THE

ONTARIO WATER RESOURCES

COMMISSION

INDUSTRIAL WASTE SURVEY

of the

CITY OF CHATHAM

1967

A

REPORT

on

AN INDUSTRIAL WASTE SURVEY OF THE CITY OF CHATHAM

1967

by

Division of Industrial Wastes

ONTARIO WATER RESOURCES COMMISSION

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SECTION I

AN INDUSTRIAL WASTE SURVEY OF THE CITY OF CHATHAM

March, 1967

INTRODUCTION

A municipal industrial waste survey was first conducted in Chatham in 1962. Since that time, municipal sewage treatment facilities in the City have been expanded to provide secondary treatment by the activated sludge process. Many of the industries in the City have taken advantage of these expanded facilities and discharge industrial wastes to the municipal sanitary sewers. Other industries were also preparing to discharge wastes to the municipal sanitary sewerage system at the time of the survey. The purpose of this report has been to review this aspect of industrial waste disposal in the City, as well as to make an overall appraisal of industrial pollution control in Chatham.

SUMMARY

Since almost all of the industries in Chatham with significant liquid industrial wastes are potential or actual users of the municipal sanitary sewerage system, this aspect of pollution control in Chatham has been of major concern in this survey.

When all of these industrial wastes are discharged to the municipal system, they could contribute up to 50 per cent of the flow to the sewage treatment plant. In addition, an equivalent proportion of the BOD waste loading on the sewage treatment plant could be industrial in origin.

Also, the sewage treatment plant at times will be receiving wastes in excess of design capacity in terms of hydraulic loading and will almost be at design capacity in terms of BOD waste loading.

It is evident, therefore, that a large proportion of the twenty year design capacity of the sewage treatment plant will have been utilised by industrial wastes and this may become a limiting factor in the future growth of Chatham, unless the sewage treatment facilities are expanded. Therefore, it is recommended that action be taken by the City of Chatham and by the industries concerned towards eliminating the unnecessary discharge of clean cooling waters to municipal sanitary sewers.

Because industrial wastes are a major portion of the flow to the sewage treatment plant, the regulation and policing of industrial discharges is of great importance. It is recommended that the City of Chatham become more active in this area and appoint a technically trained inspector or by-law enforcement officer for this purpose.

DETAILS OF SURVEY

The Industrial Directory of the City of Chatham, prepared by the City Industrial Commission, lists 118 industries and service establishments. Most of the service establishments and many of the industries listed in this directory were not considered during this survey since; on the basis of the type of operations being carried out, the size of the plant, the number of employees and water consumption data supplied by the Chatham P.U.C.; it was judged that no significant liquid industrial wastes were being discharged from these establishments.

This left about 45 industries which were visited or contacted by telephone to establish if liquid industrial waste discharges resulted from their operations. Surveys were conducted at those industries with significant waste discharges. These surveys included interviews with industrial personnel to determine the nature, sources and quantities of liquid wastes and the collection of samples of the wastes for chemical analysis. Survey reports on the industries in this latter category appear in Section II of this report.

All samples were submitted to the OWRC laboratory in Toronto for analysis in accordance with the procedures described in "Standard Methods for the Examination of Water and Wastewater", twelfth edition, published by the United States Public Health Association.

Water consumption information was supplied by the Chatham Public Utilities Commission or, in the case of private sources of supply, from company records or the estimates made by company personnel.

Water Supply

Most of the industries in Chatham obtain process and domestic water from the Chatham P.U.C. The source of supply for the municipal water system is the Thames River. During the period January to March, 1967, the P.U.C. supplied approximately 170 million gallons of water to commercial and industrial users and in the order of 85 million gallons to domestic consumers. On this basis, industrial water consumption is approximately two-thirds of the total consumption for the City.

In addition, there are a small number of industries, principally the Canada and Dominion Sugar Company Limited, Darling Company of Canada Limited, Lenover Bros. Limited and sand and gravel washing plants, which use private sources of water. Of major significance in this category is the Canada and Dominion Sugar Company Limited plant which uses approximately 8 million gallons of water per day obtained from the Thames River during the sugar beet processing season, which usually extends from October to December.

Sewage Treatment

The Chatham sewage treatment plant was completed in 1964 as a joint project of the City and the OWRC. The plant has a hydraulic capacity of 4.5 mgd and was designed to treat 11,250 lbs. per day of BOD and suspended solids.

The plant includes facilities for primary sedimentation followed by activated sludge aerobic secondary treatment, final settling and effluent chlorination. Facilities are also provided for anaerobic sludge digestion.

Gross surface water pollution has for some time been associated with seasonal discharges of tomato processing wastes from local canneries. An aerated lagoon system is being constructed by the OWRC and the City to treat these wastes.

The lagoon system will be a six cell unit with a total surface area of 37.5 acres and an operating depth of 9.5 feet. The total lagoon capacity will be about 87 million gallons, to provide total retention for an expected waste volume of 2.1 mgd during a 41 day processing season. Aeration will, initially, be provided in one cell by submerged perforated plastic pipe.

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The wastes discharged to the lagoon will be largely from the Campbell Soup Company Limited and the Libby, McNeill and Libby of Canada Limited plants via a direct sewer connection and, if necessary, raw sewage from the influent works of the activated sludge plant. The maximum expected BOD waste loading on this system is 11,000 lbs. per day or 300 lbs. BOD per acre per day.

The effluent from the system will be discharged to the Thames River on a controlled basis. Initially, it was expected that the lagoon would be in operation in time for the 1967 tomato processing season. However, construction delays and problems with the plastic pipe installation have extended the completion date until 1968.

The operating costs of the aerated lagoon and the activated sludge treatment plant, including the amortization of the capital debt is charged to the City of Chatham by the OWRC.

In common with many other joint OWRC municipal projects, the manner in which this charge is recovered from the users is at the discretion of the municipality. The City of Chatham has chosen to levy a surcharge on the water bill of all P.U.C. customers and, in the case of the aerated lagoon, will transfer the operating and capital amortization costs back to the users (i.e. the canneries) by imposing a surcharge.

It is evident that all water users in the City are contributing to the capital and operating costs of the municipal sewage treatment facilities without regard to whether the facilities are being utilized or are required by the water user. This has encouraged many of the

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TABLE I

CHATHAM SEWAGE TREATMENT PLANT

OPERATING DATA

JANUARY TO MAY, 1967

RAW SEWAGE						FINAL EFFLUENT				PER CENT REDUCTION	
Flow mgd				BOD	Susp. Solids	BOD		Susp. Solids		BOD	Susp. Solids
Month	Min.	Max.	Avg.	lbs/day	lbs/day	ppm	lbs/day	ppm	lbs/day		
Jan.	1.7	3.3	2.30	7,200	4,500	13	299	18	413	96%	91%
Feb.	1.5	3.0	2.25	8,500	4,500	11	247	15	338	97%	93%
Mar.	1.75	3.9	2.85	6,000	5,100	11	314	14	399	95%	92%
Apr.	1.3	4.2	2.85	6,300	8,900	14	398	19	540	94%	94%
May	1.3	3.2	2.51	7,500	5,900	13	326	16	401	96%	93%

TABLE II

CHATHAM SEWAGE TREATMENT PLANT

ANALYTICAL RESULTS

Sample	Date	BOD	SOLIDS			COD	Kjeldahl Nitrogen as N	Phosphorus as PO_4	pH
			Total	Susp.	Diss.				
Raw Sewage	Mar. 20, 1967	165	994	162	832	430	28	-	-
Primary Effluent	"	119	910	102	808	205	31	-	-
Final Effluent	"	12	736	12	724	67	13	-	-
Raw Sewage	Mar. 21, 1967	100	1,016	424	594	450	22	1.26	7.0
Primary Effluent	"	43	782	164	618	180	20	1.44	7.1
Final Effluent	"	8.2	728	19	709	43.1	15	1.96	7.6
Raw Sewage	Mar. 22, 1967	128	938	176	762	1,905	31	3.32	7.0
Primary Effluent	"	74	884	108	776	122	25	3.52	7.1
Final Effluent	"	9.2	688	6	682	85	8.6	3.32	7.6

N.B. All analytical results except pH are expressed in parts per million by weight.

All samples are 16 hour composites.

It is clear from the operating data and the analytical results of samples taken during this survey (see Table II) that a very high degree of treatment was being achieved by the sewage treatment plant. The average reductions in BOD and suspended solids content of the raw sewage are both greater than 90 per cent and final effluent quality is compatible with OWRC objectives.

Current waste flows and loadings are likely to be higher than those indicated in the preceding table, since wastes from Canada and Dominion Sugar Company Limited, Ontario Steel Products Limited, Canadian Filters Limited (Park Avenue plant), Darling Company Canada Limited and Lenover Brothers Limited, have been accepted into the municipal system, since the time of this survey. This would result in an increase of about 0.9 mgd in the raw sewage flow. In addition, current waste flows from the Libby, McNeill and Libby of Canada Limited plant have substantially increased due to tomato processing.

MUNICIPAL SEWER-USE BY-LAW AND OTHER REGULATIONS

Biological systems commonly employed in the treatment of domestic sewage are sensitive to many environmental changes brought about by the disposal of industrial and other wastes to municipal sanitary sewers. Therefore, the disposal of wastes to sanitary sewers must be regulated.

Under the terms of the agreement between the OWRC and the City of Chatham, only sanitary sewage may be discharged to the sewage works unless the Commission otherwise consents in writing. No wastes are to be permitted access to the sewage works which in the opinion of the Commission may damage or interfere with the operation of the sewage works.

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Consent has been given by the Commission to the acceptance of most of the industrial wastes currently being discharged to the municipal sanitary sewerage system.

Under the terms of sections 47 (f) and 47 (g) and under section 50 (a) of the OWRC Act, the Commission is empowered to regulate the quantity and quality of wastes being discharged to municipal sewers. However, as a practical matter, the regulation of waste discharges to municipal sewers is best dealt with at the municipal level.

By-Law Number 5339 of the Corporation of the City of Chatham was enacted in June, 1964 to; "regulate the discharge of water and wastes into the City of Chatham public sewers and providing penalties for the violation thereof". Some of the more important features of this by-law are the regulations regarding the disposal of wastes to sanitary sewers. It is evident from the table which follows, that excessive quantities of grease, flammable liquids, organic matter and suspended solids are prohibited as well as acidic, alkaline or toxic wastes which may be harmful to the sewerage system. A summary of the regulations prescribed by the by-law which are of particular significance with respect to industrial wastes is presented in Table III.

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TABLE III

CHATHAM SEWER-USE BY-LAW

REGULATIONS FOR WASTE DISCHARGES

TO SANITARY SEWERS

Waste Characteristic	By-Law Requirement
Temperature	150 degrees Fahrenheit maximum
Oils and grease content	100 ppm maximum (animal or vegetable origin) 15 ppm maximum (mineral origin)
Gasoline, benzene, naptha, fuel oil, acetone, solvents, or other flammable liquids.	Prohibited
Solids, such as ashes, cinders, garbage, sand, earth, mud, rags, etc. capable of obstructing sewers.	Prohibited
Animal solids, such as hair, wool, feathers, paunch manure, etc.	Prohibited
pH	Acceptable range 5.5 to 9.5
Any wastes containing toxic or poisonous substances in sufficient quantity to interfere with the operation of the sewage treatment plant.	Prohibited
Phenolic compounds	50 ppb maximum
Chlorides	1,000 ppm maximum
Sulphates	1,500 ppm maximum
BOD	300 ppm maximum
Suspended Solids	350 ppm maximum
Noxious or malodorous gases	Prohibited

Section 2 (h) is also of particular significance and states, "If the industrial wastes of any person are of such unusual strength or character that compliance with this by-law is not possible, the Corporation of the City of Chatham may agree to supply special treatment, subject to payment thereof as provided hereafter, or as may be agreed".

DISCUSSION OF FINDINGS

The City of Chatham is located on the Thames River in the County of Kent, southwestern Ontario. This location, in a largely rural area and close to the Detroit-Windsor district, influences significantly the types of industries located in the City.

Agriculture is the major industry in the surrounding rural area and, therefore, food processing and allied industries make-up about one-third of the total number of industries in Chatham. At the same time, the proximity to the main auto manufacturing centre in North America has encouraged the development of numerous auto parts and related secondary manufacturing industries.

The sixteen industries with significant liquid industrial waste discharges investigated in this survey are evenly divided between these two general categories.

The waste discharges from the food processing industries may be sub-divided into continuous and seasonal waste flows.

Table IV (a) and IV (b) indicate the waste characteristics and sources of these continuous and seasonal discharges respectively.

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TABLE IV (a)

FOOD PROCESSING INDUSTRY

SEASONAL WASTE DISCHARGES

Name	Operating Period	Waste Flow gpd	BOD lbs/day	Suspended Solids lbs/day
Campbell Soup Co. Ltd.	Aug. to Nov.	1,000,000	1,950	960
Canada and Dominion Sugar Co. Ltd.	Oct. to Dec.	120,000	3,000	218
Libby, McNeill and Libby of Canada Ltd.	July to Dec.	2,000,000	5,000*	1,000*
TOTAL		3,120,000	9,950	2,178

*estimated loadings

TABLE IV (b)

FOOD PROCESSING INDUSTRY

CONTINUOUS WASTE DISCHARGES

	Waste Flow gpd	BOD lbs/day	Suspended Solids lbs/day
Darling Co. Canada Ltd.	40,000	618	452
Erie Beverages Ltd.	12,500	<1	<1
Lenover Brothers Ltd.	6,000	300	18
Libby, McNeill and Libby of Canada Ltd.	80,000	2,200	464
Silverwoods Dairy Ltd.	5,500	<1	<1
Snell Beverages Ltd.	7,000	<1	<1
TOTAL	151,000	3,118	934

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All of these waste discharges (seasonal and continuous) are actual or potential waste loadings on the municipal sewage treatment facilities, including the proposed aerated lagoon system. In addition to these, there are the waste loadings from the secondary manufacturing industries. These are summarised in Table V.

