THE

ONTARIO WATER RESOURCES

COMMISSION

INDUSTRIAL WASTE SURVEY

of the

TOWN OF FERGUS

July, 1965

REPORT

of

AN INDUSTRIAL WASTES SURVEY

of

THE TOWN OF FERGUS

JULY, 1965

by

DIVISION OF INDUSTRIAL WASTES
ONTARIO WATER RESOURCES COMMISSION

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AN INDUSTRIAL WASTES SURVEY OF

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INTRODUCTION

A survey of the disposal of industrial wastes in the Town of Fergus was undertaken in July, 1965 to determine the amount and nature of wastes being discharged to the town sewerage system. This survey was requested by the municipality when operating problems resulting in a foul odour developed at the sewage treatment plant during the summer of 1964. The problem was temporarily solved by the passage of a municipal sanitary sewer use by-law and the co-operation of Fergus industry. However, similar problems recurred in the summer of 1965 and, therefore, a complete industrial wastes survey of the town was conducted.

The six industries in Fergus which were known to discharge significant amounts of process wastes or to use large quantities of process water were visited to obtain operating, processing and waste handling data. Of these, five discharged both their sanitary and industrial wastes directly to the municipal sanitary sewerage system, while the sixth, Beatty Brothers Limited, discharged only its sanitary wastes to the town sewerage system and sent the process wastes to the Grand River via a storm sewer. The five industries contributing to the sewage treatment plant loading are discussed in this report. A separate report on Beatty Brothers Limited has been issued.

Sampling of waste effluents was performed where the waste loading was deemed significant.

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SUMMARY

The findings of this survey indicate that the operating problems experienced at the Fergus sewage treatment plant during the summers of 1964 and 1965 may be attributed to batch discharges of organic material having a high Biological Oxygen Demand and suspended solids content. These batch discharges originated from Home Creamery Company, Limited as the by-product, whey.

Although Associated Fur Breeders Co-op., Limited and Rowe Dairies Limited as well as Home Creamery Company, Limited are discharging process wastes contrary to the terms of the Fergus sanitary sewer use by-law, it is believed that the sewage treatment plant will operate satisfactorily if the whey is disposed of by alternate means.

It is therefore recommended that the agreement between the Town of Fergus and Home Creamery Company, Limited, by which the whey is trucked away, be adhered to and that, upon expiry of the agreement, some alternate means of whey disposal other than discharge to the sewer be found. The municipal sanitary sewer use by-law should be enforced in this matter.

A summary of the significant industrial wastes treated at the Fergus sewage plant follows.

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SUMMARY OF INDUSTRIAL WASTES DISCHARGED TO SANITARY SEWERAGE SYSTEM.

Name of Industry	Type of Industry or Product	Number of Employees	Water Consumption (gpd) (supplied by Fergus PUC) Industrial	Sanitary	Process Waste Characteristics	Remarks
Associated Fur Breeders Co-op., Ltd. Associated Mixed Feeds, Ltd.	Fresh and frozen mink feed	23	14,400	600	high in suspended solids and BOD	good housekeeping should result in a satisfactory discharge
Belwood Appliance Co., Ltd.	chest freezers	85	24,700	2,200	satisfactory	wastes are being adequately handled
Home Creamery Co., Ltd.	cheddar cheese and butter	9	14,000	300	high in suspended solids and BOD	good housekeeping should be practiced no batches of by-products should be discharged to the sewer
Moore Business Forms, Ltd.	Business forms	150	7,100	4,500	acidic	neutralization of acidic wastes may be necessary
Rowe Dairies, Ltd.	milk bottling plant	7	6,400	200	high in suspended solids and BOD	good housekeeping should be practiced.

SEWAGE TREATMENT AND CONTROL

Sewage in Fergus is collected in a sanitary sewerage system and is carried to the Water Pollution Control Plant located on the south bank of the Grand River on the south boundary of the town. Treatment consists of primary clarification followed by an activated sludge process. The digested waste sludge is trucked away. The design capacity of the plant is 600,000 gallons per day with a present daily flow of 300,000 to 400,000 gallons per day.

During July of 1964, an increasing odour problem at the Water Pollution Control Plant became apparent. Warm weather coupled with an increase in the organic loading to the plant and with the occurrence of frequent organic shock loads was believed the cause of this problem. Investigations indicated that the dumping of 20,000 pounds per day of whey by Home Creamery Company, Limited was the probable source of this increase.

