SPAULDING FIBRE COMPANY, INC.

INDUSTRIAL PLASTICS DIVISION

Tonawanda, N. Y.

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N. Y. STATE DEPT. OF HEALTH
BUFFALO REGIONAL OFFICE

PLANT EFFLUENT

June 8, 1967

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Approved by: R. A. Preibisch

SUMMARY:

In late 1963, a project was undertaken to determine material balances throughout the Papermill for different grades of paper. The studies made under this project indicated that the magnitude of solid and liquid effluent from the Papermill was undesirable. Therefore, steps were taken to reduce the effluent from the papermachine systems and thus, from the Papermill. This has resulted in a 20% reduction of solid effluent from the Papermill. Further pursuit of the approach taken should cause an additional 17% reduction of solids in this area.

In May 1966, Hall Laboratories of Calgon Corporation, Pittsburgh, Pa. was retained by Spaulding Fibre Co. to augment our own pollution abatement program by conducting a survey of the industrial waste discharged from the Tonawanda, N. Y. plant. This survey was conducted during June 7 - 10 inclusively. Also, a survey was made by the I. J. C. Field Unit of the U. S. P. H. S. during August 15 to August 24, 1966.

Results of these two surveys have been included as necessary in this report to present the industrial waste discharge situation as it now stands. Decision on the means for abating this discharge depends on negotiations with the City of Tonawanda and on further studies of effluents.

Negotiations are taking place with the City. Hall Laboratories have been retained to make further studies and to recommend courses of action for complying with the agreement between the State of New York and Spaulding Fibre Company, Inc.

CONCLUSIONS:

Based on the discussions below and the attached exhibits, the following conclusions can be drawn:

1. The total combined discharge to the Gibson St. storm sewer contains organic content (BOD), suspended solids, zinc and phenol.

2. The BOD is associated with the suspended solids from the Papermill and it has been indicated that a reduction in suspended solids will cause a considerable reduction in BOD.

3. Since 1964, a 20% reduction in suspended solids from the Papermill has been attained. Based on conclusion 2, the BOD has also been reduced to some extent.

4. The discharge from the rag cookers to the Wheeler St. sanitary sewer also contains BOD and alkalinity.

continued . . .

5. The leach water from the Fibremill to the sanitary sewer contains zinc.

RECOMMENDATIONS:

1. Continue negotiations with the City of Tonawanda to determine if they would accept all or part of Spaulding's wastes in a treatment plant operated by the City.

2. Continue studies to determine what treatment is necessary to reduce present levels fo BOD, zinc, phenol, alkalinity to levels acceptable by N. Y. State authorities for discharge to the Niagara River.

DISCUSSION:

The industrial wastes of the Tonawanda plant of Spaulding Fibre Company, Inc. are discharged into either the Gibson St. storm sewer or the Wheeler St. sanitary sewer. Figure 1 is a block diagram intended to simply picture the origin of individual effluents within the plant and into which sewer system they discharge. From Figure 1, the major effluents flowing into the Gibson St. storm sewer that are considered below are:

1. Stock preparation area

2. Papermachine systems

3. Continuous fibre-making leaching

4. Spauldite tube grinding

The Stock Preparation effluent was measured by a Parshall Flume and the Papermachine effluent by a weir in all surveys. These effluents join together immediately outside the Papermill building before discharging to the Gibson St. sewer.

Table 1 compares the solid effluent from these areas for the years 1964 and 1966. The purpose of the table is to show the reduction attained in solid effluent during this span. Minor process improvements during 1965 caused some retention of solids, but a concerted effort from January 1966 through September 1966 had the greater effect on solid effluent abatement.

As can be seen in the table, only suspended solids have been considered. The reason being, that only this type of data is available for 1964. The data for 1964 (determined and collected here at Spaulding) is presented as being the effluent situation before any major changes were made in the papermachine systems. The Hall Laboratories and the U. S. P. H. S. figures that are shown were determined from data for suspended solids presented in exhibits 1, 2 and 9 (Table I).