TABLE V

AUTO PARTS AND SECONDARY MANUFACTURING INDUSTRIES

Name	Waste Flow gpd	Susp. Solids lbs/day	Heavy Metals* lbs/day	COD lbs/day
Canadian Filters Ltd. (Park Ave. plant)	65,000	96	2	1,520
Canadian Filters Ltd. (William St. plant)	72,000	48	1	760
Chatham Metal Finishings Ltd.	15,000	7	3	-
Canadian Mouldings Co. Ltd.	172,000	774	258	-
International Harvester Co. Ltd.	325,000	940	10	628
Motor Wheel Corp. Can. Ltd.	24,500	32	-	-
Ontario Steel Products Ltd. (two plants)	690,000	2,800	120	-
TOTAL	1,363,500	4,697	394	2,908

*Includes chromium, nickel, zinc, aluminum and iron.

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With the exception of the wastes from Chatham Metal Finishings Limited, all of these wastes are currently being discharged to the municipal sanitary sewerage system.

Since all of these industries are sources of actual or potential waste discharges to the municipal sanitary sewerage system, it is essential to consider the possible effects of these wastes on the municipal sewage treatment facilities.

The total (continuous) contaminated industrial waste flow is at present about 1.51 mgd. At the time of this survey, the raw sewage flow to the sewage treatment plant was in the order of 2.5 mgd. The major industrial contributions to this raw sewage flow were as indicated in Table VI.

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TABLE VI

INDUSTRIAL WASTE LOADINGS ON THE CHATHAM SEWAGE TREATMENT PLANT AS OF MARCH, 1967

Name	Waste Flow gpd	COD lbs/day	BOD lbs/day	Susp. Solids lbs/day
Canadian Filters Ltd. (William St. plant)	72,000	760	-	48
Canadian Mouldings Ltd.	172,000	-	-	774
Erie Beverages Ltd.	12,500	-	<1	<1
International Harvester Co. Ltd.	325,000	628	-	940
Libby, McNeill and Libby of Canada Ltd.	80,000	-	2,200	464
Motor Wheel Corp. Canada Ltd.	24,500	-	-	32
Silverwoods Dairy Ltd.	5,500	-	<1	<1
Snell Beverages Ltd.	7,000	-	<1	<1
TOTAL	698,500	1,388	2,200	2,258

On the basis of a total contaminated industrial waste flow of 1.51 mgd, excluding contributions of industries with seasonal operations, the current combined flow to the City sewage treatment system is about 3.3 mgd.

It is evident from Table IV (a) that the maximum potential contaminated waste flow from those industries with seasonal waste discharges is about 3.1 mgd. Therefore, the raw sewage flow at the sewage treatment facilities may fluctuate between 3.3 and 6.4 mgd.

The combined hydraulic capacity of the sewage treatment facilities will eventually be 6.6 mgd (4.5 mgd activated sludge and 2.1 mgd aerated lagoon). It is, therefore, evident that during the fall and winter period when production at the two canneries and the Canada and Dominion Sugar Company Limited plant is at a maximum, the possibility of hydraulic overloading of the sewage treatment facilities exists. It remains to be seen whether the aerated lagoon system can accommodate this excessive hydraulic loading. The reported design capacity of 2.1 mgd for a 41-day season for the lagoon system may be insufficient to provide total retention for the peak flows of up to 3.1 mgd which may be discharged to this system during a processing season which may extend beyond 41 days.

Furthermore, since the lagoon system will not be completed before the summer of 1968, hydraulic overloading of the sewage treatment plant by seasonal waste flows from Libby, McNeill and Libby of Canada Limited and Canada and Dominion Sugar Company Limited may occur. In addition, the waste flows from the 1967 tomato processing season at the Campbell Soup Company Limited plant will continue to be discharged to the municipal storm sewer and hence to the Thames River.

Consideration must be given to ways in which the hydraulic overloading of the sewage treatment facilities can be reduced. The most obvious method to achieve this objective is the elimination of the

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discharge of clean waters, such as cooling water, to municipal sanitary sewers. Table VII indicates the main sources and volumes of such discharges.

TABLE VII

COOLING WATER DISCHARGES

TO SANITARY SEWERS

Name	Flow gpd
Canadian Filters Ltd. (two plants)	96,500
Canadian Mouldings Ltd.	100,000 (estimated)
Ontario Steel Products Ltd. (two plants)	450,000
TOTAL	646,500

In addition to this, there are substantial, but undetermined amounts of cooling water being discharged to municipal sanitary sewers from Libby, McNeill and Libby of Canada Limited during the tomato processing season and equivalent cooling water discharges from the Campbell Soup Company Limited plant to the municipal storm sewer, which will eventually be discharged to the aerated lagoon system.

Also of significance in relation to the utilization of hydraulic capacity at the sewage treatment plant are the volumes of wastes from the secondary manufacturing industries containing inert or toxic materials which are not amenable to biological treatment. Almost all of the waste flows from the secondary manufacturing industries fall into this general category and, from a purely technical standpoint, in the order of 1.4 mgd (the total waste flow from these industries) of sewage treatment capacity is being used by wastes which could be disposed elsewhere and/or treated at the source by chemical or physical means.

There is some benefit in discharging certain wastes from these industries to municipal sanitary sewers, such as paint spray booth waters and other organic wastes or, wastes containing inert suspended solids, because facilities are available at the treatment plant to remove these contaminants. However, the disposal of clean cooling waters and/or wastes containing toxic heavy metals to sanitary sewers are questionable practices since, in the former case, hydraulic capacity at the treatment plant is being wasted and in the latter case the wastes may be harmful to sewage treatment processes.

The loadings of heavy metals from the secondary manufacturing industries shown in Table V may not truly indicate the degree to which these materials can effect the operation of the sewage treatment plant. The toxicity of heavy metals to sewage treatment processes may be cumulative or instantaneous, depending upon the unit of the sewage treatment plant involved and the nature of the heavy metal concerned.

Cumulative effects of heavy metals, such as the reduction of gas production and in extreme cases, the complete inhibition of biological activity, in sludge digestion equipment are largely dependant upon the nature and quantity of the heavy metal involved.

Shock or instantaneous effects such as that leading to the death of micro-organisms in the aeration units is most often associated with a single large dose of a toxic component such as a heavy metal.

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This may not be clearly indicated by the waste loading data. This aspect of industrial waste disposal by the secondary manufacturing industries is dealt with more fully in the individual industry survey reports.

The industrial BOD waste loading on the sewage treatment facilities may fluctuate between 4,000 and 11,000 lbs. per day, depending upon the seasonal waste loadings indicated in Table IV (a). This represents roughly 20 per cent and 50 per cent respectively of the total (activated sludge plant and lagoon) design capacity of the treatment facilities.

During this survey (March, 1967), the total raw sewage BOD waste loading at the sewage treatment plant was about 6,000 lbs. per day (see Table I, Sewage Treatment Plant Operating Data). At that time, the industrial contribution to this BOD waste loading was mainly attributable to the wastes from Libby, McNeill and Libby of Canada Limited. This industrial BOD contribution is calculated to be about 2,200 lbs. per day. On the basis of a literature value BOD waste loading of 0.167 lbs. BOD per person per day and a population of 30,000 for the City of Chatham, the domestic sewage BOD waste loading is estimated to be about 5,000 lbs. per day. In view of the fact that not all of the domestic sewage flow in Chatham is discharged to municipal sanitary sewers, some private residences and commercial establishments continue to utilize septic tanks and other private means of sewage disposal, there appears to be reasonable agreement between the observed raw sewage BOD waste loading of 6,000 lbs. per day and the calculated loading of 7,200 lbs. per day (2,200 lbs. per day

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industrial and 5,000 lbs. per day attributed to domestic wastes).

It is clear, therefore, that a major portion of the raw sewage BOD waste loading at the sewage treatment plant is industrial in origin and largely attributable to the major food processing industries in Chatham. During periods of peak production at these industries, as much as 50 per cent of the combined design treatment capacity of the sewage treatment plant and the aerated lagoon in terms of BOD will be utilized by industrial wastes. Also, since the aerated lagoon system will not be completed until 1968, these same peak flows will contribute to the overloading of the sewage treatment plant and, in the case of wastes from the Campbell Soup Company Limited plant, the continued pollution of the Thames River during the current tomato processing season.

The industrial suspended solids loading is also significant in terms of the utilization of treatment capacity at the sewage treatment facilities. The sources and magnitude of this waste loading are as indicated in Tables IV (a), IV (b), and V. It is evident that the continuous daily suspended solids loading is about 5,600 lbs. and the maximum potential loading is approximately 7,300 lbs.

At the time of this survey, the raw sewage suspended solids loading at the sewage treatment plant was 5,000 lbs. per day. The industrial contribution to this loading, as indicated by Table IV, was about 1,300 lbs. per day. The theoretical domestic sewage suspended solids loading for Chatham is 6,000 lbs. per day at 0.2 lbs. per capita per day, assuming all of the population is serviced by sanitary sewers. It is therefore evident that there is a reasonable

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agreement between the actual raw sewage suspended solids loading of 5,000 lbs. per day and the theoretical value of 7,300 lbs. per day.

On the basis of the foregoing discussion, it appears that the disposal of industrial wastes to municipal sanitary sewers in Chatham may be subject to review in future, particularly in the event that excessive industrial waste loadings reduce the available capacity of the sewerage system and thus become a limiting factor in the growth of Chatham.

In the case of wastes from the food processing industries, and the canneries in particular, disposal to the municipal sanitary sewerage system is often the only feasible method of pollution control. The wastes contain high concentrations of organic matter and are, therefore, amenable to biological treatment. The provision of such treatment by the individual industry would very likely be prohibitively expensive. This has been recognized by the City of Chatham in its willingness to accept industrial wastes from the food processing industries into municipal sanitary sewers and by its provision of separate facilities to treat cannery wastes. However, in the disposal of food processing wastes to sanitary sewers, it is essential that all possible measures are taken to ensure that waste flows and loadings are maintained at minimum practicable levels.

In the case of wastes from the secondary manufacturing industries, capacity at the sewage treatment facilities is being absorbed by wastes which are not amenable to biological treatment.

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However, at this point it must be acknowledged that with few exceptions, all the industries in Chatham have contributed and are continuing to contribute to the capital and operating costs of the municipal sewerage system. Obviously, the disposal of industrial wastes to municipal sanitary sewers would be regarded by all industries in Chatham as a legitimate use of municipal facilities for which the City of Chatham is being adequately reimbursed.

It is clear, therefore, that any change in the present status regarding the disposal of industrial wastes to municipal sewers in Chatham would likely lead to a change in the manner of levying charges to recover capital and operating costs for the municipal facilities. For example, surcharges could be levied on the basis of waste loading rather than water consumption.

Increased BOD and suspended solids loadings could be accommodated by either modifying or extending aeration and sludge digestion facilities at the sewage treatment plant. However, excessive hydraulic load would necessitate an expansion of the sewage treatment plant. Thus, measures to eliminate the unnecessary discharge of industrial wastes to municipal sanitary sewers are of prime importance.

The Corporation of the City of Chatham is preparing to enter, or has recently entered, into agreements with a number of industries to accept substantial industrial waste loadings into the municipal sewage works. Generally, these agreements specify the quantity and quality of wastes which will be accepted.

The Chatham sewer-use by-law is also specific with regard to the quality of wastes which will be accepted into municipal sewers. This survey has pointed out a number of instances where industrial discharges to municipal sewers exceed the requirements of the by-law and for which no consent or approval has been obtained from the City or the OWRC.

Clearly, there is a continuing need for adequate policing of agreements between the City and industries and the enforcement of the sewer-use by-law. This has, in the past, largely depended upon pollution surveys carried out by OWRC personnel. It must be recognized that few municipalities have the technical resources to carry out detailed investigations of the waste disposal practices of industries. However, the appointment of a technically trained inspector or by-law enforcement officer by the City may be a worthwhile consideration.

CONCLUSIONS AND RECOMMENDATIONS

Industrial waste discharges in Chatham are a major proportion of the total raw sewage flow to the sewage treatment facilities. By the end of 1968, it is expected that there will be no significant contaminated industrial waste discharges to surface waters in the Chatham area.

The potential raw sewage flow to the sewage treatment plant approaches the design capacity of the facilities during peak periods and the expected industrial BOD and suspended solids loadings are approximately one-half and one-third the design treatment capacity respectively.

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These factors may reduce the effective life of the sewage treatment plant and may tend to retard industrial and population growth in Chatham, unless the treatment plant is modified or expanded to accommodate the increased loadings.

It is, therefore, recommended that measures to reduce industrial waste flows and loadings be investigated. Investigations should be directed towards the elimination of industrial waste discharges to municipal sanitary sewers for which little or no benefit in terms of waste treatment is afforded at the sewage treatment plant. For example, the discharge of cooling waters and toxic wastes could be eliminated by treatment at the source and disposal of the treated effluent to storm sewers or watercourses.

In addition, industries should be encouraged to reduce waste flows and loadings by the re-use of process waters and the installation of pretreatment facilities. The degree to which this can be accomplished has been clearly demonstrated at the Canada and Dominion Sugar Company Limited plant.

Furthermore, since industrial wastes are such a significant factor in sewage disposal in Chatham, the regulation of industrial waste discharges to municipal sewers requires greater emphasis. It is recommended that technical personnel be appointed by the City of Chatham to police agreements between industries and the City and to enforce the municipal sewer-use by-law.