On October 5, 1964, the Town of Fergus enacted a by-law regulating the discharge of wastes into the sanitary sewerage system. The maximum Biochemical Oxygen Demand (BOD) and suspended solids allowed to the system by this by-law was set at 300 and 350 parts per million respectively.

Measures taken to minimize the odour at the Water Pollution Control Plant included pre-chlorination of the raw sewage and the addition of an odour-control chemical supplied by Penn Taylor. These measures did control the odour but did not resolve the problem. During the winter months of 1964-65, Canada Packers, Limited hauled the whey from Home Creamery by tank-truck to its plant in Harrison where it was dried and used for animal feed. However, this operation ceased the following spring, resulting in a re-occurrence of the problems at the Fergus treatment plant.

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On June 14, 1965, a composite sample of the influent to the Water Pollution Control Plant, taken hourly from 8 a.m. to 4 p.m., was found to have a BOD of 1260 parts per million and a suspended solids content of 696 parts per million compared to a BOD and suspended solids content of 200 to 300 parts per million usually found in normal raw sewage discharged to a sewage treatment plant. A grab sample taken at 11:40 a.m. the same day was found to have a BOD of 2100 parts per million and a suspended solids content of 432 parts per million. These figures are believed to be typical of the normal day by day raw sewage received at the treatment plant during the time Home Creamery Company, Limited discharged the by-product, whey, into the sewerage system. Moreover, these values, especially the BOD, far exceeds the limit set out in the by-law and also exceeds the maximum concentrations for efficient operation of the activated sludge process.

An agreement was reached between the Town and Home Creamery Company, Limited, whereby, effective July 19, 1965, the whey be again trucked away with the town temporarily paying part of the costs. This resulted, as expected, in a much lower BOD content in the raw sewage to the Water Pollution Control Plant, and therefore enabled the plant to operate in an efficient manner.

The maximum limits for discharge of industrial wastes to the Fergus sanitary sewers as set out in the Fergus sanitary sewer use by-law are in part as follows:

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Temperature - not to exceed 150° F

Oils and Greases - (a) animal or vegetable origin - 100 parts per million

(b) mineral origin - 10 parts per million

pH - not lower than 5.5

- not higher than 9.5

Suspended Solids - 350 parts per million

Biochemical Oxygen Demand - 300 parts per million.

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CONDUCT OF SURVEY

The information contained in this report was obtained principally by consultation with industrial management and by the collection and analysis of waste samples from those industries from which waste loadings appeared important. Brief examinations of the industrial processes and methods of waste disposal, accompanied by the analytical results obtained on the waste samples, form the basis for any recommendations made.

The initial work in this survey was greatly facilitated by the use of a list of industries and water consumption figures supplied by the Fergus Public Utilities Commission.

All samples taken were analyzed at the Ontario Water Resources Commission Toronto Laboratory in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater", Eleventh Edition.

Mr. D. S. Tolson of the Industrial Wastes Division, Ontario Water Resources Commission, assisted in gathering the information required in preparing this report.

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GENERAL DISCUSSION OF FINDINGS

A study of the industrial wastes discharged to the Fergus sanitary sewerage system revealed the most significant waste characteristics to be Biological Oxygen Demand (BOD), suspended solids and acidity and alkalinity.

Biological Oxygen Demand is usually exerted by dissolved and suspended organic solids in the waste and imposes a load on the biological units of the treatment plant. Oxygen must be provided so that the aerobic bacteria present in the sludge can grow and oxidize the organic matter. An added BOD load then, caused by an increase in organic waste, requires more bacterial activity, more oxygen and greater biological-unit capacity for its proper treatment. The 5-day test at 20° C is usually performed, and it must be emphasized that only a part of the oxidizable matter is decomposed in this time. In general, approximately 68 percent of the total oxygen demand is realized.

Some of this BOD is due to suspended solids that are removed by primary sedimentation, but industrial wastes from dairies or creameries consist largely of dissolved organic material which cannot be removed by primary treatment, and hence, must be treated in the secondary biological units of the treatment plant.

Suspended solids in the waste are removed by screening and settling. However, before these reach the sewage plant, large amounts of solids may result in clogging and blocking of pipes and sewers. Moreover, large amounts of suspended solids in the influent to the treatment plant may result in overloading of the plant's primary sedimentation facilities and consequently,

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impair the secondary activated sludge process.