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As can be seen under the heading, Total Suspended Solids Effluent for the year 1966, the total was based on our data for the papermachine and on Hall Laboratories' data for the beater room. In general, it is felt that our data is more complete as it covers extended periods of time, different paper grades and more samples. For instance, 1,895 lbs./day was used for the papermachine room. This is in fairly close agreement with the Hall Laboratories result which is based on a lower volume flow and is cause of the difference between the two. On the other hand, the U. S. P. H. S. value was based on a flow almost the same as the Hall Laboratories flow, but the two week sampling indicated higher loading. This loading is not consistent with Spaulding results on an average basis and it is felt that the U. S. P. H. S. solid effluent value is not typical.

In the stock preparation area Spaulding helped generate the volume flow data for the Hall Laboratories result for 1966. While the Hall reported result may be slightly high, it is believed that the U. S. P. H. S. value seems too low. Therefore, the Hall result was used in calculating the total solid effluent for 1966.

On the basis of actual measurement, an average solid effluent reduction of 19.7% has been attained. This is about 52.5% of the reductions that were reported in late 1965 that could be made. A usable solids loss of 3,475 lbs./day existed then and was about 37.5% of the total effluent. The papermachine systems modifications made in 1966 are such that further efforts should enable a reduction close to 37%.

Exhibits 1 and 2 represent the present discharge situation in the above mentioned areas with the minor exceptions noted above. The exhibits demonstrate the extent of suspended solids loading as well as other contamination such as BOD. In this regard, Hall Laboratories found that in the case of the effluents from the stock preparation area and the papermachines, a decrease in suspended solids caused a substantial decrease in BOD. To support this view the following is extracted and quoted verbatim from the Hall Laboratories report.

> "From our observations of the Papermill waste water, we deduced that the greater portion of BOD could be removed from these waters by clarification of the suspended material. Subsequent to our initial survey, we had additional samples of the waste water from the paper-making machines and the stock preparation area collected and sent to our laboratories for analysis. On these samples, the chemical oxygen demand (COD) and biochemical oxygen demand (BOD) were determined on shaken and filtered samples. The filtered samples simulated what we might reasonably expect to achieve with proper clarification.?

continued . . .

The results of our analyses are tabulated below:

Sample No.	S-4611	S-4612
Identification	Stock Preparation	Paper Machines
pH	6.9	7.0
	mg/l	mg/l
Suspended Solids	170	500
COD, Total	236	554
COD, Filtered	82	26
BOD, Total	75	255
BOD, Filtered	45	10

The above analyses indicate that we could expect to achieve a reduction in BOD of 96% based on the paper machine waste and a reduction of 40% based on the stock preparation waste. Using flows determined during the survey, and indicated in the report, the amount of BOD contributed daily by the two streams as well as the calculated affect of their combination can be tabulated as follows:

Water Source	Total BOD, pounds/24 hours	Filtered BOD, pounds/24 hours
Stock Preparation	1,837	1,102
Paper Machines	2,580	101
Combined Waste	4,417	1,203

The degree of reduction obtained on the combined waste would be 72.7% giving a BOD in the effluent equivalent to 35 mg/l."

While organic content (BOD) is prevalent in the Papermill wastes, the leach water from the continuous fibre-making operation contains zinc (exhibit 3). The Spauldite tube grinding effluent contains some phenol (exhibit 4). These contaminants are found in the combined discharge to the Gibson St. storm sewer as shown in exhibit 5. The loadings shown in exhibit 5 are based on a flow of 3,000 gpm, which is derived from exhibits 1 - 3 as follows:

continued . . .

Stock Preparation	2,000 gpm
Papermachines	843
Continuous Fibre	463
	3,306 gpm

The flow of 3,306 gpm or 4,752,000 gpd does not include minor flows shown in Figure 1 such as the Spauldite tube grinding effluent and varnish kettle cooling water.

As regards the Wheeler St. sanitary sewer, two areas discharge into it on a batch system basis. The waste water from the rag cookers is one of the discharges. Rag cooking is a batch operation using about 5,000 gallons of water and 300 to 1,000 lbs. of 50% caustic per batch. In 25 hours there are eight batches or dumps of highly alkaline water. Based on 5,000 gallons per batch, the contaminant loading and concentration are presented in exhibit 6.

The other source of batch-type discharge to Wheeler St. is the batch fibre-making area. Here, 76 tanks of 2,500 gallons each are dumped daily. On the basis of 2,500 gallons per dump, and analysis of the leach water, average loading and concentration was derived and is presented in exhibit 7.