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SECTION II

CAMPBELL SOUP COMPANY LIMITED

This cannery is located on Richmond Street in Chatham. The plant is engaged in the manufacture of vegetable juices and soups.

DETAILS OF SURVEY

The plant was not operating during this survey. Mr. L. G. Chambers, Plant Manager, provided general operating data as follows:

Production:	Peas - June to July (6 weeks) Tomatoes and Lima Beans - mid August to October. Intermittent processing of other vegetables after tomato season. Operations usually end in November and begin again in June.
Water Consumption:	300,000 to 1,500,000 gpd
Waste Disposal:	Storm sewer after screening in rotating drum screens.

Waste Loading

Based on the results of a survey conducted at this plant in September, 1966 waste loadings from this plant are estimated to be as follows:

Flow	BOD lbs/day	Susp. Solids lbs/day
1.2 mgd	1,950	960

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DISCUSSION OF FINDINGS

The waste loadings indicated in the preceding table represent the maximum potential loadings during the tomato processing season. At the present time, this waste loading is being discharged to a municipal storm sewer and hence to the Thames River. It is expected that this waste will be directed to the municipal aerated lagoon when this facility is completed in 1968.

CONCLUSIONS

It is evident that the gross pollution of the Thames River, associated with the waste discharge from this plant, will continue during the current processing season, but it is expected that this will be eliminated by the commencement of the 1968 season.

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CANADA AND DOMINION SUGAR COMPANY LIMITED

This plant is located on Tecumseh Road in Chatham. The plant is engaged in the manufacture of sugar and sugar by-products from sugar beets.

SUMMARY

The plant was not operating during this survey. However, a comprehensive industrial waste survey was conducted at this plant in November, 1966. Briefly, this survey indicated that the Company's staged programme of pollution control by in-plant waste reductions had almost reached the limit of effectiveness. In-plant controls have successfully reduced the contaminated waste flow to the point where serious consideration can be given to the discharge of this waste flow to the municipal sanitary sewerage system. This course of action was recommended in the 1966 report and subsequent negotiations between the Company and the City have reached the stage that agreement to this procedure has been achieved. At an OWRC Liaison Committee meeting in Chatham on June 15, 1967, it was agreed as follows:

(a) The Division of Plant Operations of the OWRC be requested to advise on the quality and quantity of wastes from this Company that could be accepted by the municipal sewage treatment plant.

(b) Subject to the quality and quantity of the wastes being reasonably acceptable for treatment, the City of Chatham will accept the wastes of Canada and Dominion

Sugar Company Limited into the municipal sanitary sewerage system on the basis of standards set by the OWRC Division of Plant Operations.

(c) The acceptance of these wastes will be on the basis of a trial period covering the 1967 sugar beet processing season.

(d) Mr. C. W. Case, P. Eng., of Todgham and Case Limited will be appointed by the City as a consultant in this matter, to act as liaison engineer between the City and the Canada and Dominion Sugar Company Limited during the trial period.

(e) The City will be reimbursed financially for consultants fees and other costs with respect to this study.

(f) The exact volume of wastes discharged to the treatment plant will be measured.

The acceptability of this procedure was subsequently confirmed to the City by the OWRC and the agreement then executed.

A summary of the data obtained during the 1966 survey is as follows:

Production and Operating Data

Operating Schedule	-	3 x 8 hour shifts per day
		7 days per week
		October to December
Number of employees	-	350 during processing season

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Production and Operating Data (continued)

Production volume - 31,000 tons sugar beets per day

Water consumption - Thames River 8.4 mgd
Chatham P.U.C. 0.13 mgd

Sources of Wastes and Wastes Disposal

Condenser cooling waters and other clean waters are discharged directly to the Thames River and comprise the major waste flow from this plant. Flume and wash waters are discharged to a lagoon system which is recirculated back to the plant with a controlled overflow from this system to the Thames River. Lime slurry from the juice purification is thickened and filtered prior to disposal to a holding pond.

WASTE LOADING

Table I.

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TABLE I

WASTE LOADINGS FOR CANADA AND DOMINION SUGAR

COMPANY LIMITED - CHATHAM PLANT

Sample Location	Date	Flow mgd	BOD lbs/day	Susp. Solids lbs/day	COD lbs/day
Raw water intake	1966	8.4	50	84	1,008
	1965	8.4	1,850	3,528	4,020
	1964	8.4	1,100	8,400	7,600
	1963	8.45	1,700	4,300	6,090
Clean water sewer	1966	8.06	806	5,882	-
	1965	7.9	1,500	1,400	3,600
	1964	5.4	300	2,200	2,700
	1963	2.2	400	1,750	1,600
Influent to lagoons	1966	5.18	137,400	190,600	207,400
	1965	7.8	-	-	-
	1964	7.8	178,000	473,600	196,000
	1963	6.2	49,800	405,000	115,200
Overflow from lagoons	1966*	0.12	3,000	218	4,800
	1965	0.502	11,000	850	11,000
	1964	3.0	37,100	270	54,300
	1963	6.24	39,300	749	53,000
Net waste to river	1966	-	3,756	6,016	-
	1965	-	12,700	2,250	14,500
	1964	-	37,400	1,930	51,600
	1963	-	39,700	2,500	54,600

*Based on average flow figure provided by Canada and Dominion Sugar Company Limited.

CONCLUSIONS AND RECOMMENDATIONS

The 1966 survey report on this Company's waste disposal practices concluded that the plant wastes were readily biodegradable and amenable to treatment in the municipal facilities. Although the waste strength was found to be quite high, the fact that plant operations are seasonal and considerable storage capacity is available in the recirculating lagoon system, suggested that a controlled discharge to the municipal sanitary sewerage system was feasible. This has subsequently been agreed upon by all parties concerned and it remains to be seen during the initial trial period whether this can become a permanent practice.

CANADIAN FILTERS LIMITED

This Company manufactures automotive air filters at two locations in Chatham, the William Street plant and the Park Avenue plant.

DETAILS OF SURVEY

Personnel Participating

Mr. F. L. Craig - OWRC

Mr. R. A. Abbott - OWRC

Personnel Interviewed

Mr. M. McGregor - Plant Engineer, William Street plant

Mr. R. Pitre - Plant Superintendent, Park Avenue plant

Operating Schedule

Park Avenue plant - 2 shifts per day, 5 days per week

William Street plant - 2 shifts per day, 5 days per week

Number of Employees

Park Avenue plant - 80

William Street plant - 100

Water Consumption

Park Avenue plant	-	Sanitary	1,500 gpd
		Industrial	63,500 gpd
William Street plant	-	Sanitary	2,000 gpd
		Industrial	70,000 gpd

Manufacturing Processes and Sources of Wastes

Operations at both the William Street and Park Avenue plants are very similar.

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Filter housings are fabricated from sheet steel, phosphatized, painted and paper or wire gauze elements inserted.

Fabricating operations involving pressing, forming and welding utilize cooling waters, which are discharged after one passage through the equipment.

Phosphatizing operations, and to a lesser extent painting operations, are the principal sources of contaminated wastewaters from both plants. However, there is only one phosphatizing unit at the William Street plant while there are two at the Park Avenue plant. Therefore, cooling waters from fabricating and forming operations are the principal wastewaters from the William Street plant, while phosphatizing rinses, spent solutions and paint spray booth waters are the principal wastewaters from the Park Avenue plant.

Phosphatizing operations involve the immersion of the metal parts in an acid phosphate cleaner, followed by a spray rinse and finally immersion in a phosphoric-chromic acid sealer. The parts are then dried and transferred to the paint line. All of these operations are carried out in proprietory units. Sources of wastes from these units are the continuous running rinse after the acid cleaner and the periodic dumps of spent cleaners and chromic acid sealers.

Currently, all tanks in both phosphatizing units at the Park Avenue plant are discharged daily at the end of the second shift. This involves the dumping of two 2,000 U.S. gallon acid cleaner tanks, two 800 U.S. gallon rinse tanks and two 900 U.S. gallon phosphoric-chromic acid sealer tanks.

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Painting operations at the Park Avenue plant are carried out in four water walled paint spray booths. The water curtain in these booths is recirculated through a 500 gallon tank. These tanks are skimmed and dumped about once per week.

Phosphatizing and painting operations at the William Street plant are essentially the same as the Park Avenue plant.

Waste Disposal

All wastewaters from the William Street plant are discharged to the Chatham sanitary sewerage system.

During this survey wastewaters from the Park Avenue plant were being discharged to a combined sewer on Park Avenue and hence to McGregors Creek. Company personnel indicated that a pumping station was being constructed by the City of Chatham to conduct wastes from this sewer to the Chatham sanitary sewerage system.

Sampling and Analysis

Phosphatizing and painting operations were not being carried out at the William Street plant during this survey. For this reason no samples were taken at the William Street plant.

The Park Avenue plant was visited on March 21, 1967. Samples were taken at 15 minute intervals of the running rinse following the acid cleaner on both phosphatizing machines and the cooling water sump on one of the machines. These were combined to give composite samples representative of the wastes between 11 a.m. and 12 noon. During the same period, grab samples were taken of the acid cleaner solution and the chromic-phosphoric acid sealer solution from one of the phosphatizing machines. A grab sample was also taken of the

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recirculating water curtain in one of the paint spray booths.

All samples were submitted to the OWRC laboratory for analysis for BOD, solids, pH, COD, phosphate and chromium.

ANALYTICAL RESULTS

See following page.

CANADIAN FILTERS LIMITED

Date Sampled: March 21, 1967

All analyses except pH reported in
ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids Total	Solids Susp.	Solids Diss.	pH at Lab.	COD	Total Phosphate as PO_4	Hexav. Chromium as Cr	Total Chrome
T 651	25.	702	48	654	7.5	145	1.28	1.05	1.16
T 652	135.	1,478	78	1,400	7.1	68.8	**	0.0	0.64
T 653	380.	16,474	2,436	14,038	5.9	4,360	**	0.0	0.36
T 654	--	894	20	874	3.7	--	**	115.	120.
T 655	--	334	6	328	7.2	--	0.82	--	--
T 656	320.	668	15	653	7.4	788.	--	--	--

** Explosive material - test cannot be performed.

T 651	1.	#1 Machine - Acid Cleaner rinse - Composite 11:00 a.m. to 12:00 noon.
T 652	2.	#2 Machine - Acid Cleaner rinse - Composite 11:00 a.m. to 12:00 noon.
T 653	3.	#1 Acid Cleaner - Grab sample - 11:20.
T 654	4.	#3 Chromic Acid Sealer - Grab sample 11:25.
T 655	5.	Cooling water sump #1 Machine - Composite 11:00 a.m. to 12:00 noon.
T 656	6.	Paint spray booth water - Grab sample 12:05.

WASTE LOADINGS

Sample	Flow gpd	BOD lbs/day	Suspended Solids lbs/day	Chromium lbs/day	COD lbs/day
#1 machine rinse	10,000*	2.5	4.8	--	14.5
#2 machine rinse	10,000*	13.5	7.8	--	6.9
#1 acid cleaner	3,400	13.0	83.0	--	1,482.4
#3 Chromic sealer	1,500	--	--	1.8	--
Paint spray booth	2,000	6.4	--	--	15.8
*estimated					
TOTAL	26,900	35.4	95.6	1.8	1,519.6

DISCUSSION OF FINDINGS

The analytical results of samples taken during this survey indicate that the running rinses from the phosphatizing operations and other continuous wastes in the Park Avenue plant meet the requirements of the Chatham sewer-use by-law for disposal to the sanitary sewerage system.

However, of greater concern are the intermittent batch discharges of high strength spent solutions. Generally, the spent acid cleaners and the paint spray booth waters are acceptable for discharge to the sanitary sewer in most respects, but the chromic-phosphoric acid sealer is substantially in excess of the sewer-use by-law requirements in terms of chromium and pH.

Chromium is toxic to the micro-organisms essential to biological processes at the sewage treatment plant and excessive amounts should not be discharged to a sanitary sewer. Therefore, the chromic phosphoric acid sealer should be treated for the removal of chromium

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before discharge to the sanitary sewer. Conventional treatment processes for chromium wastes usually employ some form of reducing agent such as sodium bisulphite to reduce hexavalent chromium to the trivalent state, followed by neutralization with alkali to precipitate the chromium as the trivalent hydroxide, which may then be removed by sedimentation.

If this is impracticable, consideration should be given either to the reduction of chromium losses from the plant or to an alternative method of disposal.

Although the William Street plant was not sampled during this survey, it is reasonable to assume that wastes from this plant are similar to the wastes discharged from the Park Avenue plant with the possible exception that the greater volume of cooling water discharged from the William Street plant may tend to dilute the contaminated waste flow to a greater extent. However, the disposal of clean cooling water to sanitary sewers should be reduced as much as possible.

Waste loadings data suggest that in the order of 35 lbs. BOD, 95 lbs. suspended solids and 2 lbs. of chromium are discharged daily from the Park Avenue plant. Approximately half these amounts are likely to be discharged from the William Street plant.

CONCLUSIONS AND RECOMMENDATIONS

Continuous waste flows from both the William Street and Park Avenue plants of this company are unlikely to adversely effect the operation of the Chatham sewage treatment plant.

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Intermittent discharges of spent chromic-phosphoric acid solutions are in excess of the Chatham sewer-use by-law requirements in terms of chromium and pH.

It is recommended that consideration be given to the treatment of these wastes for the removal of chromium and the control of pH to acceptable levels or, failing this, that waste reduction or alternative disposal of these wastes be considered.

It is also recommended that, where practicable, cooling water be segregated from the contaminated waste flow and discharged to municipal storm sewers.