The disposal of highly acidic or alkaline wastes to a sanitary sewerage system may adversely affect the operation of a sewage treatment plant, but the small volumes of these wastes discharged to the Fergus sewage system will not likely result in upsets or any operating problems at the treatment plant. However, acidic wastes may corrode the sewers in the proximity of the discharge before appreciable degrees of dilution can be obtained. Alkaline wastes can deposit calcium carbonate scales in the sewers resulting in a reduced diameter and increased roughness.

The importance of preventing batch discharges of material high in BOD or suspended solids from reaching the sewerage system cannot be over-emphasized. Normal sewage received at most treatment plants contains 200-300 parts per million BOD and 200-300 parts per million suspended solids. Using the volume of 400,000 gallons of raw sewage received daily at the Fergus treatment plant, this corresponds to 800-1200 pounds of BOD and 800-1200 pounds of suspended solids treated in 24 hours or 33-50 pounds of each per hour. One gallon of milk or 3 gallons of whey each contain approximately 1 lb. of BOD. Therefore, it can readily be realized that a batch of 100 or 200 gallons of either of these materials, discharged over a short period of time, could readily upset the operating conditions, resulting in the foul odour experienced at the plant during the summers of 1964 and 1965. A further consequence of this shock loading is the poor quality final effluent discharged from the plant to the Grand River, thereby partially defeating the purpose for which the sewage plant was designed.

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GENERAL CONCLUSIONS AND RECOMMENDATIONS

The results of this survey reveal that Home Creamery Company, Limited, Rowe Dairies, Limited and Associated Fur Breeders Co-op., Limited are discharging wastes containing higher than permissible concentrations of BOD and suspended solids. However, as long as shock loads of material with high organic content are not discharged to the sanitary sewerage system, the treatment plant should continue to operate satisfactorily. It is therefore recommended to the town and the industries involved, that at no time should batch discharges of milk, whey, other dairy products or by-products, or any other material high in suspended solids or BOD, be discharged to the sewerage system contrary to approved methods.

More specific recommendations for each industry are included in the sections dealing with the individual industries.

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ASSOCIATED FUR BREEDERS CO-OP., LIMITED

and

ASSOCIATED MIXED FEEDS, LIMITED

Associated Fur Breeders Co-op., Limited and Associated Mixed Feeds, Limited, with combined head-offices located at 198 St. Patrick Street East, produce fresh and frozen mink feed. Processing plants are located at 198 St. Patrick Street East and on Black Street. A freezing plant and refrigerated warehouse is situated on St. George Street. Mr. B. Dickinson is the General Manager of these combined plants.

SUMMARY

Both sanitary and industrial wastes produced at the two processing plants are discharged to the municipal sanitary sewerage system after some screening of the process wastes. These process wastes are high in Biological Oxygen Demand and suspended solids.

It is recommended that good housekeeping practices be closely followed at all times to minimize the organic loading in the effluent discharged to the sewer. Housekeeping at this plant would consist mainly of preventing any solid material that could be disposed of otherwise from entering the town sewers. Process spillage and other waste organic material on the floor should be collected in drums before the floor is water hosed.

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PLANT PROCESSES

a) St. Patrick Street Plant

Fish and chicken by-products; tripe, bones, lungs, livers, etc. are mixed with water and ground to form a thick pasty mixture. Other additives are added during the operation to make up a formula mink feed. The product is stored in trays, frozen and refrigerated either at this plant or at the refrigerated warehouse until required.

b) Black Street Plant

At the Black Street processing plant, frozen smelt are partially thawed, cooked to remove a toxic scale enzyme, mixed with oatmeal to thicken the mixture, cooled, frozen and stored under refrigeration either here or at the refrigerated warehouse on St. George Street.

c) St. George Street Warehouse

This ammonia-refrigerated warehouse is used to store the products until required.

PRODUCTION DATA

Operating Schedule - 1 shift per day
6 days per week at the St. Patrick St. plant
4 days per week at the Black St. plant.

Number of Employees - 23

Production Volume - 50 tons of mink feed produced per day at the St. Patrick St. plant
- 5 tons of frozen smelt cooked per day at the Black St. plant.

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PERSONNEL

Mr. B. Dickinson - General Manager

Mr. H. Andrews - Plant Superintendent.

WATER CONSUMPTION

Source - Fergus PUC

Consumption - 6,900 gpd at the St. Patrick Street plant

- 5,000 gpd at the Black Street plant

- 3,100 gpd at the St. George Street Warehouse.