The main contaminants in the two discharges to Wheeler St. are BOD and alkalinity from the rag cookers and zinc in the fibre leach water.

Discharges, other than shown in Figure 1 to Wheeler St., are sanitary waste, utility effluent and roof drains.

The water that is used within the confines of Spaulding Fibre property is obtained from two sources. In 1966, water was purchased from the City of Tonawanda and consumed at the rate of 1,367,000 gpd. This water is used mainly in the Spauldite and fibre-making areas. An analysis of this water appears in exhibit 8.

River water is pumped by Spaulding from the Niagara River for use exclusively in the paper-making processes. This water is passed through a sand filter before use. The analysis of unfiltered and filtered river water is shown in exhibit 8. The usage rate is approximately 4,000,000 gpd.

Based on the above preliminary work and other considerations, alternative or parallel courses of action for treatment of the industrial waste discharge at Spaulding Fibre may be suggested.

continued . . .

1. Negotiate with City of Tonawanda for acceptance of all waste discharged from Spaulding Fibre.

2. Install clarifier at Spaulding Fibre and discharge clarifier effluent to stream if acceptable.

3. Install a clarifier at Spaulding Fibre for treatment of discharge and negotiate with City of Tonawanda for treatment of clarifier effluent.

4. Negotiate with the City of Tonawanda to accept that portion of our plant effluent, such as rag cooking liquor and initial washer water, which contains BOD and the remainder be given treatment at our plant as in alternatives 2 and 3.

The above alternatives are contingent on negotiations with the City of Tonawanda and the results of further effluent testing and economic studies to determine feasibility of the suggested methods. To date, the City of Tonawanda has been contacted as can be seen by exhibits 10 and 11. Metcalf and Eddy, consultants for the City, visited Spaulding Fibre on June 1 to consider the possibility of the City accepting Spaulding's wastes and are presently conducting a survey of these wastes.

Hall Laboratories is still being retained by Spaulding Fibre Company, Inc. for the purpose of further studies to determine the processes and process equipment necessary to treat the waste discharge from Spaulding so that it is acceptable to the Niagara River.

continued . . .

Table 1

PAPERMILL SOLID EFFLUENT

Papermachine Room
Suspended Solids Effluent

Data Source	1964	1966
Spaulding Fibre Co., Inc.	3,067 lbs./day[a]	1,895 lbs./day[b]
Hall Laboratories	-	1,724 "
U. S. P. H. S.	-	2,590 "

Stock Preparation System
Suspended Solids Effluent

Data Source	1964	1966
Spaulding Fibre Co., Inc.	6,228 lbs./day	-
Hall Laboratories	-	5,568 lbs./day
U. S. P. H. S.	-	2,400 "

Total Suspended Solids Effluent

1964 - 3,067 + 6,228 lbs./day = 9,295 lbs./day

1966 - 1,895 + 5,568 lbs./day = 7,463 "

Total Suspended Solid Effluent Reduction - 1,832 lbs./day or 19.7%

a - Average data, February 25 - April 1, 1964:
568 gpm; 450 mg/l suspended solids

b - Average data, September 12 - November 14, 1966:
928 gpm; 170 mg/l suspended solids