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CANADIAN MOULDINGS LIMITED

This Company is engaged in the manufacture and finishing of extruded aluminum products for domestic appliances and construction materials. The plant is located on La Croix Street in Chatham.

DETAILS OF SURVEY

Personnel Participating

Mr. R. M. Gotts - OWRC

Mr. G. Samuel - OWRC

Personnel Interviewed

Mr. J. C. Taffeiren

Number of Employees

110

Operating Schedule

2 shifts per day

5 days per week

Water Consumption

Sanitary 2,000 gpd

Industrial 170,000 gpd

Manufacturing Processes and Sources of Wastes and Disposal

Aluminum is received at the plant in ingot form. This is melted down and alloying materials added to produce a material of the required hardness and rigidity for extrusion. The aluminum alloy smelt is poured into steel moulds where it is cooled by city water circulated through cooling channels on the outside of the moulds. The alloyed castings are then stored prior to being fed to the extrusion presses.

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A certain proportion of the plant production, generally construction materials, is subjected to an anodizing treatment to produce a durable oxide skin on the aluminum surface. A further small proportion of plant production is finished with various dyed anodized coatings or spray painted.

Aluminum parts to be anodized are first cleaned in an alkali etch and/or soap cleaner solution. The parts are then pickled in a hot sulphuric acid solution and finally electrolytically anodized in a sulphuric acid anodizing bath.

Following the anodizing operation, the oxide coating on the parts is sealed by immersion in a hot water bath. Where dyed anodized parts are being manufactured, the parts after anodizing are dipped in the dye tank and then sealed by immersion in a nickel acetate sealer solution.

The purpose of the seal operation is to convert the aluminum oxide Al_2O_3 coating to the monohydrate $Al_2O_3.H_2O$ which, being of greater volume, tends to seal the microscopic pores in the coating.

Since most of the dyes used in the dyeing operations are water soluble it is likely that much of the dye would be leached from the anodize coating if a hot water seal were used. For this reason the dyed anodized parts are sealed in a hot nickel acetate solution.

There are three major sources of wastewaters in this plant; the foundry area, the extrusion area and the two anodizing areas. Cooling waters from the foundry moulds and the extrusion presses are discharged to a large sump, which is the source of water for rinses and

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solution make-up in the anodizing processes. Excess cooling water is discharged from this sump to the municipal sanitary sewer. Anodizing operations are carried out in a large area and a small area. Sources of wastes from these operations are continuous running rinses and periodic dumps of spent solutions. The following table indicates the nature and approximate dumping schedule for spent solutions from both anodizing areas:

SMALL AREA

Solution	Volume	Dump Schedule
Nickel Acetate Sealer	400 gallons	Monthly
Double Dye Tanks	400 gallons	Monthly
Hot Water Sealer	--	Daily
Sulphuric Acid Anodize Electrolyte	600 gallons	Monthly
Caustic Etch	600 gallons	Monthly
Caustic Dye Cleaner	--	Daily
Paint Spray Booth	1,300 gallons	Monthly

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Large Area

Solution	Volume	Dump Schedule
Caustic Etch 4-6 oz/gal NaOH 1 oz/gal Aquatone Metal Cleaner	6,000 gallons	every 6 to 8 weeks
Soap Cleaner	6,000 gallons	every 6 months
Sulphuric Acid Anodize Electrolyte 12 to 15% H_2SO_4	6,500 gallons	every 6 to 10 weeks
Hot Water Sealer	--	monthly

At the present time, strong acid and alkaline solutions are discharged directly to the municipal sanitary sewer. Some attempt is made to coincide the dumping of strong acids and alkalies such that neutralization may occur in the sewer. This has met with little success and the company have proposed to install an equalization and neutralization system to treat spent solutions.

Sampling and Analysis

The plant was visited on March 23 and composite samples were obtained of the continuous effluents from the small and large anodizing areas and of the total plant effluent. The composites were obtained by combining equal aliquots of the waste flows taken at regular intervals. At the same time, grab samples were taken of the following:

Small area nickel acetate sealer

Small area double dye tanks

Small area hot water sealer

Small area sulphuric acid electrolyte

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Small area caustic etch

Small area caustic cleaner

Small area paint spray booth water

Large area caustic etch

Large area soap cleaner

Large area sulphuric acid electrolyte

Large area hot water sealer

All samples were submitted to the OWRC laboratory for analysis for solids, pH, acidity, alkalinity, nickel and aluminum.

Analytical Results

See following page.

CANADIAN MOULDINGS LIMITED

Date Sampled: March 23, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	Solids			Acidity as $CaCO_3$	Alkalinity as $CaCO_3$	pH at Lab.	Nickel as Ni	Aluminum as Al
	Total	Susp.	Diss.					
T 712	1,686	5	1,681	508	471	6.0	185.	3.1
T 713	7,488	5	7,483	909	54	5.7	--	114.
T 714	824	7	817	6	114	8.0	--	1.3
T 715	110,688	195	110,493	0	89,880	13.1	--	26,600 (2.66%)
T 716	307,422	1,690	305,732	0	76,440	13.4	--	16,600 (1.66%)
T 717	380	16	264	0	3,054	11.4	--	1.2
T 718	110,916	832	110,084	0	112,400	13.7	--	19,300 (1.93%)

T 712	1. Nickel Acetate Seal Tank -	Small area -	Grab	sample.
T 713	2. Double Dye Tanks	"	"	"
T 714	3. Seal Tanks	"	"	"
T 715	6. Caustic Etch	"	"	"
T 716	5. Caustic Tank	"	"	"
T 717	7. Paint Spray Tank	"	"	"
T 718	8. Caustic Etch	Large area -	Grab	sample.

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CANADIAN MOULDINGS LIMITED

Date Sampled: March 23, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	Solids			pH at Lab.	Acidity as $CaCO_3$	Alkalinity as $CaCO_3$	Nickel as Ni	Aluminum as Al
	Total	Susp.	Diss.					
T 719	11,120	3,002	8,118	10.6	--	37,800	--	2,660
T 720	*	36	*	0.1	176,800	0	--	1,000
T 721	120	41	79	1.3	25,400	0	--	1.3
T 722	520	118	402	3.5	160	0	--	5.5
T 723	392	41	351	6.1	0	153	0.0	6.4
T 724	1,292	96	1,196	4.8	68	92	0.0	16.

* Will not dry under heat lamp.

T 719	9.	Soap cleaner (Diversey 202) Large area - Grab sample
T 720	10.	Electrolyte (H_2SO_4) Strong Acid Large area - Grab sample
T 721	11.	Hot water sealer
T 722	12.	Composite - Small area effluent
T 723	13.	Composite - Large area effluent
T 724	14.	Composite - Combined plant effluent

DISCUSSION OF FINDINGS

The analytical results indicate that the continuous daily wastes from this plant, with minor exceptions, meet the requirements of the Chatham sewer-use by-law for discharge to the municipal sanitary sewer. However, the disposal of spent solutions from this plant to the sanitary sewer is of major concern, since the nature of these wastes is such that adverse effects are experienced at the sewage treatment plant to the extent that raw sewage is temporarily by-passed to the Thames River when these wastes are discharged. This is a highly questionable practice and for this reason the company has proposed to neutralize spent solutions and discharge the neutral liquor to the sanitary sewer over an extended period. This should eliminate the problems associated with extreme acidic and alkaline conditions and the shock effect of these wastes on the sewage treatment plant.

However, the neutralization of these spent solutions will result in the formation of large concentrations of precipitated metal hydroxides, particularly nickel and aluminum. It can be seen from the analytical results that certain of the alkaline etch and sulphuric acid solutions contain 2 to 3 per cent aluminum. Neutralization of these solutions will result in a 4 to 5 per cent suspension of precipitated aluminum hydroxide. The potential effects of this material on the sewage treatment plant are difficult to establish.

A survey of the literature suggests that no adverse effects are likely to be encountered, although solids handling costs at the sewage treatment plant may be slightly increased. The use of precipitated ferric and aluminum hydroxides as settling aids is common in the waste

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treatment field and it is therefore possible that the disposal of neutralized spent anodizing solutions to the sanitary sewer will be beneficial to the sewage treatment processes.

The disposal of excess cooling water to the sanitary sewer is a questionable practice, since no benefit in terms of treatment is obtained at the treatment plant and hydraulic capacity at the treatment plant is therefore being wasted.

CONCLUSIONS AND RECOMMENDATIONS

The continuous daily wastes from this plant are generally acceptable for continued discharge to the municipal sanitary sewer. Major operating problems at the sewage treatment plant have been associated with the disposal of spent anodizing solutions. The proposed neutralization and disposal system should correct many of the problems associated with the disposal of spent anodizing solutions. No adverse effects are likely to be encountered at the sewage treatment plant attributable to the presence of high concentrations of suspended aluminum hydroxide in the neutralized spent anodizing solutions, provided measures are taken to ensure that the wastes are generally neutral and discharged slowly to the sanitary sewer. It is, therefore, recommended that the proposed neutralization system be installed as quickly as possible.

It is also recommended that consideration be given to the disposal of excess cooling water to the municipal storm sewer instead of the sanitary sewer.

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CHATHAM METAL FINISHING LIMITED

This small job plating operation is located on 5 Cemetery Road.

DETAILS OF SURVEY

Personnel Participating

Mr. F. L. Craig - OWRC

Personnel Interviewed

Mr. R. Boileau - Partner

Mr. E. W. Smith - Partner

Operating Schedule

8 hours per day

5 days per week

Number of Employees

6

Water Consumption

15,000 gpd

Sources of Liquid Wastes and Disposal

Conventional cadmium, zinc and tin barrel plating operations are carried out at this plant. Zinc plating was being carried out during this survey. Sources of liquid wastes are the continuous running rinses following plating and pre-cleaning operations and periodic dumps of spent acid and alkali cleaners.

These wastes are discharged via an open drain in the shop floor to a municipal storm sewer and eventually to McGregors Creek.

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Sampling and Analysis

The plant was visited on March 23, 1967 and samples were taken of the total plant effluent at 15 minute intervals and combined to give a composite sample representing operations between 10:15 a.m. and 11:45 a.m. This sample was submitted to the OWRC laboratory for analysis for solids, pH, zinc, and cyanide.

Analytical Results

See following page.

CHATHAM METAL FINISHING LIMITED

Date Sampled: March 23, 1967

All analyses except pH reported
in ppm unless otherwise reported

Lab. No.	Solids			pH at Lab.	Zinc As Zn^{++}	Cyanide as HCN
	Total	Susp.	Diss.			
T 698	516	44	472	9.1	17.	24.
T 698	10. Combined plant effluent - 10:15 - 11:45 a.m. at 1/2 hour intervals.					

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DISCUSSION OF FINDINGS

It is evident from the analytical results of samples taken during this survey that concentrations of zinc, cyanide and suspended solids in the waste discharge from this plant are in excess of OWRC objectives for wastes being disposed to a natural watercourse.

The OWRC objectives for these waste constituents are as follows:

Cyanide	0.1	parts per million maximum
Zinc	5	parts per million maximum
Suspended Solids	15	parts per million maximum
pH	5.5 to 10.5	

Treatment procedures for this type of waste usually involve alkaline chlorination with chlorine or hypochlorite to destroy cyanide, followed by neutralization and settling to control the pH and reduce the suspended solids content. In view of the small waste volume, treatment would probably be best accomplished in a small batch system utilizing one or two treatment tanks to contain the total daily waste flow.

CONCLUSIONS AND RECOMMENDATIONS

Wastes being discharged from this plant are in excess of OWRC objectives in terms of zinc, cyanide and suspended solids content.

It is recommended that treatment measures to reduce the levels of these contaminants be instituted by the company.

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DARLING COMPANY OF CANADA LIMITED

The Chatham plant of the Darling Company of Canada Limited is located on Park Avenue East. The plant is engaged in the manufacture of tallow and protein concentrates from waste animal products.

DETAILS OF SURVEY

The survey was conducted on Tuesday, March 21, 1967.

Personnel Participating

Mr. E. W. C. Turner - OWRC

Personnel Interviewed

Mr. L. Bathurst - Plant Manager

Mr. L. Bechard - Plant Superintendent

Description of Plant and Process

The Chatham plant of the Darling Company of Canada is a fairly old rendering plant. Facilities are included for the collection of wastes for rendering, unloading, cooking, condensation of volatiles, pressing of tallow, drying of solids and partial primary treatment of plant waste effluents.

Tallow is made in two grades, depending on the source. Top grade tallow comes from fat and bones and second grade from offal. When grades are changed, it is necessary to clean-out the cookers and this is done by "boiling-out". The process of "boiling-out" the cookers takes between one and two hours and is normally carried out at night. However, on the day of the survey, the cookers were "boiled-out" during the afternoon and it was possible to obtain grab samples of the wastes emanating from this process.

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Since the previous survey in 1964, a number of changes have been instituted or are planned:

(1) A new modern unloading station is being installed. This new system, which will largely obviate the need for manual labour should result in less wastewaters as all the wastes from floor washing, etc. associated with the unloading, will be transferred to the cookers.

(2) A new air flotation grease skimmer, manufactured by the Link Belt Company, has been installed in series with the old gravity-settling tank and automatic sludge removal has been installed on the settling tank.

(3) A cooling tower has been installed and will eventually be used to cool condenser waters. It is hoped to operate a closed system on the condenser cooling waters, thereby eliminating the discharge to the creek. Present cooling water is drawn from the creek and discharged back after one pass. The outfall of this cooling water to the creek is separate from the general waste outfall. The cooling tower cannot be used at present due to insufficient load bearing capabilities of the building structure. This will be strengthened when the new unloading station is complete, and the cooling tower will then be brought into service.