(Average - first six months, 1965.)

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SOURCES OF WASTE AND WASTE DISPOSAL

a) St. Patrick Street Plant

All liquid wastes from this plant are discharged to the municipal sanitary sewerage system. The major sources of industrial wastes are process spillage occurring during the grinding and mixing operations and floor and equipment washings. Before hosing the floors, a large part of the solid material is shovelled into drums and trucked away.

During September of 1964, fine basket type screens were installed on the two floor drains to the sanitary sewer in this plant to prevent the coarser solids from entering the sewerage system. However, the screen on the drain in the grinding room was removed after rapid plugging occurred and, instead, a pit, one foot in depth, was constructed under the sewer outlet to collect the settleable solid material. This pit is cleaned once or twice a day.

The second drain is located in the cold-storage area and the screen here is not subjected to such severe plugging.

Boiler blow-down water constitutes a source of weak waste. The boiler make-up water is softened by chemical treatment.

b) Black Street Plant

All liquid wastes from the Black Street cooking plant are discharged to the municipal sanitary sewerage system.

There are essentially no process spillings at the Black Street cooking plant. The only source of waste originates from cleaning and rinsing the cooker

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and cooler at the end of the day, with a small solid product loss to the sewer. Most of this solid product is collected in steel drums and trucked away.

Uncontaminated and unrecirculated cooling water is used in a freon refrigeration system and is discharged to the sanitary sewerage system.

c) St. George Street Warehouse

This refrigerated warehouse discharges only cooling water from an ammonia refrigeration system. This discharge is not sent to a sewer but, instead, seeps into the ground.

DETAILS OF SAMPLING PROGRAMME

Two 40-oz. grab samples, one from each drain at the St. Patrick Street plant were taken immediately after the completion of wash-up operations at 9:30 a.m., July 27. These samples were analyzed at the Ontario Water Resources Commission Toronto Laboratory, where the following results were obtained:

	5-day BOD	Total Solids	Suspended Solids	Dissolved Solids	Ether Solubles
Grinding Room Sewer	2,800	3,846	1,534	2,312	780
Cold Storage Area	9,600	17,226	14,092	3,134	2,200

(Results are shown in parts per million)

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DISCUSSION OF FINDINGS

The important characteristics of wastes from the St. Patrick Street processing plant are Biological Oxygen Demand (BOD) and suspended solids.

The BOD is a measure of the oxygen required for the aerobic bacterial stabilization of the decomposable organic matter in waste and serves to predict or measure the effects of wastes on a sewage treatment plant. Wastes high in suspended solids, when discharged to a sewerage system, may result in clogging and blocking of pipes.

The analyses obtained on the two grab samples are not to be taken as representative of the total plant waste effluent during a day but only as an indication of the degree of waste loading originating at this plant.

However, the two samples taken indicate an extremely high waste loading. Assuming a waste volume of 2000 gallons per day from the grinding room and a volume of 1000 gallons per day from the cold storage area, the daily estimated BOD and suspended solids loading is 152 pounds and 172 pounds respectively. Normal raw sewage delivered to most treatment plants has a BOD and suspended solids content of 200 - 300 parts per million of each. At the Fergus treatment plant where the average raw sewage volume handled is 400,000 gallons per day, these figures would correspond to a loading of 33 - 50 pounds of BOD and 33 - 50 pounds of suspended solids treated over a one hour period. Therefore, it can be seen that this industry contributes quite significantly to the sewage plant loading, and any improvements in the effluent quality would greatly facilitate sewage treatment plant operation.

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It should also be emphasized that any batch discharges of wastes higher than normal in organic material should not be sent to the sewer. The small volume of sewage handled at the Fergus sewage plant prohibits this since any such discharge could readily cause a sewage plant operating upset. This could result in a foul odour problem at the plant and in improper and incomplete sewage treatment before final discharge of the treatment plant effluent to the Grand River.

RECOMMENDATIONS

The main recommendation in regard to the operation of the Black Street fish cooking plant as well as the St. Patrick Street processing plant is that good housekeeping practices be closely adhered to at all times. All solid wastes should be collected in drums where possible and land-dumped or disposed of by some other suitable method. At no time should solid material be flushed to the sewer when other methods of disposal are available.

