



THE
ONTARIO WATER RESOURCES
COMMISSION

GROUND AND SURFACE WATER
INVESTIGATIONS

TOWNSHIP OF EAST WHITBY

INDUSTRIAL DISPOSAL (OSHAWA) LIMITED

1964

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ONTARIO WATER
RESOURCES COMMISSION

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APRIL - JULY 1964

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INTRODUCTION

Earlier this year the firm of Industrial Disposal (Oshawa) Limited outlined plans for expansion of the 35-acre refuse site located on Lot 3, Concession 3, Township of East Whitby. The proposal included the collection and treatment of leachate from both the existing and proposed site, which would be situated on a 24 to 36-acre tract of land adjacent to and immediately south of the present site. Subsequently the township council requested the Commission to investigate the possible effects on surface and ground waters from both the present site and the proposed future landfill operation.

A map, which includes the information pertinent to this report, is appended.

HISTORY

Topography of Original Site

Prior to commencement of the landfill operation the area within the existing toe of the fill was at its relative highest elevation near the present lagoon site from where the land sloped in a north-westerly direction toward a depression and in a westerly direction to the relative lowest elevation at the south-west corner.

Operations and Pollution Problems

Operations were commenced in July, 1957, in an abandoned gravel pit at the site. A number of springs rising in the gravel pit and flowing to a tributary of Harmony Creek, referred to as the Taunton Branch, suggested that water pollution problems would probably arise from refuse disposal in this area. These anticipated conditions were borne out by subsequent operating experience.

In an effort to alleviate the pollution problems, arising in part from the springs in the original refuse disposal area, ~~attempts~~ were made to divert the spring waters through the disposal

area to the creek by means of tiles. This measure proved to be unsuccessful as leachate gained access to the tiles. Consequently a collection pond and pumping equipment were provided to collect and deliver the leachate and spring discharge to a lagoon for further treatment. However, these measures have proved to be insufficient in preventing pollution of ground and surface waters.

WATER QUALITY INVESTIGATIONS

Sampling and Laboratory Results

With reference to the appended map and the laboratory analysis sheets, samples were obtained from surface and ground water sources as follows:

<u>Date Collected</u>	<u>Source</u>	<u>Sample Point Number</u>
May 25	Surface	1 to 7 inclusive
May 25	Ground	10, & 11
June 22	Surface	14
June 22	Ground	12, 13, 15, 16, & 17
July 20	Surface	18 to 25 inclusive

The laboratory results should be interpreted with reference to the OWRC water quality objectives listed below:

<u>Item</u>	<u>Concentration</u>
5-Day BOD	4 ppm maximum
Iron	0.3 ppm maximum
Phenol	5 ppb maximum
M.F. Coliform Count	2400 coliforms per 100 ml maximum

ppm - parts per million
ppb - parts per billion

Surface Water

The laboratory results of the surface water samples, collected on May 25, exceed the Commission objectives with respect to; 5-day BOD and iron at stations 3 and 4; phenols at stations 3 to 7 inclusive; and coliforms at station 4.

The laboratory results of the sample collected at station 14 on June 22, indicate higher 5-day BOD and phenol concentration and

lower iron concentration when compared to the results of May 25.

When considering the results of the samples collected on July 20, numbered 18 to 25, inclusive, the Commission objectives are exceeded in particular at station 18 with respect to iron and coliform organisms; at station 23 with respect to 5-day BOD, iron, phenols, and coliform organisms; and at station 25 with respect to phenols. Further, the results show the iron concentrations of the water to generally increase as the stream progresses. At the time of sampling the flow in the watercourse was observed to be somewhat less than on the initial date of investigation.

Ground Water

The samples of ground water, collected on May 25 and June 22, were obtained from test holes which were excavated to a depth of approximately 12 feet.

The seepage into test holes 10, 11, and 12 was observed to come mainly from the north. The laboratory results of the samples indicate that a ground water pollution problem exists in this area and that the degree of pollution is most severe at the test hole closest to the filled area.

The samples from the test holes south of the filled area are numbered 13, 15, 16, and 17. The laboratory results of these samples indicate that the pollution of ground waters resulting from the landfill operation is most significant in the area south of the toe of the filled area between Creek No. 1 and Creek No. 2.

EFFECTS ON FUTURE WATER DEVELOPMENT

There is a shallow overburden aquifer present in the area immediately south of the disposal site, which is likely hydraulically connected with the Taunton Branch.

If a housing development was constructed in the area south

of the disposal site and the shallow aquifer was used as a source of water, it is possible that the withdrawal of sizeable quantities of water could induce recharge from the nearby stream or that the cone of depression could remove ground water from the site of the disposal area to the well area.

Officials of the City of Oshawa have indicated that water services are not available outside city boundaries, which suggests that any development in this area would be obliged to resort to a communal or individual ground water supplies.

PROPOSED CORRECTIVE MEASURES

Ground Water Interception and Comments

During the month of June a six-inch "hel-cor" perforated copper-iron interceptor pipe was placed at a depth of approximately 12 feet below grade along the north end of the property in an effort to intercept and divert ground water flows entering the site area. On July 20, an investigation revealed a negligible flow from the pipe.