(4) A sewer line has been installed from the first plant sewer manhole to connect with the municipal trunk sewer running along Park Avenue. At the time of the survey, the connection

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had not been made as the Company was awaiting approval from the City. Subsequently, this connection has been made and wastes are therefore currently being discharged to the municipal sanitary sewer on a trial basis.

Production and Operating Data

Production is presently down by about 20% over last year's level and the plant does not operate on Mondays. Cookers are washed once per day.

Water Consumption

The plant uses an average of 40,000 gallons per day of water supplied by the P.U.C. Peak flows of about 100 gpm are to be expected over short periods such as during cooker washing operations.

Sources of Liquid Waste and Disposal

Liquid wastes are produced from various sources within the plant. The main sources are the condensates from the rendering operation, the condensates and wash waters from the cooker "boil-out" operation and condenser cooling waters.

All contaminated wastes are conducted to the waste treatment facilities which are briefly described below:

(1) All wastes enter a sump via a coarse screen which removes large lumps of solid materials.

(2) From the sump, the wastes are pumped to a roughing tank fitted with sludge scrapers and grease skimmers. Sludge and grease are collected and fed back to the rendering process.

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(3) "Settled" wastewaters pass from the roughing tank and are fed to a "Rex Chain Belt" air-flotation polishing tank. Compressed air is fed to the tank via diffusers and more grease and solids are removed. Sludge also forms in this tank and is removed by a screw conveyor. The floated material from this tank is recycled back to the sump. (1)

(4) The effluent from the flotation tank passes into a final, baffled settling tank before being discharged to the first outside manhole and hence to the sanitary sewer. Cooling waters are segregated from the contaminated waste flow and discharged to McGregors Creek.

Sampling and Analysis

Samples were taken at half-hourly intervals of the contaminated wastes before and after treatment during normal operation. These were combined to give composite samples of the wastes. When the cooker "boil-out" operation commenced, composite samples were again taken of the wastes before and after treatment. A grab sample of the untreated wastes from the "boil-out" operation was also taken.

All samples were submitted to the OWRC Toronto Laboratories for analysis for BOD, solids, ether solubles, COD, pH, free ammonia, total nitrogen and phosphorus.

Analytical Results

See following page.

DARLING COMPANY LIMITED

Date Sampled: March 21, 1967

All analyses except pH reported to
ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids Total	Solids Susp.	Solids Diss.	COD	pH at Lab.	Free Ammonia as N	Total Kjeldahl as N	Phosphorus as PO_4	Ether Solubles
T 634	1,650	3,374	2,166	1,208	2,420	6.9	11.5	84.	1.84	1,102
T 635	1,540	3,240	1,120	2,120	2,515	6.5	92	150.	3.12	934
T 636	9,500	11,524	9,566	1,958	35,250	6.2	72	570.	**	7,323
T 637	1,575	3,092	1,286	1,806	27,820	6.5	66	160.	1.96	450
T 638	5,600	15,044	13,162	1,882	28,600	5.9	60	540.	**	8,149

** Explodes when digested - Test cannot be performed.

T 634	1. Plant waste before treatment - normal operation - Composite 1:30 - 3:00 p.m.
T 635	2. Plant waste after treatment - normal operation - Composite 1:30 - 3:00 p.m.
T 636	3. Plant waste before treatment - cooker washing - Composite 2:40 - 3:30 p.m.
T 637	4. Plant waste after treatment - cooker washing- Composite 3:00 - 4:30 p.m.
T 638	5. Grab - Cooker wash water before treatment - 3:10 p.m.

WASTE LOADINGS

Assuming a total daily contaminated waste flow of 40,000 gallons during this survey, inclusive of a peak flow of 100 gpm for one hour during the cooker boil-out, the waste loadings discharged from the treatment facilities are indicated in Table I.

Due to the short sampling periods, these waste loadings may not be completely representative of average daily conditions. However, the table should indicate the general orders of magnitude of the waste components being discharged.

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TABLE I

	Flow gpd	Susp. Solids lbs/day	BOD lbs/day	Ether Sol. lbs/day	COD lbs/day	Total Nitrogen lbs/day	Free Ammonia lbs/day
Normal wastes Sample T-635	34,000	380	524	318	855	51	31
Cooker Boil-out Sample T-637	6,000	72	94	27	1,670	96	4
TOTAL	40,000	452	618	345	2,525	147	35

DISCUSSION OF FINDINGS

It is clear from the analytical results that concentrations of BOD, suspended solids and ether solubles in the contaminated waste flow from this plant are in excess of the requirements of the Chatham sewer-use by-law. Nevertheless, the nature of the wastes are such that treatment in the municipal sewage treatment plant is the only logical solution to the pollution of McGregors Creek, other than the cessation of rendering operations at the Darling Canada Limited plant.

It is perhaps worthwhile to consider the degree of treatment being achieved at the Darling Plant prior to the discharge of the wastes to the sanitary sewer, particularly with a view to determining what improvements can be made if operating problems develop at the sewage treatment plant.

Treatment Plant Efficiency

The treatment efficiencies indicated in the following table have been calculated from the analytical results of the samples of the plant wastes before and after treatment for the two sample periods of this survey.

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TABLE II

	Plant Wastes 1:30 to 3:00 p.m.	Plant Wastes 2:40 to 4:30 p.m.
BOD ppm Before Treatment	1,650	9,500
BOD ppm After Treatment	1,540	1,575
% Removal	6.7	83.5
Susp. Solids ppm Before Treatment	2,166	9,566
Susp. Solids ppm After Treatment	1,120	1,286
% Removal	48	86.6
Ether Soluble ppm Before Treatment	1,102	7,323
Ether Soluble ppm After Treatment	934	450
% Removal	18	93.8

There is a large difference in treatment efficiency in terms of BOD, suspended solids and ether solubles between the two sampling periods.

A subsequent telephone conversation with the plant manager indicated that on the day of the survey it was discovered that certain areas of the waste treatment facilities were not operating correctly. A complete overhaul of these facilities, including repairs to the air compressor and a general clean-out of tanks, is reported to have

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considerably improved the efficiency of treatment. The plant manager, therefore, feels that the results of the samples taken during this survey will not be truly representative of normal operations.

However, the treatment efficiencies indicated for the later sampling period of this survey suggest that removal efficiencies in the order of 80 per cent or more can be achieved by the treatment facilities. On this basis, it is evident that further improvements in the efficiency of the existing facilities would be difficult to accomplish.

Therefore, if operating problems are experienced at the Chatham sewage treatment plant which are attributable to wastes from the Darling Canada Limited plant, further extensions to the existing pretreatment facilities at this industry may be necessary. Potential problems may be the excessive accumulation of grease and suspended solids in sewers, leading to plugging or odour problems. Hopefully, this will not occur, but these factors must be considered in the current trial period.

CONCLUSIONS AND RECOMMENDATIONS

The nature of the wastes from this plant is such that disposal to the municipal sanitary sewerage system, after pretreatment to reduce the suspended solids and ether solubles content, is the logical approach to pollution control. However, some problems may arise from the high ether solubles content and strong odours of these wastes. The Darling Canada Limited plant is located at the extreme opposite end of the city from the sewage treatment plant; transporting the wastes from one end of the city to the other, through a densely populated area, could, therefore, create a public nuisance due to odours and lead to the coagulation of ether soluble material (grease) in the sewer as the waste cools. These potential problems must, therefore, be considered both by the industry and the City of Chatham, during the current trial period.

ERIE BEVERAGE LIMITED

This plant is located at 71 Park Avenue East in Chatham. The plant is engaged in the preparation and bottling of soft drinks.

DETAILS OF SURVEY

Personnel Participating

Mr. F. L. Craig - OWRC

Personnel Interviewed

Mr. P. A. Dick - Owner

Mr. J. Catton - Plant Manager

Operating Schedule

8 hours per day

5 days per week

Number of Employees

14

Water Consumption

12,500 gpd

Sources of Liquid Wastes and Waste Disposal

Manufacturing operations at this plant involve the mixing of syrups, the dilution of this syrup with demineralised water in the bottling operation, followed by carbonation and capping.

Bottle washing operations are the most significant source of contaminated wastewater in the plant. Bottle washing is carried out in two machines. The bottles are pre-washed in a spray-rinse, caustic washed and rinsed again. The two running rinses are the major

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waste flows from these machines. These wastes are coarse screened and discharged to the municipal sanitary sewer.

Other wastes include demineralizer regeneration wastes, periodic dumps of the caustic wash and cooling waters.

Sampling and Analysis

The plant was visited on March 20, 1967, and grab samples were taken of the pre-rinse and final rinse from one of the bottle washers.

These samples were submitted to the OWRC laboratory for analysis for BOD, solids and pH.

Analytical Results

See following page.

ERIE BEVERAGES LIMITED

Date Sampled: March 20, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids			pH at Lab.
		Total	Susp.	Diss.	
T 640	0.6	--	--	--	8.3
T 641	22.	554	14	540	9.6

T 640	B. Grab Sample - Final Rinse - 11:30 a.m.
T 641	C. Grab Sample - Pre-Rinse.

CONCLUSIONS AND RECOMMENDATIONS

The analytical results of samples taken during this survey indicate that liquid wastes arising from operations at this plant are unlikely to have adverse effects on the Chatham sanitary sewerage system.

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INTERNATIONAL HARVESTER COMPANY OF CANADA LIMITED

The International Harvester Company plant is located on Richmond Street in Chatham. The plant is engaged in the manufacture of motor trucks and commercial vehicles.

DETAILS OF SURVEY

Officers of the Company

Mr. W. B. P. Brown - Plant Manager

Mr. E. Horlacher - Plant Engineer

Mr. F. Atkinson - Plant Engineering Department

Mr. J. Case - Plant Chemist

Personnel Participating

Mr. R. A. Abbott - OWRC

Mr. F. L. Craig - OWRC

Personnel Interviewed

Mr. F. Atkinson

Mr. J. Case

Operating Schedule

1 shift per day

5 days per week for main production

2 shifts per day

5 days per week for metal finishing

Number of Employees

1,200 to 1,400

Production

65 units per day

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Water Consumption

Sanitary 25,000 gpd

Industrial 325,000 gpd

Manufacturing Processes and Sources of Wastes

Operations at this plant consist essentially of assembly and finishing processes. Truck parts are received at the plant from outside sources.

Assembly operations use very little process water, apart from cooling water used in welding machines and air compressors. This cooling water is recirculated through a large reservoir and fresh water only added to make up for evaporation losses and to control the temperature.

Finishing operations are the major source of contaminated waste-waters from this plant. These operations consist of alkali cleaning of sheet metal and engine blocks, zinc phosphate and chromate treatment of sheet metal and cab parts, iron phosphate treatment of chassis parts; followed by spray painting in water-walled paint spray booths. Sources of wastes from these processes are indicated in the following table.

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UNIT	WASTE	VOLUME	DUMP SCHEDULE
Six-stage Zinc phosphate (sheet metal)	Two rinses	unknown	continuous
	Alkali cleaner	3,400 gal.	every two months
	Chromate	3,400 gal.	
Five-stage Zinc phosphate (cab parts)	Two rinses	unknown	continous
	Alkali Cleaner	2,300 gal.	once per week
	Chromate	unknown	unknown
Iron Phosphate	Rinse	unknown	continuous
	Alkali Cleaner	1,070 gal.	once per week
	Chromate	750 gal.	once per week
Engine Block Cleaner	1st stage Alkali 2nd stage Alkali	2,930 gal. 2,440 gal.	Not dumped replenished every 2 1/2 months
Sheet Metal Cleaner	Alkali Cleaner	470 gal.	once per month
	Emulsion	395 gal.	once per week
Paint Spray Booths:			
No. 1 Chassis line	Recirculated Water	795 gal.	once per week
No. 2 Chassis line	"	2,868 gal.	"
No. 1 Wheel line	"	679 gal.	"
No. 2 Wheel line	"	573 gal.	"
No. 1 Sheet Metal line	"	2,456 gal.	"
No. 2 Sheet Metal line	"	2,456 gal.	"
No. 3 Sheet Metal line	"	2,456 gal.	"

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Table continued.

UNIT	WASTE	VOLUME	DUMP SCHEDULE
No. 1 Conversion line	Recirculated Water	600 gal.	Once per week
No. 2 Conversion line	"	600 gal.	"
No. 1 Cab line	"	10,550 gal.	"
No. 2 Cab line	"	12,630 gal.	"

Other uses of water in the plant are for steam generation purposes, cadmium plating of small parts, paint stripping and rust stripping. Boiler blow-down, spent solutions from paint and rust strippers, rinses and spent solutions from cadmium plating are the principle wastes from these processes.

All plant wastes, except the iron phosphate washer wastes, are discharged via two sewers to the Richmond Street municipal sanitary sewer. The iron phosphate washer wastes are discharged to a municipal storm sewer.

Sampling and Analysis

The plant was visited on March 21, 1967, and grab samples were obtained of the following wastes:

Six stage phosphate
washer cleaner

Six stage washer
chromate solution

Sheet metal paint
spray booth

Iron phosphate
cleaner

Engine block washer
1st stage cleaner

Sheet metal washer
cleaner

Cold acid paint
stripper rinse

Sanitary sewer
#1 manhole (domestic sewage)

Sanitary sewer
#2 manhold (main plant wastes)

All samples were submitted to the OWRC laboratory for analysis for BOD, solids, pH, COD, chromium, phosphate, zinc and iron.

Analytical Results

See following page.