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BELWOOD APPLIANCE COMPANY, LIMITED

Belwood Appliance Company, Limited, located at 105 Queen Street West, fabricates chest freezers from aluminum and steel sheet metal. Plant Manager of this company is Mr. R. Slater.

SUMMARY

Both industrial and sanitary wastes are discharged untreated to the municipal sanitary sewerage system. The industrial waste loading originates from steel phosphating, aluminum bonderizing and spray-painting operations, and are satisfactory for discharge to the municipal sewer.

PLANT PROCESSES

Steel sheet metal is hand-washed with a dilute phosphate solution while aluminum sheet metal is bonderized as protection against corrosion prior to spray-painting and further fabrication into chest freezers.

PRODUCTION DATA

Operating Schedule	-	1 shift per day
	-	5 days per week
Number of Employees	-	85
Production Volume	-	15,000 freezers per year.

PLANT PERSONNEL

Mr. R. Slater	-	Plant Manager.

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WATER CONSUMPTION

Source - Fergus PUC

Volume - 2,200 gpd for sanitary purposes

- 24,700 gpd for industrial purposes

(average - first six months of 1965).

SOURCES OF WASTE AND WASTE DISPOSAL

This company produces industrial wastes in the phosphating, bonderizing and painting operations. All liquid wastes are discharged to the municipal sanitary sewerage system.

The phosphating process consists simply of hand-washing the steel sheets with a 10 percent solution of zinc phosphate in water made up in a 3-gallon pail. This solution is discharged to the sewer at the end of the day and is a very small source of waste.

Aluminum bonderizing is accomplished in five stages. The sheet metal is dipped into one of five different baths at each stage. The first stage involves cleaning the metal with a commercial alkali cleaner (Parco Cleaner 352). This alkaline solution is rinsed off with hot water in the second stage. The third stage consists of the application of an acid bonderizer (Bonderite 723 A and 723 B) to the metallic surfaces followed by a cold water rinse in the fourth stage. The fifth and final stage consists of dipping the sheets into a chromic-phosphoric acid solution (Parcolene). Tank capacities of the first and third stages are 480 gallons. The remaining three stages have tank capacities of 360 gallons. The two running water rinses overflow

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continually into the sanitary sewer while spent solutions in the remaining three still baths (alkali cleaner, bonderizer, Parcolene) are trucked away at intervals depending on use and land-dumped.

Following the steel phosphating and aluminum bonderizing, the sheet metal is spray-painted in a water-walled spray booth. The water, containing a paint coagulant, is recirculated in a closed system and is discharged once every two weeks into the sanitary sewerage system. Prior to discharge, the paint floating on the surface is skimmed off.

Cooling water from five spot welders is also discharged to the sanitary sewer.

DETAILS OF SAMPLING PROGRAMME

Two 40-oz. grab samples, one from each running water rinse tank, were taken at 2:00 p.m. on July 27 and analyzed at the Ontario Water Resources Commission Toronto Laboratory. The analytical results obtained are as follows:

	5-day BOD	Suspended Solids	pH	Aluminum as Al	Iron as Fe
Hot Water Rinse Tank (Stage # 2)	1.2	84	7.8	0.6	1.9
Cold Water Rinse Tank (Stage # 4)	0.4	43	-	0.4	0.5

(All results except pH are reported in parts per million)

Samples of the alkali cleaner, bonderite and Parcolene solutions were not taken as they are land-dumped when spent.

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HOME CREAMERY COMPANY, LIMITED

Home Creamery Company, Limited, located at 250 St. Andrew Street East, produces cheddar cheese and butter. The owner of this creamery is Mr. W. Hicks.

SUMMARY

All industrial and sanitary wastes except whey formed during the cheese-making and buttermilk separated during the churning of cream into butter are discharged untreated to the municipal sanitary sewerage system. The whey and buttermilk are trucked away.

It is recommended that good housekeeping practices be strictly adhered to at all times. It is also recommended that material of high organic content be disposed of by some other means than discharge to the sanitary sewer.

PLANT PROCESSES

Raw milk is received in tank trucks, weighed, pasteurized and pumped into one of three 900-gallon cheese vats. The separation of the casein from the whey is effected by the addition of rennet to the milk followed by continuous agitation. The separated whey is withdrawn and the cheese washed, strained, shaped and packaged for sale. An average of 2000 pounds cheese is produced daily.

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In the butter-making process, raw cream is weighed, sampled, pasteurized and churned. The resultant butter is washed and packaged for sale. An average of 2000 pounds butter is produced daily in two batches.