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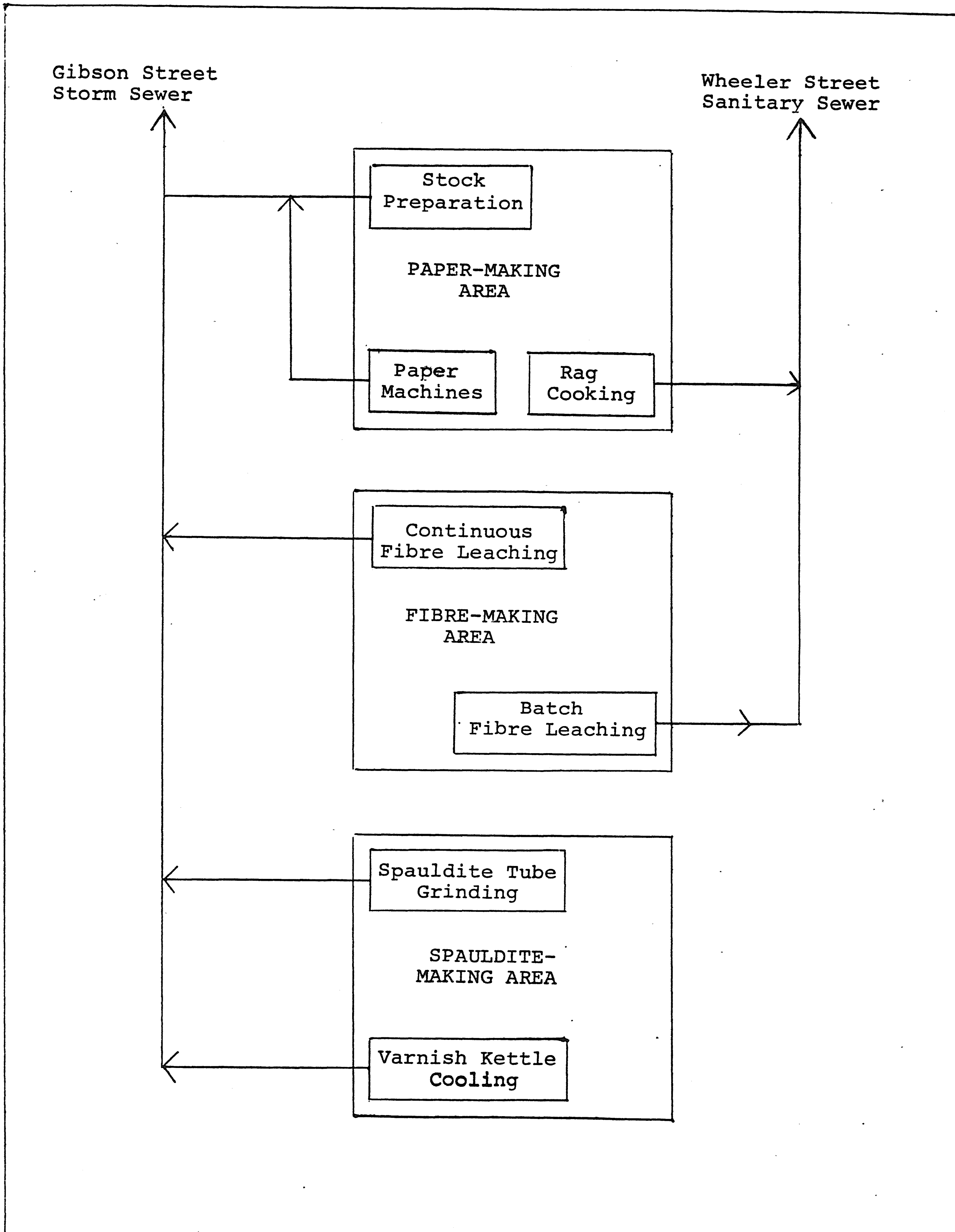
Gibson Street Storm Sewer
Wheeler Street Sanitary Sewer
Stock Preparation
PAPER-MAKING AREA
Paper Machines
Rag Cooking
Continuous Fibre Leaching
FIBRE-MAKING AREA
Batch Fibre Leaching
Spauldite Tube Grinding
SPAULDITE-MAKING AREA
Varnish Kettle Cooling

Figure 1

Spaulding Fibre
Tonawanda, New York

EXHIBIT I-B

In-Plant Samples

Paper Mill Waste Water at Weir

	Ave. Loading Lbs./8 Hrs.	Ave. Concentration mg/1
Alkalinity as $CaCO_3$ - pH 4.6	209.80	62.22
Chemical Oxygen Demand (COD)	640.18	189.87
Biochemical Oxygen Demand (BOD)	221.90	65.81
Suspended Solids	574.68	170.45
Total Solids	2497.27	740.67
Ave. Flow, gpm	842.91	

EXHIBIT 1
Source: Hall Laboratories
June 1966

Spaulding Fibre
Tonawanda, New York

EXHIBIT II-A

In-Plant Samples

Paper Mill Waste Water at Parshall Flume

	Ave. Loading Lbs./8 Hrs.	Ave. Concentration mg/1
Alkalinity as $CaCO_3$ - pH 4.6	1080	135
Chemical Oxygen Demand (COD)	2144	268
Biochemical Oxygen Demand (BOD)	736	92
Suspended Solids	1856	232
Total Solids	4584	573
Ave. Flow, gpm	2000	

Note: Average flow determined during original survey was 2980 gpm. Above value based on later data.