INTERNATIONAL HARVESTER LIMITED

Date Sampled: March 21, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids			pH at Lab.	Chromium as Cr		Total Phosphate as PO_4	Zinc as Zn	Iron as Fe	COD
		Total	Susp.	Diss.		Tot.	Hexa.				
T 657	50.	8,134	1,862	6,272	10.3	-	-	650	0.0	-	2,720
T 658	* int.	1,520	14	1,506	3.0	360.	280.	480	-	-	1,030
T 659	4.2	322	7	315	6.5	-	-	2.5	-	-	40.0
T 660	75.	850	63	787	10.9	-	-	1.00	-	-	218.0
T 661	400.	18,332	146	18,186	5.1	-	-	10,000	-	-	11,790
T 662	3,450.	87,140	314	86,826	12.6	7.5	0.0	7,100	-	-	46,000
T 663	500.	12,708	2,020	10,688	9.7	-	-	2,125	0.0	-	4,930
T 664	520.	12,568	1,308	11,278	9.1	-	-	4,400	0.0	-	7,380

T 657	1. 6 Stage Washer Cleaner	Grab 2 p.m.
T 658	2. Chromic/Phosphoric Sealer - 6 Stage Washer	Grab 2 p.m.
T 659	3. Cold Acid Paint Stripper Rinse	Grab 2:15 p.m.
T 660	4. Sheet Metal Paint Spray Booth	Grab 2:30 p.m.
T 661	5. Iron Phosphate Cleaner	Grab 2:45 p.m.
T 662	6. Cadmium Plating Alk. Cleaner	Grab 2:45 p.m.
T 663	7. Engine Washer First Cleaner	Grab 2:45 p.m.
T 664	8. Sheet Metal 2 Stage Washer Cleaner	Grab 3:00 p.m.

INTERNATIONAL HARVESTER LIMITED

Date Sampled: March 21, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids			pH at Lab.	COD	Chromium as Cr		Total Phosphorus as PO_4
		Total	Susp.	Diss.			Total	Hexa.	
T 665	130.	876	260	616	7.6	309.	0.0	0.0	50.
T 666	54.	668	292	376	7.2	181.	2.6	2.6	29.5

T 665	9.	Sanitary Sewer #1 Manhole	Grab 3;30 p.m.
T 666	10.	Sanitary Sewer #2 Manhole	Grab 3:40 p.m.

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WASTE LOADINGS

Waste	Flow gpd	Susp. Solids lbs/day	Chromium lbs/day	COD lbs/day
Continuous daily wastes	316,000	920	8.3	573
Spent Alkali Cleaners (Sample T-663)	1,000	20	-	49
Paint Spray Booths (Sample T-660)	7,500	5	-	16
Spent Chromic -Phosphoric seal (Sample T-658)	500	<1	1.8	5
TOTAL	325,000	945	10.1	643

DISCUSSION OF FINDINGS

The continuous daily waste flow from this plant to the municipal sanitary sewer, as indicated by the analytical results for samples T-665 and T-666, meet the requirements of the Chatham sewer-use by-law.

However, of more concern are the intermittent discharges of high strength solutions, such as alkali cleaners and chromates. It is estimated that some 250,000 gallons of spent alkali phosphate cleaners, 160,000 gallons of spent chromate solutions and 1,900,000 gallons of paint spray booth water are discharged annually. It is clear from the analytical results of representative samples of these materials (samples T-660, T-661, T-663, T-664 and T-658) that substantial loadings of BOD, COD and chromium are present in these discharges. The discharge of large amounts of biochemical and chemical oxygen demanding materials to the sanitary sewerage system is not of major concern, since the

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function of the municipal sewage treatment plant is to remove these materials from domestic sewage. However, the disposal of high strength chromium wastes to the municipal system may result in operating problems at the treatment plant, since chromium is toxic to the micro-organisms essential to the function of the sewage treatment plant. The Chatham sewer-use by-law requires that no wastes be discharged to the municipal sanitary sewers containing greater than 3 ppm hexavalent chromium and, therefore, spent chromate solutions should be treated for the removal of chromium before disposal. Conventional treatment processes for chromium wastes usually involve reduction of the chromium to the trivalent state with sulphur dioxide or a bisulphite compound in acid solution and then precipitation of the trivalent chromium as the hydroxide by addition of alkali. The precipitated trivalent chromium hydroxide may then be removed by sedimentation or filtration.

The high or low acidity of the spent solutions may also be characterized by the toxic effect on micro-organisms in the sewage treatment plant. The Chatham sewer-use by-law requires that all wastes discharged to municipal sewers be within the pH range 5.5 to 9.5. It is clear from the analytical results that many of the spent solutions discharged from this plant do not meet this requirement.

However, consideration must be given to the dilution available from the continuous daily waste flow. It is likely that the pH effects of the disposal of spent solutions will be minimized by this dilution, since the pH of these spent solutions is not greatly in excess of the by-law requirement. However, it is unlikely that dilution will reduce

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the concentration of chromium in the total plant effluent to the requirements of the by-law when spent chromates are discharged.

The disposal of wastes from the iron phosphate washer to the municipal storm sewer may result in the pollution of the receiving watercourse. The OWRC objectives in terms of BOD, suspended solids and pH for wastes being discharged to a natural watercourse are 20 ppm maximum, 15 ppm maximum and 5.5 to 9.5 respectively. In view of the analytical results of the spent cleaner from the iron phosphate washer (sample T-661), these wastes are in excess of these objectives and as such should be treated or disposed to the municipal sanitary sewer.

CONCLUSIONS AND RECOMMENDATIONS

The normal continuous daily waste flow from this plant to the municipal sanitary sewer meets the requirements of the Chatham sewer-use by-law.

The disposal of spent solutions, particularly spent chromates, may be detrimental to operations at the municipal sewage treatment plant. It is, therefore, recommended that spent chromates be treated for the removal of chromium prior to discharge.

The discharge of wastes from the iron phosphate cleaner to the municipal storm sewer is in excess of OWRC objectives and the requirements of the sewer-use by-law. It is recommended that these wastes be discharged to the municipal sanitary sewer.

LENOVER BROTHERS LIMITED

This plant, located on Park Avenue East, is engaged in processing and packing meat.

DETAILS OF SURVEY

Personnel Interviewed

Mr. G. Lenover - President

Mr. K. Lenover - Secretary-Treasurer

Operating Schedule

8 hours per day

5 days per week

Number of Employees

8

Production

40 cattle per week

40 hogs per week

Water Consumption

Sanitary 250 gpd

Industrial 5,750 gpd

Manufacturing Processes and Sources of Wastes

The plant water is obtained from a private well. The volume used was previously estimated at 6,000 gpd. The water meter was not operating during this survey and the volume used could not be accurately determined.

A large proportion of the water used is for compressor cooling purposes on refrigeration equipment. This is re-used in slaughtering and packing operations. The cooling water overflows into a collection tank

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which is then used to wash entrails, etc. Other processing wastes include wastewaters resulting from the washing of carcasses, floors, equipment and from a scalding tank and roughers used to remove hair from hog carcasses.

There are no facilities for blood collection in this plant and this is discharged with other plant wastes.

Solid wastes are collected and removed to a rendering plant.

All liquid wastes, except sanitary waste, discharge to a sump located in the slaughterhouse floor. This sump drains into a 3,000 gallon concrete septic tank, which in turn drains into McGregor's Creek.

Sampling and Analysis

The plant was visited on March 20, 1967, and composite samples of the effluent from the septic tank to McGregors Creek and the wastes from the killing floor were obtained by combining equal aliquots of these effluents taken at regular intervals. A grab sample was also taken of blood from the killing floor.

All samples were submitted to the OWRC laboratory for analysis for BOD, solids and ether solubles.

Analytical Results

See following page.

LENOVER BROTHERS LIMITED

Date Sampled: March 20, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids Total	Solids Susp.	Solids Diss.	pH at Lab.	Ether Solubles*
T 642	5,100.	7,940	1,620	6,320	7.6	60
T 643	1,950.	2,922	306	2,616	7.4	19
T 644	84,000.	19,250	--	--	7.6	28
T 645	8,000.	11,556	322	11,234	7.5	3

* Test performed on Duplicate Sample.

T 642	1. Waste from killing floor - Composite - 10:00 a.m.-4:00 p.m.
T 643	2. Combined plant effluent - Composite - 10:00 a.m.-12:00.
T 644	3. Beef blood - Grab Sample
T 645	4. Combined plant effluent - Composite - 1:00 p.m.-4:00 p.m.

DISCUSSION OF FINDINGS

WASTE LOADINGS

	Flow gpd	BOD (ave.) ppm	BOD (ave.) lbs/day	Susp. Solids (ave.) ppm	Susp. Solids (ave.) lbs/day
Combined plant effluent	6,000	4,975	300	314	18

The sample of the killing room drainage (T-642) is similar in strength to the combined plant effluent. This sample excluded the wastewater from the refrigeration system which is re-used to wash entrails.

The grab sample of blood from the killing room (T-644) has an extremely high BOD. It is reported that approximately 2 gallons of blood is discharged for every cattle kill and 0.75 gallons per hog kill.

Thus, approximately 22 gallons of blood are discharged during a normal operating period. This represents some 18 pounds of BOD per day or roughly 7 per cent of the total BOD waste loading from this plant.

It is clear from the analytical results that wastewaters being discharged from this plant to McGregors Creek are substantially in excess of OWRC objectives in terms of BOD and suspended solids. However, it is expected that the pollution of McGregors Creek will soon be eliminated by the disposal of these wastes to the municipal sanitary sewerage system. Consideration should, therefore, be given to the requirements of the Chatham sewer-use by-law in respect to this company's waste disposal practices.

The combined plant effluent is in excess of the by-law require-

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ment of 300 ppm maximum for BOD. The company have indicated that blood will be collected for alternative use or disposal when the connection to the sanitary sewer is made. This should result in a reduction in the BOD of the combined plant effluent. Other measures to reduce the BOD, such as more efficient solids removal, may be necessary when the connection to the sanitary sewer is made. However, it is unlikely that such measures will reduce the BOD to the requirements of the sewer-use by-law.

There is no doubt that these wastes should be discharged to the municipal sanitary sewer and, therefore, the acceptance of these high strength wastes must be negotiated with the City of Chatham.

CONCLUSIONS AND RECOMMENDATIONS

Wastewaters being discharged from this plant to McGregors Creek are substantially in excess of OWRC objectives in terms of BOD and suspended solids. In the order of 300 pounds of BOD and 18 pounds of suspended solids are discharged daily. Levels of ether solubles material in the wastewaters are generally acceptable.

It is recommended that the discharge of these wastes to the municipal sanitary sewerage system be implemented as soon as possible.

In order to reduce the BOD of the total plant effluent it is further recommended that blood not be permitted to enter the sanitary sewer system; every effort should be made to collect this waste for disposal elsewhere.

Processing wastes should continue to be discharged to the existing sump prior to disposal to the sanitary sewer. Removable hand screens, or some other screening device, should be placed in this sump to prevent coarse solids gaining access to the sanitary sewer.

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Every effort should be made to separate all solid wastes from the plant effluent for alternative disposal.

LIBBY, MCNEILL AND LIBBY OF CANADA LIMITED

This plant is engaged in the manufacture of canned and bottled food products. The plant is located at 330 Richmond Street in Chatham.

DETAILS OF SURVEY

Personnel Participating

Mr. R. M. Gotts - OWRC

Mr. R. Crawshaw - OWRC

Personnel Interviewed

Mr. J. A. Turner - Plant Engineer

Mr. M. K. Kobylka - General Foreman

Operating Schedule

1 to 2 shifts per day

5 days per week

Number of Employees

800 during tomato season (August to October)

200 during remainder

100 salaried staff, year round

Production

5,000 cases per day beans

30,000 cases per shift tomatoes, 90% juice

Water Consumption

Sanitary 15,000 gpd

Industrial 200,000 to 400,000 gpd (10 months)
1.5 to 2.0 mgd during tomato season

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Manufacturing Processes and Sources of Wastes

Canned beans are the major product from this plant. Other products include, pickles (relish and olives), canned spaghetti, mince meat, sauerkraut, mustard, tomato sauce, tomato juice and meat products. During this survey, beans were the main vegetable being processed.

Blanche and wash waters are the principal wastes from all vegetable canning operations. Wash waters are the major source of wastes from tomato processing.

Considerable quantities of cooling water are discharged during processing and this is isolated from the contaminated wastewaters and discharged to a municipal storm sewer.

All other plant wastes, except tomato processing wastes, are discharged to a municipal sanitary sewer and hence to the sewage treatment plant. The contaminated waste flow during this survey was estimated to be about 80,000 gpd and the cooling water discharge to the municipal storm sewer about 120,000 gpd. During tomato processing, the total waste flow, including cooling water is discharged to the municipal sanitary sewerage system.

Facilities are now being constructed to direct tomato processing wastes to a municipal aerated lagoon treatment system prior to disposal to the Thames River. It was expected that these facilities would be available for the 1967 tomato canning season. However, delays in the completion of the lagoon have necessitated the continued disposal of the tomato wastes to the STP.

Pretreatment facilities at the plant involve screening of coarse solids from the wastes, prior to disposal to the sanitary sewer.

Sampling and Analysis

The plant was visited on March 21, 1967, and samples were taken of the total plant effluent to the sanitary sewer at 15 minute intervals and combined to give composite samples representing waste characteristics for the operating periods 1:00 p.m. to 1:45 p.m. and 2:00 p.m. to 2:45 p.m.

Grab samples were also taken of the cooling water discharge, the bean blancher wastes and the equipment clean-out wastes.

All samples were submitted to the OWRC laboratory for analysis for BOD, solids, COD, kjeldhal nitrogen and pH.

Analytical Results

See following page.