PRODUCTION DATA

Operating Schedule - 1 shift per day
- 5 1/2 days per week

Number of Employees - 9

Production Volume - 2,000 pounds cheddar cheese per day
- 2,000 pounds butter per day.

PLANT PERSONNEL

Mr. W. Hicks - Owner

Mr. J. Hicks.

WATER CONSUMPTION

Source - Fergus PUC

Volume - 300 gpd for sanitary purposes
- 14,000 gpd for industrial purposes (average - first six months of 1965).

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SOURCES OF WASTES AND WASTE DISPOSAL

The major source of waste in the cheese-making is the production of 20,000 pounds per day of whey. This is trucked away after settling to separate the butter-fat. During the butter churning, about 200 gallons of separated buttermilk per batch or 400 gallons per day is produced. This is trucked away, dried and used for animal feed. After the cream has been churned and the separated milk removed, the butter is water-washed with 200 gallons of water. This is discharged to the sanitary sewer.

Other wastes discharged to the sanitary sewer originate from process spillage and equipment cleaning. Used milk cans are steam-cleaned with the recovered milk being collected and processed. Boiler blow-down and regeneration wastes from a water softener used on boiler make-up water results in a very weak waste containing sodium chloride. A small ammonia refrigeration unit uses a small amount of cooling water which is uncontaminated upon discharge to the municipal sewer.

DETAILS OF SAMPLING PROGRAMME

A grab sample of the butter wash water was taken at 8:30 a.m. on July 27 and analyzed at the Ontario Water Resources Commission Toronto Laboratory. Results of the analyses are as follows:

	5-day BOD	Total Solids	Suspended Solids	Dissolved Solids	pH	Ether Solubles
Butter Wash Water	5500	7038	2938	4100	10.8	360

(All results except pH reported in parts per million.)

In addition, a sample of the whey produced by Home Creamery on June 14, 1965, submitted by the Fergus Water Pollution Control Plant operator disclosed a 5-day BOD of 16,000 parts per million, a suspended solids content of 648 parts per million, and a dissolved solids content of 62,894 parts per million.

DISCUSSION OF FINDINGS

The greatest difficulty encountered in treating milk processing wastes in a municipal sewage treatment plant usually results from shock loading caused by accidental or intentional dumping of such by-products as skim milk, buttermilk or whey. The extreme loading on the sewage plant following a large-scale discharge of such wastes usually renders the sewage septic and interrupts the treatment process. This is particularly true at the smaller sewage treatment plants designed to treat low volumes of sewage as is the case in Fergus.

During the summer months of 1964, Home Creamery Company, Limited, discharged approximately 20,000 pounds whey per day over a period of one to two hours to the municipal sanitary sewers resulting in extreme operating conditions and a foul odour problem at the Water Pollution Control Plant. During the following winter, the whey was trucked away by Canada Packers Limited, thereby temporarily solving the problem. However, in the summer of 1965, whey was again sent to the sewage treatment plant resulting in similar problems at the sewage plant. On July 19, 1965, agreement was reached with the Town of Fergus by which the whey would be trucked away. This is now being done with the result that the treatment plant is operating satisfactorily.

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Samples of this whey disclosed a 16,000 parts per million Biological Oxygen Demand (BOD) content. This BOD is a measure of the oxygen required for the aerobic stabilization of the decomposable organic matter in waste and serves to measure or predict the effects of wastes on a sewage treatment plant.

Normal raw sewage has a BOD content of 200 - 300 parts per million. At the Fergus sewage plant, based on a sewage volume of 400,000 gallons per day, this amounts to 800 - 1200 pounds of BOD handled per day or 33 - 50 pounds of BOD per hour. The BOD content of 20,000 pounds whey is approximately 370 pounds. This amount of BOD, when discharged over a period of 1 - 2 hours, is obviously more than sufficient to seriously upset the sewage treatment plant operations and result in the problems encountered at the plant during the summers of 1964 and 1965.

RECOMMENDATIONS

The main recommendation in regard to the operation of this creamery is that at no time should such by-products as buttermilk or whey be discharged to the sewer contrary to approved methods. Means of preventing batch discharges of such wastes to the sewerage system, either accidental or intentional, should be provided if the sewage treatment plant is to operate continuously as intended.

Moreover, good housekeeping practices should be followed at all times to minimize milk and cream loss to the sewer.