While the ground water quality investigations have been reconnaissance in nature, they do indicate a need for more representative water quality information both north and south of the site. Continuation of the exploration programme designed to define the quantitative aspects of the ground water problem should include a continuing study of ground water quality. Further it would be desirable to make provision for a long term ground water quality surveillance test-well sampling programme.

Waste Treatment Scheme and Comments

Faced with an expansion of the waste disposal operations, the company proposed the following:

- to intercept and divert ground water flows north of the

present landfill around the fill area and thus reduce or eliminate water filtering through the fill area and becoming contaminated.

- to divert the course of the Taunton Branch around a proposed extension of the fill area on adjacent property.
- to impound the west tributary, Creek No. 1 on the attached map, and thereby collect and divert the contaminated flows to two series-operated stabilization ponds of approximately 300,000 cubic feet combined capacity.

The effluent from the second stage pond would discharge to the diverted watercourse.

From the sample results itemized 1 and 2, in the appended table, together with visual observations by a bacteriologist, it is indicated that the waste would be difficult, if not impossible, to stabilize in a manner suitable to protect surface water quality. The difficulties involved include the high iron content which may cause restriction of sunlight penetration and, therefore, the requisite algal bloom may not develop.

Associated with the lagoon construction is the proposed diversion of the Taunton Branch. The diversion or changing and damming of a watercourse would require approval of the Surveyor-General, Lands Division, Ontario Department of Lands and Forests, Queens Park, Toronto 5, Ontario.

SUMMARY

At the request of the township council an investigation was conducted by Commission staff into surface and ground water qualities in the vicinity of the Industrial Disposal (Oshawa) Limited refuse site.

The firm has operated a refuse disposal operation in the

Township of East Whitby since 1957. Leachate from this site aggravated by the "springy" nature of the area, has created an almost continuous pollution problem.

The firm proposes to take option on adjoining property and divert the Taunton Branch to allow for the construction of a two-celled stabilization pond which would receive drainage from the area of the disposal operation and also permit expansion of the landfill operation. It is not expected that this proposal will effectively solve the ground and surface water pollution problems resulting from the landfill operation.

On the basis of the laboratory results it may be concluded that a ground water pollution problem exists north of the site and that the pollution south of the site is most significant in the area between Creek No. 1 and Creek No. 2.

A ground water intercepting drain installed north of the site this year has had limited success as a diversion scheme designed to intercept quantities of ground water. A continuation of the ground water exploration programme should include a study of ground water quality over an extended period of time, through a test-well sampling programme.

Future housing development in the area south of the site would probably rely on ground water supplies and it is anticipated that the polluted ground water may have an adverse influence on such supplies.

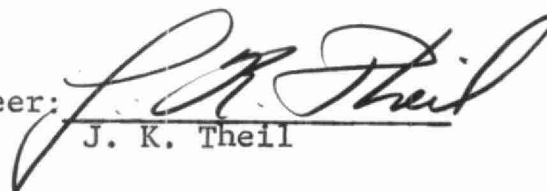
RECOMMENDATIONS

1. Continued efforts should be expended in the exploration, interception, and diversion of ground water in the vicinity of the existing disposal site.


2. Continued efforts should be made to prevent leachate, from the existing landfill site, from entering ground and surface waters.

All of which is respectfully submitted,

District Engineer:

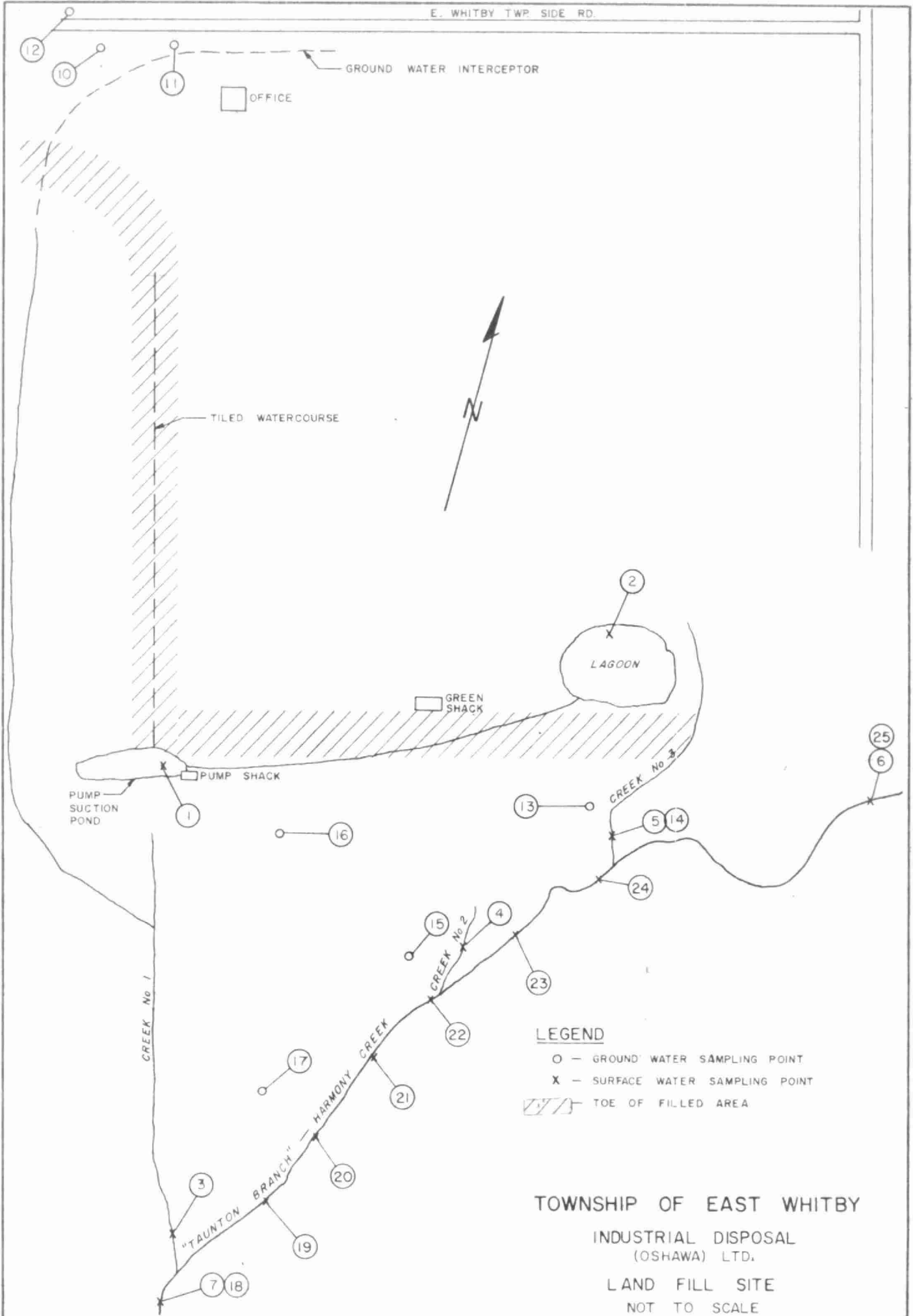

J. K. Theil

Approved by:


K. H. Sharpe, Director *see 10/23*

LABORATORY RESULTS

<u>Date Collected</u>	<u>Sample Pt. No.</u>	<u>Source</u>	<u>Description of Sample Point No.</u>	<u>5-Day BOD ppm</u>	<u>Iron ppm</u>	<u>Phenols ppb</u>	<u>Coliform Organisms /100 ml M.F.</u>
May 25	1	Surface	Pump Suction Pond Contents	960	102	500	80
"	2	"	Lagoon Contents	920	42	500	0
"	3	"	Creek No. 1 from area of pump suction pond	12	18.4	30	10
"	4	"	Creek No. 2 from refuse disposal site	104	11	90	21,000
"	5	"	Creek No. 3 from lagoon area-above confluence	2	0.99	8	1,300
"	6	"	Taunton Branch at Buckaroo Ranch sideroad	1.3	0.35	8	96
"	7	"	Taunton Branch below confluence with Creek No. 1	1.4	0.67	25	900
"	10	Ground	Test hole-approx. 150' north-west of office	3.8	11.0	8	
"	11	"	Test hole-approx. 100' north-west of office	100	4.2	30	
June 22	14	Surface	Creek No. 3 from lagoon area-above confluence	12.0	0.50	15	
"	12	Ground	Test hole-across sideroad and north-west of office	1.2	9.2	10	
"	13	"	Test hole-south of lagoon	16	1.80	12	
"	15	"	Test hole-below green shack-midpoint on property	53	42.5	175	
"	16	"	Test hole-east of pump suction pond	1650	96	0	
"	17	"	Test hole-south of test hole 16 near Taunton Branch	38	15.5	40	
July 20	18	Surface	Taunton Branch -below Creek No. 1	3.0	1.90	0	5,000
"	19	"	" " -above " No. 1	1.2	0.71	0	4,000
"	20	"	" " - " " No. 1	1.1	0.72	0	600
"	21	"	" " - " " No. 1	1.5	0.55	0	2,000
"	22	"	" " - " " No. 1	1.1	0.61	3	730
"	23	"	" " - " " No. 2	4.4	0.70	18	4,100
"	24	"	" " -below " No. 3	1.4	0.51	2	1,300
"	25	"	" " at buckaroo Ranch sideroad	1.3	0.40	13	1,100



GROUND WATER INTERCEPTOR

OFFICE

TILED WATERCOURSE

LAGOON

GREEN SHACK

PUMP SHACK

PUMP SUCTION POND

LEGEND

- O - GROUND WATER SAMPLING POINT
- X - SURFACE WATER SAMPLING POINT
- [Hatched Box] - TOE OF FILLED AREA

TOWNSHIP OF EAST WHITBY

INDUSTRIAL DISPOSAL
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LAND FILL SITE
NOT TO SCALE

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