LIBBY, MCNEILL AND LIBBY OF CANADA LIMITED

Date Sampled: March 21, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids			Total Kjeldahl as N	COD	pH at Lab.
		Total	Susp.	Diss.			
T 646	3,800	5,970	656	5,314	310.	6,030	4.4
T 647	*int.	368	4	364	1.30	50	7.4
T 648	1,700	3,858	504	3,354	13.	4,240	4.4
T 649	450	916	176	740	17.	610	6.5
T 650	1,950	3,742	398	3,344	25.	3,850	7.0

T 646	1. Combined process effluent	Composite 1 p.m. - 1:45 (15 min. intervals)
T 647	2. Cooling Water	Grab
T 648	3. Combined process effluent	Composite 2 p.m. - 2:45 p.m. (15 min. intervals)
T 649	4. Bean Blancher Discharge	Grab 3:00 p.m.
T 650	5. Equipment Clean-out, Start	Grab 4:00 p.m.

WASTE LOADINGS

Based on an estimated waste flow of 80,000 gpd to the municipal sanitary sewer and the average of results for the two total plant effluent composite samples, daily waste loadings are estimated to be as follows:

	Ave. ppm	Waste Loading lbs/day	Population Equivalent
BOD	2,750	2,200	13,000
Suspended solids	580	464	2,300
COD	5,133	4,100	--

During the tomato processing season, these waste loadings are likely to increase substantially, since in the order of 2 mgd of wastes will be discharged.

DISCUSSION OF FINDINGS

The analytical results of samples taken during this survey indicate that the wastewaters being discharged from this plant to the municipal sanitary sewerage system are substantially in excess of the requirements of the Chatham sewer-use by-law in terms of BOD and suspended solids. The daily waste loading in terms of BOD is equivalent to a population of 13,000, which is roughly half that of the City of Chatham.

Few major operating problems have been experienced at the sewage treatment plant attributable to waste discharges from this plant, except those associated with the seasonal overloading due to the high strength wastes from tomato processing, which will be dealt with in the proposed aerated lagoon system. Odour problems have been encountered at the sewage treatment works, which appear to be related to bean process-

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ing wastes. This is mainly a nuisance problem and complaints from local residents have been numerous when the offensive odours occur. The offensive odour is not clearly distinguishable from other food odours at the cannery, but is occasionally most pronounced at the sewage treatment plant. Prechlorination of the raw sewage and reduced aeration at the sewage treatment plant have been used in attempt to reduce the odour, but this has met with little success. Sewage odours are commonly associated with the generation of hydrogen sulphide gas by anaerobic or septic conditions in sewers. Sewer cleaning, chlorination or aeration are often effective in controlling odours caused in this way. There is no clear evidence to suggest that septic sewer conditions are the source of the odour problem at the Chatham sewage treatment plant, but it may be worthwhile to investigate this possibility. It is possible that the chlorine demand of the combined raw sewage at the treatment plant is of such magnitude that prechlorination is not effective in reducing sulphide odours. Therefore, it may be worthwhile to observe the odour effects of prechlorination of the bean wastes at the cannery prior to disposal to the municipal sanitary sewer. If this proves unsuccessful, then the use of odour masking agents may be worthy of consideration.

The cooling water discharge, as indicated by the analytical results for sample number T-647, appears to contain some contaminants, since the dissolved solids and COD analysis are not typical of a clean water discharge. This contamination does not appear to be excessive and, therefore, this waste should continue to be discharged to the municipal storm sewer.

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It is evident from the analytical results of sample number T-650 that equipment clean-outs are a significant source of high concentrations of BOD and suspended solids. The volume of this waste discharge is unknown and, therefore, the waste loadings from this source cannot be calculated.

The strength of wastes from the tomato processing operation has not been clearly established. Survey data collected in 1958 suggests that the wastes may have a BOD of up to 250 ppm and a suspended solids content of about 50 ppm. On this basis, potential daily waste loadings on the proposed aerated lagoon from this source may be as high as 5,000 lbs. BOD and 1,000 lbs. suspended solids. A substantial volume of cooling water is discharged to the sanitary sewer with the tomato processing wastes; this should be directed to the municipal storm sewer.

CONCLUSIONS AND RECOMMENDATIONS

Wastes being discharged from this plant to the municipal sanitary sewerage system contain very high concentrations of BOD and suspended solids. The waste strength in terms of BOD has a population equivalent of about 13,000. This may double during the tomato processing season.

An odour nuisance is being experienced at the sewage treatment plant attributable to the disposal of bean processing wastes to the municipal sanitary sewer. It is recommended that prechlorination of these wastes and other plant wastes be investigated as an odour control measure. If this proves to be ineffective, it is recommended that the use of odour masking chemicals at the sewage treatment plant be investigated.

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It is further recommended that cooling water discharged to the municipal sanitary sewer during tomato processing be diverted to the municipal storm sewer.

MOTOR WHEEL CORPORATION OF CANADA LIMITED

This plant is located at 650 Riverview Drive in Chatham. The plant is engaged in the manufacture of automobile wheels.

DETAILS OF SURVEY

Personnel Participating

Mr. R. M. Gotts - OWRC

Mr. R. Crawshaw - OWRC

Personnel Interviewed

Mr. P. Fair - Plant Manager

Operating Schedule

1 to 2, 8 hour shifts per day

5 days per week

Number of Employees

67 during 1 shift operation

87 during 2 shift operation

Water Consumption

Sanitary 1,500 gpd

Industrial 24,500 gpd

Manufacturing Processes and Sources of Wastes

Steel is received at the plant in sheet form. This is first acid pickled and then subjected to a zinc phosphate surface treatment. The sheet is then cut, formed and welded to the finished wheel which is finally spray painted.

Sources of wastes are largely the metal pretreatment operations. Spent pickle is recirculated through an acid recovery and neutralization

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system in which ferrous sulphate is crystallised and recovered from the solution and the acid returned to the pickle tank. The rinses following pickling and excess spent acid are discharged to a neutralization sump where alkali is added to neutralize the acid and precipitate dissolved iron. The precipitated iron is removed in a clarifier and the decant from the clarifier is returned to the rinse tank. There is a continuous bleed-off from this system to the municipal sanitary sewer to maintain an acceptable dissolved solids concentration in the pickle rinse.

The phosphatizing operation involves consecutive applications of alkali cleaners, zinc phosphate and chromate sealer solutions to the sheet steel. Rinses and spent solutions from this process are discharged to the neutralization sump on the pickle line. Ferrous ions present in the pickling rinses and spent acid are apparently sufficient to reduce the hexavalent chromium from the chromate sealer to the trivalent state, which is subsequently precipitated as trivalent chromium hydroxide and removed in the clarifier.

Wash water from the paint spray booth is also periodically discharged to the neutralization sump.

Sludge from the clarifier is disposed to a land disposal site at the rate of 1,000 gallons twice weekly. Ferrous sulphate crystals are land dumped twice monthly.

Sampling and Analysis

The plant was visited on March 22, 1967 and samples of the total plant effluent to the sanitary sewer were taken at 15 minute intervals and combined to give three composite samples representing

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waste characteristics between the hours 1:15 to 2:00 p.m., 2:15 to 3:00 p.m. and 3:15 to 4:00 p.m. A grab sample of the total plant effluent was also taken at 11:30 a.m. and of the paint spray booth water at 3:00 p.m.

All total plant effluent samples were submitted to the OWRC laboratory for analysis for solids, pH, chromium, zinc, sulphate, phosphate and iron while the paint spray booth water samples was also analyzed for BOD and COD.

Analytical Results

See following page.

MOTOR WHEEL CORPORATION OF CANADA LIMITED

Date Sampled: March 22, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids			pH at Lab.	Chromium as Cr	Zinc as Zn	Sulphate as SO_4	Phosphate as PO_4	COD	Iron as Fe
		Total	Susp.	Diss.							
T 682	-	6,726	42	6,684	7.5	0.0	0.7	4,120	0.62	-	14.0
T 683	-	6,846	134	6,712	7.4	0.0	0.1	4,200	0.50	-	31.0
T 684	-	6,924	120	6,804	6.7	0.0	0.5	4,180	0.66	-	29.3
T 685	-	6,962	138	6,824	6.5	0.0	0.5	4,260	0.16	-	45.0
T 686	1,660.	3,004	94	2,910	10.3	-	-	-	-	5,260	0.10

T 682	1. Grab 11:30 a.m.)
T 683	2. Composite 1:15 - 2:00 p.m.)
T 684	3. Composite 2:15 - 3:00 p.m.) Combined plant effluent
T 685	4. Composite 3:15 - 4:00 p.m.)
T 686	5. Grab 3:00 p.m. - Paint spray booth

DISCUSSION OF FINDINGS

The analytical results indicate that the total plant effluent during this survey meets almost all of the requirements of the Chatham sewer-use by-law.

Levels of suspended solids, metals and phosphate, and the pH are unlikely to have adverse effects on the municipal sewage treatment plant. Sulphate ion concentrations are in excess of the by-law requirement of 1,500 ppm maximum, but this is unlikely to be critical to the efficient operation of the sewage treatment plant.

There is no indication of the effectiveness of chromium removal when the spent chromate sealer is discharged. It is evident from the analytical results that any chromium present in the normal phosphatizing rinses is being removed. However, in order to ensure that chromium is effectively removed when the spent chromate sealer is discharged, this should be thoroughly mixed with an excess of spent pickle liquor prior to neutralization.

CONCLUSIONS AND RECOMMENDATIONS

During this survey, the effluent from this plant being discharged to the municipal sanitary sewer was within the requirements of the Chatham sewer-use by-law in almost all respects.

It is, therefore, recommended that this company continue to exercise effective control of the normal daily waste flow.

The periodic disposal of spent chromate sealer may give rise to problems if measures are not taken to ensure that chromium is being removed in the neutralization system. In this regard, it is recommended that an excess of spent pickle liquor be mixed with this solution prior to disposal to the neutralization system.

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ONTARIO STEEL PRODUCTS LIMITED

This Company operates two plants in Chatham; manufacturing automobile bumpers, springs, torsion bars and associated hardware. The St. George Street plant is engaged in the manufacture of bumpers and torsion bars, while the Raleigh Street plant manufactures springs.

DETAILS OF SURVEY

Officers of the Company

Mr. B. D. Park	-	Division Manager
Mr. M. Roberts	-	Manager, St. George Street Plant
Mr. D. Bondy	-	Manager, Raleigh Street Plant
Mr. R. Shaw	-	Plating Supervisor, St. George Street plant

Personnel Interviewed

Mr. B. D. Park

Mr. R. Shaw

Operating Schedule

5 days per week

2 shifts per day

Number of Employees

500 at St. George Street Plant

250 at Raleigh Street Plant

Production

St. George Street Plant	-	Bumpers 2,400/day
		Springs and Torsion Bars 60 tons/day
Raleigh Street Plant	-	Springs 125 tons/day

<u>Water Consumption and Distribution</u> (Imperial Gallons)

Raleigh Street Plant	- Sanitary	-	5,000 gpd
	Cooling	-	158,000 gpd
St. George Street Plant	- Sanitary	-	10,000 gpd
*Plating Rinses:			
Chrome line		-	65,500 gpd
Nickel line		-	62,500 gpd
Bonderize		-	43,800 gpd
Balance of Cooling		-	292,000 gpd
Dust Collector		-	3,200 gpd
Boiler Make-up		-	50,000 gpd
TOTAL			690,000 gpd

*Re-used cooling water

<u>Manufacturing Processes and Sources of Wastes</u>

<u>St. George Street Plant</u>

(a) <u>Bumpers</u>

Steel is received in plate form and surface ground automatically under abrasive belts. After surface grinding, the plates are chemically cleaned and surface treated (bonderized) to facilitate pressing and drawing operations. The plates are then cut to form bumper blanks which are then placed over bumper contour dies, and pressed or drawn to conform to the die patterns. The bumpers are then removed, de-burred and polished prior to plating.

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Plating operations involve the applications of nickel and chromium protective, and decorative coatings to the bumpers.

Sources of liquid wastes from these processes consist of the following:

Compressor Cooling	Plating rinses.
Press Cooling	Spent acids and cleaners from plating lines.
Dust Collector	Spent acids and cleaners from bonderize line.
	Bonderize rinses.

A portion of the compressor cooling water is re-used as rinses in the bonderize line; as are plating tank cooling waters re-used as plating rinses.

(b) Torsion Bars

Special alloy steel rods are forged, machined, heat treated and oil quenched to form finished torsion bars.

Sources of liquid wastes from these operations are quench oil cooling water and heat treatment furnace bearing cooling water.

Raleigh Street Plant

This plant is mainly engaged in the manufacture of automobile springs. Alloy spring steel is received from an outside supplier, pre-cut to the required dimensions for the type of spring being manufactured. The main leaf assembly is rolled at both ends and press fitted with bronze bushings. The auxiliary leaves are cut to length and attached to the main leaf to form the completed spring. Before assembling the leaves,

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they are heat treated and oil quenced; cooling waters from these processes are the major source of wastewaters from this plant.

WASTE DISPOSAL

Cooling waters and domestic sewage from the Raleigh Street plant are discharged to a municipal sanitary sewer.

At the present time, all liquid wastes from the St. George Street Plant are discharged to a municipal storm sewer, and thence to the Thames River.

Chromium and nickel bearing rinses have been isolated from the main plating room discharge and will be directed to a waste treatment system; in conjunction with spent acids and alkalies from the plating lines. Facilities are available in the waste treatment plant for the reduction of hexavalent chromium to the trivalent state by the continuous addition of sodium bisulphite solution. This trivalent chromium will then be neutralized and precipitated by the continuous addition of lime slurry. In a similar manner, nickel rinses will be fed into the neutralization system for pH adjustment.

