.7	2,465.	0.26

REMARKS AND RECOMMENDATIONS

Considering the character of the effluents individually, it was noted that at the 42" sewer a high pH condition existed. This was coupled with the presence of free ammonia. This is a toxic combination which could be lethal to fish and other aquatic life. There is also a BOD in excess of OWRC objectives.

The First Street sewer effluent had a low acceptable BOD but had excessive suspended solids and was also highly alkaline.

The First Street sluice effluent proved to be acidic and exhibited a high BOD.

Free chlorine was present in the effluent from the 20" Chlorine and Caustic sewer and the pH was very high. Suspended solids were also high here.

The Second Street and Third Street sewers contained wastes which were not particularly objectionable.

While the effluent from the large Steam Plant sewer contained rather high suspended solids, it was not too bad in the other respects.

The small Steam Plant sewer carried a highly acid effluent.

There was a feature common to the first four outfalls which is cause for concern; that is the chloride concentration. While high concentrations of this constituent may be inherent, due to the nature of the processes, the level in the Chlorine-Caustic sewer was unusually high. In fact the total plant loading of chlorides had risen roughly 50% when compared with that encountered in the survey of October 1957, although the total waste flow has only increased about 20%.

In general, the BOD values found are not so significant as the COD values. The COD levels are indicative of the discharge or loss of organic matter. These organics may be harmful to the life in the river as well as causing taste and odour problems in potable waters.

Remarks and Recommendations continued - -

It is recommended that the Dow Chemical Company make an early appraisal of the character of the waste streams within the plant and develop a programme for the reduction of the constituents discussed above. It is suggested this be done as soon as possible and an outline of the action proposed be submitted to the Ontario Water Resources Commission within six months of receipt of this report.

Prepared by:

.....
Industrial Wastes Branch

Supervised by:

.....
Supervisor, Industrial Wastes Branch,
Division of Laboratories.