EXHIBIT 2
Source: Hall Laboratories
June 1966

Spaulding Fibre
Tonawanda, New York

EXHIBIT III-B

Effluent Samples

Fibre Plant Waste Water at Weir

	Ave. Loading Lbs./8 Hrs.	Ave. Concentration mg/1
Alkalinity as $CaCO_3$ - pH 4.6	103.30	55.77
Chloride (Cl)	172.41	93.08
Chemical Oxygen Demand (COD)	27.36	14.77
Biochemical Oxygen Demand (BOD)	< 9.27	5.00
Zinc (Zn)	110.44	59.62
Suspended Solids	65.54	35.38
Total Solids	659.73	356.16
Ave. Flow, gpm	463.08	---

EXHIBIT 3
Source: Hall Laboratories
June 1966

Spaulding Fibre
Tonawanda, New York

EXHIBIT IV-B

Effluent Samples

Tube Grinder

	Ave. Loading Lbs./8 Hrs.	Ave. Concentration mg/1
Alkalinity as $CaCO_3$ - pH 4.6	2.9	87
Phenol	0.7	21
Suspended Solids	63	1890
Total Solids	101	3030

Ave. Flow, 4000 gals/8 hours

EXHIBIT 4
Source: Hall Laboratories
June 1966

Spaulding Fibre
Tonawanda, New York

EXHIBIT V-A

Effluent Samples

Storm Sewer at Gibson Street

	Ave. Concentration mg/1	Ave. Loading Lbs./8 Hrs.
Lab. No.	S-1559 & S-1764	S-1559 & S-1764
Date	6/7/66 & 6/9/66	6/7/66 & 6/9/66
Alkalinity as $CaCO_3$ - pH 4.6	94	1128
Chloride (Cl)	140	1680
Chemical Oxygen Demand (COD)	242	2904
Biochemical Oxygen Demand (BOD)	102.5	1230
Phenol	0.067	0.804
Zinc (Zn)	57.5	690
Suspended Solids	157.5	1890
Total Solids	622.5	7464
Flow, gpm	3000	

EXHIBIT 5
Source: Hall Laboratories
June 1966

Spaulding Fibre
Tonawanda, New York

Exhibit VII-B

In-Plant Samples

Paper Mill Waste Water

Rag Cooker

	Ave. Loading Lbs./dump	Ave. Concentration mg/l
Alkalinity as $CaCO_3$ - pH 8.2	199.31	9.97
Alkalinity as $CaCO_3$ - pH 4.6	385.44	19.27
Chemical Oxygen Demand (COD)	1202.08	60.10
Biochemical Oxygen Demand (BOD)	404.79	20.24
Suspended Solids	167.92	8.40
Total Solids	1275	63.75
Tank Volume, gals.	5000	

EXHIBIT 6
Source: Hall Laboratories
June 1966

Spaulding Fibre
Tonawanda, New York

Exhibit VIII-B

In-Plant Samples

Fibre Leach Tanks

	Ave. Loading Lbs./dump	Ave. Concentration mg/l
Alkalinity as $CaCO_3$ - pH 4.6	1.02	0.10
Chloride (Cl)	8.80	0.88
Chemical Oxygen Demand (COD)	3.37	0.34
Biochemical Oxygen Demand (BOD)	0.10	0.10
Zinc (Zn)	9.44	0.94
Suspended Solids	0.52	0.05
Total Solids	11.11	
Tank Volume, gals.	2500	

EXHIBIT 7
Source: Hall Laboratories
June 1966

Spaulding Fibre
Tonawanda, New York

EXHIBIT IX

Niagara River Water

Analytical Results

	Raw River Water	Filtered River Water	Tonawanda City Water
pH	7.1-7.8	-----	7.4
	mg/l	mg/l	mg/l
Total Solids	259	310	206
Suspended Solids	21	10	18
Dissolved Solids	238	300	188
Hardness *	131	164	130
Calcium (Ca) *	35	34.4	27
Magnesium (Mg) *	4	---	---
Zinc (Zn) *	0.44	30	0.12
Chlorine (Cl)	36	74	25
Sulfate (SO_4) *	29	26	28.8