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MOORE BUSINESS FORMS, LIMITED

Moore Business Forms, Limited, located on Victoria Terrace, prints business forms. This plant was surveyed by Mr. R. C. Stewart of the Industrial Wastes Division of the Ontario Water Resources Commission in October of 1964. No new processes or sources of waste have been introduced since that time.

The Plant Supervisor of Moore Business Forms, Limited is Mr. A. E. White.

SUMMARY

All sanitary and industrial wastes are discharged to the municipal sanitary sewerage system.

Wastes from a photographic darkroom and from the production of magnesium printing plates are discharged along with boiler blow-down water to a dilution tank which serves to even out the flow and waste loading of the plant effluent before discharge to the sewer. The overflow from this dilution tank is highly acidic, and it is therefore recommended that neutralization of the dilution tank contents could be performed before discharge to the municipal sewer.

PRODUCTION DATA

Operating Schedule - 2 shifts per day, 1 shift on Friday
- 5 days per week

Number of Employees - 150.

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PLANT PERSONNEL

Mr. A. E. White - Plant Supervisor.

WATER CONSUMPTION

Source - Fergus PUC

Volume - 4,500 gpd for sanitary purposes

- 7,100 gpd for industrial purposes

(average - first six months of 1965).

SOURCES OF WASTES AND WASTE DISPOSAL

Magnesium printing plates are produced by a photographic-acid etching process. The oil and the acid drag-out in the rinse water is piped to a 6 x 4 ft. dilution tank, 4 feet deep, having a submerged outlet, 18 inches from the top. This tank collects the oil and evens out the flow of acid rinse water.

The photographic darkroom wastes, about 3 gallons per day of developing and fixing solutions plus rinse water, is also piped to the above dilution tank.

Two small sources of wastes are the glue pots from the machines assembling the forms and the aniline ink pots from the printing processes. These pots are washed out at the end of each shift. The glue wastes pass through a screened trap into the sewer while the ink wastes are collected in a sump and pumped to the sewer.

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Cooling water is used on the carbon coating machines and the brake on a paper slitter. A refrigeration system has a closed cooling system and the three compressors are air-cooled.

Boiler make-up water is treated by phosphate addition followed by pH correction. Much of the plant water is softened by ion exchange, but these units are not regenerated, instead they are replaced on a rental basis. Boiler blow-down is discharged through the dilution tank.

DETAILS OF SAMPLING PROGRAMME

A 40-oz. grab sample of the dilution tank contents was taken at 1:30 p.m. on July 5. The aqueous phase of the sample, corresponding to the effluent from the tank was analyzed at the Ontario Water Resources Commission Toronto Laboratory. The results are as follows:

	5-day BOD	Suspended Solids	Silver as Ag	Magnesium as Mg	Ether Solubles	pH	Acidity as $CaCO_3$
Dilution Tank Contents (Aqueous Phase)	16	9	0.0	1118	23	2.8	3220

(All results except pH reported in parts per million).

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DISCUSSION AND CONCLUSIONS

The wastes from this plant are satisfactorily handled with the exception of the high acid content of the effluent from the dilution tank. It is unlikely that the sewage treatment plant would be adversely affected because of the small flow from this source and because of the neutralizing action of normally alkaline domestic sewage. However, this acidic waste could deteriorate the sewers in the proximity of the discharge before appreciable degrees of dilution are obtained. Therefore, neutralization of these acid wastes by lime or other means should perhaps be performed before discharge to the dilution tank.

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ROWE DAIRIES, LIMITED

Rowe Dairies, Limited, located at 489 St. Patrick Street West, is a general milk bottling plant. Mr. A. Rowe is the owner.

SUMMARY

All sanitary and industrial wastes are discharged untreated to the municipal sanitary sewerage system.

Wastes, high in organic solids, originate from bottle, floor and equipment washings and from process spillage.

Good housekeeping practices are recommended to prevent the loss of milk and milk products to the sewer and especially to prevent batch discharges of these materials to the town sewerage system.

PLANT PROCESSES

Raw milk is received in tank trucks and is pasteurized, centrifuged, homogenized, cooled, bottled and stored under refrigeration until sold. In addition, orange juice and buttermilk are bought, bottled and sold.

PRODUCTION DATA

Operating Schedule - bottling from 7 a.m. to 12 noon
- 6 days per week

Number of Employees - 7

Production Volume - milk - 9000 lbs. per day
- orange juice - 60 quarts per week
- buttermilk - 32 gallons per week.