Spent acids and alkalies will be retained in holding tanks and periodically metered into the neutralization system.

The Company proposes to discharge the treatment plant effluent to the municipal sanitary sewer; in conjunction with cooling water and other less contaminated wastewaters when sanitary sewer service becomes available.

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Conduct of Survey

The main plant offices were visited on March 20, 1967, and Mr. B. D. Park, Division Manager, supplied general operating data for both the St. George Street and Raleigh Street plants. Mr. R. Shaw, Plating Supervisor, supplied detailed information on the plating operations at the St. George Street plant.

On March 22, 1967, samples were obtained of the following waste streams from the St. George Street plant:

1. Chrome line wastes to treatment.
2. Nickel line wastes to treatment.
3. Bonderizing line wastes to sewer.
4. Total plant effluent to storm sewer.
5. Chrome line wastes to sewer.
6. Nickel line wastes to sewer.

Samples 1 to 4 are composites, obtained by combining equal portions taken at half-hourly intervals between 10:00 a.m. and 4:00 p.m.

Samples 5 and 6 are grab samples taken at 2:00 p.m.

Analytical Results

See following page.

ONTARIO STEEL PRODUCTS

Date Sampled: March 22, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	Solids			pH at Lab.	Nickel as Ni	Chromium		Phosphate as PO_4	Zinc as Zn	Sulphate as SO_4	Acidity as $CaCO_3$
	Total	Susp.	Diss.			Total	Hexav.				
T 706	2,506	8	2,498	3.0	2.0	300.	280.	0.00	-	-	516
T 707	2,684	7	2,677	1.6	54.	0.0	0.0	0.34	-	3,720*	-
T 708	326	59	267	6.8	1.0	0.66	0.5	2.92	2.6	-	-
T 709	618	13	605	2.9	10.	15.	14.	0.00	1.1	392	-
T 710	324	79	245	7.4	0.3	0.7	0.5	0.06	0.0	78	-
T 711	526	166	360	9.7	185.	0.0	0.0	1.68	0.0	100	-

* Part of it as free H_2 SO_4 which does partly evaporate in drying process. This causes disagreement with the solids

T 706	1. Chrome line wastes to treatment - Composite 10:00 a.m. to 4:00 p.m.
T 707	2. Nickel line wastes to treatment - Composite 10:00 a.m. to 4:00 p.m.
T 708	3. Bonderizing line wastes to sewer - Composite 10:00 a.m. to 4:00 p.m.
T 709	4. Total plant effluent to storm sewer - Composite 10:30 a.m. to 4:00 p.m.
T 710	5. Chrome line wastes to sewer - Grab.
T 711	6. Nickel line wastes to sewer - Grab.

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DISCUSSION OF FINDINGS

Table of Waste Loadings

	Flow gpd	Susp. Solids lbs/day	Nickel lbs/day	Chromium lbs/day	Sulphate lbs/day
Chrome line wastes to treatment	22,400	1.8	0.5	67	100*
Chrome line wastes to sewer	43,100	18.0	-	-	33
Nickel line wastes to treatment	41,300	2.9	22.0	-	1,550
Nickel line wastes to sewer	21,200	35.0	39.0	-	21
Bonderize line wastes to sewer	43,800	26.0	-	-	-
TOTAL	171,800	83.7	61.5	67	1,704
Total plant effluent	477,000	62.0	48.0	72	1,870

*Calculated from total acidity

Waste loadings in terms of suspended solids, chromium, nickel and sulphate for the constituent waste streams are in generally good agreement with the waste loadings calculated for the total plant effluent sample. This suggests that samples taken during this survey are reasonably representative of the actual waste flows.

The difference in waste volume between the total plant effluent and the sum of the constituent waste flows is accounted for by cooling, sanitary and boiler feed uses.

It is evident from the analytical results on page 103 that concentrations of toxic metals, and the pH of the total plant effluent do not meet OWRC objectives. However, in view of the fact that these wastes will shortly be discharged to the municipal sanitary sewerage system, only the aspects of waste control applicable to the provisions of the municipal sewer-use by-law will be considered.

During this survey, the waste treatment facilities were not being operated. However, wastes were being pumped through the units, and it is, therefore, possible to assess the efficiency of waste segregation within the plant. It is evident from the analytical results of samples T-706, T-709, and T-710 that chromium bearing wastes have been almost completely segregated from the total chromium line wastes and are being pumped to the waste treatment system.

The segregation of nickel bearing rinses does not appear to have been so effective; there is a substantial concentration of nickel in the wastes from the nickel line (sample T-711) which is being discharged directly to the storm sewer, and, therefore, by-passing the treatment unit.

Suspended solids losses do not appear to be critical at present. However, in view of the fact that the treatment process will use lime for neutralization, all dissolved metals and much of the sulphate will appear as insoluble precipitates in the final discharge, in conjunction with excess lime slurry. There are no facilities planned to control suspended solids losses, although the Company indicate that land is available for a small settling basin, should this be required. On the basis of the analytical results of this survey, in the order of 2,800 lbs. of suspended solids may be present in the total plant effluent after neutralization with lime. This represents a concentration of 600 ppm in

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the total plant effluent, which is in excess of the municipal sewer-use by-law requirement of 350 ppm maximum.

Also of concern is the fact that in the absence of any solids removal facilities, toxic metals such as chromium and nickel, originally present in the dissolved state, will be present in the final discharge to the sanitary sewer as precipitated metal hydroxides.

Precipitated metal hydroxides are somewhat less toxic to the biological processes in a sewage treatment plant than the dissolved metal ions, but can cause problems in the sludge digestion facilities at the sewage treatment plant.

Water usage in the Raleigh Street plant is almost exclusively for cooling purposes. This is discharged uncontaminated to the municipal sanitary sewer. In a similar manner, cooling water not re-used as metal finishing rinses in the St. George Street plant will be discharged to the municipal sanitary sewer when this becomes available.

The use of sanitary sewers, as a means of disposing of cooling water, is a questionable practice, since this tends to dilute sewage and absorbs some of the hydraulic capacity of the municipal sewerage system. Of the total water used at both plants, 65% or 450,000 gpd is discharged as uncontaminated wastewaters.

CONCLUSIONS AND RECOMMENDATIONS

Wastewaters currently being discharged to the municipal storm sewer from the St. George Street plant are in excess of the OWRC objectives in terms of pH, chromium and nickel. It is expected that these wastewaters will be discharged to the municipal sanitary sewerage

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system, after pretreatment to reduce hexavalent chromium to the trivalent state and to adjust the pH within the range of 5.5 to 9.5. However, these pretreatment procedures will not effect a reduction in the concentrations of toxic metals, and may substantially increase the suspended solids content of the total plant effluent.

Substantial volumes of clean cooling water from both plants are being discharged. It would appear to be in the interests of the Company to investigate the possibility of re-using cooling water via a cooling tower or refrigeration system; this would have the added advantage of reducing the hydraulic loading on the municipal sanitary sewerage system.

It is recommended that consideration be given to the installation of suspended solids removal facilities prior to the disposal of treated plating wastes from the St. George Street plant to the municipal sanitary sewer.

It is further recommended that the re-use and recirculation of cooling water from both the Raleigh Street and St. George Street plants be fully investigated; or if this is impracticable, it is recommended that these uncontaminated wastewaters be discharged to the municipal storm sewer system.

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SNELL BEVERAGES LIMITED

Date Sampled: March 20, 1967

All analyses except pH reported
in ppm unless otherwise indicated

Lab. No.	5-Day BOD	Solids			pH at Lab.
		Total	Susp.	Diss.	
T 639	0.5				8.9

T 639	A. Grab sample - Combined bottle washing operation effluent 1:40 p.m.

DISCUSSION OF FINDINGS

The analytical results of the bottle washer rinse sample indicate that this waste is acceptable for discharge to the municipal sanitary sewer.

Other plant wastes not sampled during this survey are unlikely to adversely effect the municipal sanitary sewerage system and should continue to be discharged to the sanitary sewer.

CONCLUSIONS AND RECOMMENDATIONS

Wastes discharged from this plant are acceptable for continued disposal to the municipal sanitary sewer.

SILVERWOODS DAIRY LIMITED

The Silverwoods Dairy is located at 222 Raleigh Street in Chatham. The plant is essentially a milk receiving and distributing centre.

DETAILS OF SURVEY

Personnel Participating

Mr. R. Crawshaw - OWRC

Mr. F. L. Craig - OWRC

Personnel Interviewed

Mr. H. A. MacArthur - Plant Superintendent

Operating Schedule

8 hours per day

5 to 6 days per week

Number of Employees

52

Water Consumption

5,700 gpd

Sources of Liquid Wastes and Waste Disposal

No milk processing is carried out at this plant. Sources of liquid wastes are compressor cooling water, boiler blowdown, floor washings and sanitary wastewaters.

All wastes are discharged to the municipal sanitary sewer. Spoiled milk or other high strength waste is sold to local farmers.

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CONCLUSIONS AND RECOMMENDATIONS

No significant wet processing operations are carried out at this plant. The plant was visited on March 21, 1967, but in the absence of any operations producing liquid wastes being carried out at the time, no samples were taken.

It is unlikely that the small volume of liquid waste discharged from this plant will adversely effect the Chatham sanitary sewerage system.

Spoiled milk or other high strength wastes should continue to be disposed elsewhere and at no time discharged to the sanitary sewer.

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SKYLINE FARMS LIMITED

This Company proposes to operate a poultry processing plant on Bothwell Street in premises formally operated by Thames Valley Poultry Limited.

DETAILS OF SURVEY

Personnel Interviewed

Mr. R. Marshall - President

Mr. I. Chambers - Plant Manager

Personnel Participating

Mr. G. Samuel - OWRC

Proposed Operations

Poultry processing operations are expected to begin in June or July, 1967. Approximately 7,000 birds will be processed daily and this production is expected to increase substantially in the future. Operations will be carried out on an eight hours per day, five days per week basis. Approximately fifty persons will be employed at the plant.

Process and domestic water will be obtained from the Chatham P.U.C. and it is expected that in the order of 60,000 gallons will be used daily. Measures are to be taken to separate blood, feathers, offal and other solid wastes from the plant waste flow prior to disposal to the municipal sanitary sewerage system.

CONCLUSIONS AND RECOMMENDATIONS

Based on the reported production volume of this proposed plant, literature value waste loadings in terms of BOD and suspended solids are in the order of 160 and 80 lbs/day respectively. These do not appear

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to be excessive and provided that effective solid waste control is maintained, no adverse effects should be encountered in the disposal of wastes from this plant to the municipal sanitary sewer.

It is recommended that a waste survey be conducted at this plant when production begins.

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DRY INDUSTRIES

Adams Sand Gravel Ltd.	R.R. 3 Chatham	Sand and gravel excavation and washing. Wastes recirculated.
British Leaf Tobacco Co. Canada Ltd.	Patterson Ave. Chatham	Tobacco drying. No liquid wastes except boiler blowdown.
Chatham Sand Gravel Co. Ltd.	199 Stanley St. Chatham	Dredging of Thames River bed. Sandstock piled, decant returned to river.
Domtar Packaging Ltd.	Richmond St. W. Chatham	Manufacture of cardboard cartons. Dry operation, 12,000 gpd cooling water discharged to sanitary sewer.
Dover Corp. Canada Ltd.	Richmond St. Chatham	Manufactures automotive service equipment, valves nozzler, elevators. Soluble cutting oil, 75 gallons, disposed to sanitary sewer twice per week.
Emig Clay Products Ltd.	202 Stanley St. Chatham	Manufactures ceramic tile and bricks. Dry process, no liquid wastes.
Huron Gravel Ltd.	R.R. 3 Chatham	Sand gravel are excavated, washed and stockpiled. Washings recirculated, no wastes.
Ontario Plant Foods Ltd.	Bothwell St. Chatham	Dry blending of fertilizers. Small volume of cooling water during liquid fertilizer production, one month per year.

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DRY INDUSTRIES (continued)

Parkinson Cowan Canada Ltd.	Richmond St. Chatham	Manufactures gas meters and gas appliances. Chemical cleaner, 100 gallons, dumped to sanitary sewer weekly. Paint spray booth, 300 gallons, discharged once per month to sanitary sewer.
Progressive Welders Canada Ltd.	Keil Drive Chatham	Manufacture of welding machines. Dry process 4,500 gpd cooling water discharged to sanitary sewer.
Spurgeons Engines Ltd.	40 Borrowman St. Chatham	Automotive engine rebuilding. Engine washings discharged to septic tank and tile drain.
Purity Dairies Ltd.	St. Clair St. Ext., Chatham	Milk distribution station. No processing. Floor washings discharged to a ditch.
Sunnen Products Ltd.	280 Grand Ave. E. Chatham	Manufactures honing machines and honing stones. Phosphate degreases for machine parts. Degreases dumped twice yearly at rear of property.
Warren Alloy Canada Ltd.	165 Keil Drive Chatham	Manufactures gas meters, lamps and small appliances. Dry process, no liquid wastes.

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DRY INDUSTRIES (Addendum)

Name	Address	Remarks
Canada Packers Ltd.	Richmond St.	Mixing and blending of liquid and dry phosphate-ammonia fertilizers. Very little wet processing, no liquid wastes.
C.I.L.	King St. E.	Mixing and blending of dry fertilizers. No wet processing, no liquid wastes.
Eaton Springs Canada Ltd.	Riverview Drive	Manufacture of automobile springs. Cooling water recirculated only make-up added. No wastes.
Silverwoods Dairy Ltd.	Raleigh St.	Milk receiving and distributing centre. No wet processing. Very little liquid wastes.