* Based on a single analysis

EXHIBIT 8
Source: Hall Laboratorie
June 1966

WASTE SURVEY REPORT
SPAULDING FIBRE COMPANY
TONAWANDA, NEW YORK

Prepared by

WATER POLLUTION CONTROL ADMINISTRATION

I. J. C. FIELD UNIT

BUFFALO, NEW YORK

PURPOSE OF SURVEY

This study was conducted to obtain current data on the quantity of Spaulding Fibre Plant wastes discharged directly to the Niagara River. It is part of a program designed to provide information on the total quantity of industrial wastes discharged directly to the River.

DATE OF SURVEY

August 15 to August 24, 1966

ORGANIZATION OF SURVEY

The Buffalo Regional Office of the New York State Health Department made the preliminary arrangements and reached an agreement with plant officials to have the survey made.

Plant personnel provided information on waste discharge and characteristics, assisted in selecting sampling points and cooperated by providing facilities needed for waste sampling and flow measurements.

Sampling of the wastes and flow measurements were made by I. J. C. Field Unit personnel.

Analytical determinations were preformed by New York State and I. J. C. Field Unit laboratory personnel.

PERSONNEL PARTICIPATING

Spaulding Fibre Corporation

John Ludemann, Plant Manager

EXHIBIT 9

Spaulding Fibre Corp. Personnel Cont.

George Creighton, Process Engineer

William Billman, Process Engineer

Harold Parker, Research Engineer

New York State Health Department

John Tygert, Progect Engineer

Linda Carter, Chemist

Gene Popielarz, Chemist

I. J. C. Field Unit

H. A. Anderson, Engineer

M. W. Ruszaj, Chemist

T. Gelesinski, Scientific Aide

LOCATION OF PLANT

The plant is located at 310 Wheeler Street in the City of Tonawanda, New York

RAW MATERIALS

Rags

Caustic Soda

Wood Pulp

Zinc Chloride

Phenol

Formaldehyde

PRODUCTION

The paper mill produces approximately 40 tons of paper per day.

OPERATIONS

The paper mill normally operates 24 hours per day, five or six days per week. Some portions of the plant operates 24 hours per day, seven days per week.

EMPLOYEES

The total number of employees is about 1,500.

WATER SUPPLY

City of Tonawanda water is purchased for sanitary purposes and some process operations. Niagara River water is filtered and is used for all pulping and paper making processes.

MANUFACTURING PROCESS

The manufacturing process consists essentially of the production of pulp fiber by caustic cooking of rags, production of colored paper from the rag and purchased pulp, treatment of the paper with zinc chloride or resins and lamination to form vulcanized fibre or laminated plastic materials which may or may not be formed or machined into a variety of shapes.

WASTE SOURCE AND DISPOSAL

The principal waste sources discharged directly to the Niagara River are:

Pulp preparation excluding rag cooking wastes

Paper machine wastes

Continous fibre leaching line wastes

Resin production cooling water

These wastes enter a City of Tonawanda storm sewer which outfalls near the south City limits.

The following process wastes are discharged to the City of Tonawanda sanitary sewers.

Zinc chloride batch leaching wastes

Rag cooking wastes

WASTE REDUCTION MEASURES

Fiber losses are reduced by use of savealls on paper machine white water.

All waste losses from resin production other than uncontaminated cooling water have been eliminated. Residual liquids containing phenol or its homologues which at one time were discharged to the river, later collected and sold for its phenol content are now recovered for reuse.

SURVEY PROCEDURES

SAMPLE COLLECTION

Samples of the three effluents discharging directly to the Niagara River through a city storm sewer were collected over twenty-four hour periods. The automatic samplers collected a constant volume portion every seven or fifteen minute interval.

Hourly grab samples were collected of the intake water prior to sand filtration and composited daily from 8 A.M. to 4 P.M. as were the river water and storm sewer outfall samples collected on August 23rd. The rag cooker, zinc chloride leaching and fiber tube waste samples were grab samples.

FLOW MEASUREMENTS

Stock preparation waste flow was estimated by making occasional measurements of the level in the parshall flume. The average value for the survey period was calculated and used. Flow in the machine room and fiber department had been measured by means of weirs for a period of about one week shortly prior to this survey. The average values of the above determinations were used.