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PLANT PERSONNEL

Mr. A. Rowe - owner

WATER CONSUMPTION

Source - Fergus PUC

Consumption - 6,600 gpd average for first six months of 1965.

SOURCES OF WASTES AND WASTE DISPOSAL

The process wastes in this plant originate from bottle washing, drippings from process equipment, floor wash-ups and wastes containing acids or alkalis used in cleaning the tanks. These cleaning solutions amount to 120 gallons per day and should not present a problem. All sanitary and industrial wastes are discharged to the municipal sanitary sewerage system.

DETAILS OF SAMPLING PROGRAMME

A 40-oz. grab sample was taken from the plant sewer at 9:30 a.m. on July 6 during the bottling operation. A second 40-oz. grab sample was taken from the alkali solution used in cleaning the milk tanks and associated equipment. Both samples were analyzed at the Ontario Water Resources Commission Toronto Laboratory. The results of the analyses are as follows:

	5-day BOD	Suspended Solids	Dissolved Solids	pH	Ether Solubles	Kjeldahl Nitrogen as N
Plant Effluent during Bottling	680	435	1211	6.5	65	31
Alkali Cleaning Solution	1000	440	3578	11.9	285	64

(All results except pH reported in parts per million).

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DISCUSSION OF FINDINGS

Using a waste volume of 2250 gallons per day (250 gallons per 1000 pounds of milk intake) exclusive of cooling water, this plant has an estimated equivalent sewered population of 91 persons on a Biochemical Oxygen Demand (BOD) basis and 48 persons on a suspended solids basis. The dairy estimates a sewered loss of 300 pounds of milk per day. This amounts to a 3.3% loss which is higher than normal for bottling plants.

The greatest problem in handling dairy wastes usually occurs when large shock loads of milk or other wastes high in organic content are discharged accidentally or otherwise to the sewage treatment plant. One gallon of milk has approximately 1 pound of BOD content. A sudden discharge of 100 gallons, or in other terms, of 100 pounds of BOD over a short period of time to the sewer could result in extreme operating conditions at the sewage plant where the average hourly loading is usually 33 - 50 pounds per hour. This extreme loading may result in rendering the sewage septic and in completely interrupting the treatment process. Therefore, at no time should such batch discharges be sent to the sewer contrary to approved methods.

The highly acidic and alkaline cleaning solutions should not present a problem at the sewage treatment plant because of the small volumes of these wastes. However, the sewers may begin to deteriorate in the vicinity of the dairy.

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RECOMMENDATIONS

At no time should large discharges of milk or milk products be sent to the sewer contrary to approved methods. Means of preventing such discharges, whether accidental or intentional, should be provided to ensure continuous and proper sewage treatment plant operation.

Good housekeeping practices are of major importance in the milk industry and should be strictly adhered to at all times. Equipment leaks should be minimized and process spillings avoided if at all possible.

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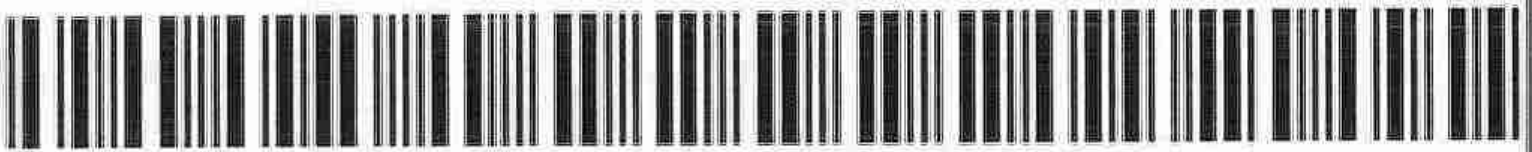
JDL/eb

Appendix

LIST OF DRY INDUSTRIES

NAME	PRODUCTS
Box Veneers Limited	Veneers
Chromo Lithographing Company Limited	Commercial and Job Printing
Fergus Awning Company	Canvas Goods
Roti Wood and Metal Products Company Limited	Plywood
Savage Shoes Limited	Shoes
Superior Barn Equipment Company Limited	Steel Chairs
Walinga Body and Coach Limited	Truck Bodies
Wellington Lumber and Supply	Pre-cut Lumber, Hardwood Pallets
James Wilson and Sons Limited	Cereals, Feeds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