ANALYTICAL METHODS

Analyses were performed according to procedures given in the 12th edition of "Standard Methods For the Examination of Water and Wastewater".

DISCUSSION

The plant was operating normally during the survey period so the data obtained may be expected to represent the normal quantity and characteristics of waste discharges.

The data on waste quantities and characteristics are presented in Tables I, II and III. A summary of the net waste discharges is given in Table IV.

The data shows that a considerable quantity of suspended solids are present in the wastes from the stock preparation department and machine room. These waste solids are essentially pulp fibers lost in the manufacturing processes.

The color of the final product is attained by coloring the fibers prior to the paper machine process. A number of colors are produced. The fiber containing wastes do discolor a limited area of the Niagara River in the vicinity of the storm sewer outfall to some degree at all times. The river discoloration is particularly prominent when bright colors such as red is being produced. The discoloration occurs in an area frequented by the public and complaints have been registered.

When these wastes have been allowed to settle in the laboratory the result has been a colorless and relatively clear supernatant with all of the color in the settled solids. This indicates that effective removal of the settleable solids from the wastes would produce a colorless and relatively clear effluent.

The phenol content of the wastes was not significantly greater than that present in the intake water. The intake water is a short distanse downstream of some phenol containing waste discharges.

Some extractables were found in the machine room and stock preparation wastes. These most probably are extractables normally present in pulp fibers and not mineral oils.

The machine room wastes contained a significant quantity of five day Biological Oxygen Demand. It may be that much of this B.O.D. is in the suspended solids phaze. It is suggested that the plant investigate this in order to determine the degree of B.O.D. removal which would be accomplised by effective removal of the settleable solids from the wastes.

Some very rough exploratory scale bioassays using guppies as test fish were made on the above effluents. The fish generally lived 96 hours or more in 100 per cent concentrations of the machine room and stock preparation effluents indicating that these wastes contain relatively little if any acute toxicity to fish.

The rough determinations indicated some acute toxicity in the continuous fiber wastes. It appeared that the 96 hour median toxic limit (TLm) may be in the range of 30 to 50 percent concentration of the waste in Niagara River water.

The slight amount of zinc in the wastes from the continous zinc chloride leaching process most probably is the cause of the toxicity to fish. Although the toxicity of these waters may not be extremely high it demonstrates the need for maximum continuing control and adequate precautions to prevent spills or increased losses of zinc to waste.

Grab samples were collected of certain other process wastes. The fiber tube grinding wastes were found to contain a high concentration of phenol. These wastes also enter the storm sewer but the volume of this discharge is practically infinitesmal and does not contribute a signigicant quantity of phenol to the total wastes.

should be Spaulite Tube

The rag cooker waste is a highly concentrated material which discharges to the municipal sanitary sewers. Normally one batch of waste, estimated to be about 5,000 gallons, is discharged every three hours over a period of 15 to 30 minutes duration.

The analytical data indicates that the chemical characteristics of the batch zinc chloride leaching waste is essentially the same as that of the municipal water supply used in this process. These wastes which may approximate 100,000 gallons per day are discharged to the municipal sanitary sewers. It appears that this water would be of very suitable quality for reuse as process water for paper manufacture.

It is believed that the minimum treatment of the machine room, stock preparation and fibre department wastes needed to make them suitable for discharge to the Niagara River is essentially complete removal of the suspended solids in these discharges.

TABLE I

SOLIDS CONTENT OF INTAKE AND EFFLUENTS

SOURCE	SAMPLING PERIOD 1966	FLOW M.G.D.	TOTAL SOLIDS Total mg/l	TOTAL SOLIDS Total lbs/day	TOTAL SOLIDS Fixed mg/l	TOTAL SOLIDS Vol. mg/l	SUSPENDED SOLIDS Total mg/l	SUSPENDED SOLIDS Total lbs/day	SUSPENDED SOLIDS Fixed mg/l	SUSPENDED SOLIDS Vol. ~~lbs/day~~	TURBIDITY
MACHINE ROOM SEWER	Aug. 15-16		322	3,260	107	215	89	899	4	85	
	16-17		516	5,220	200	316	271	2,740	25	246	
	17-18		452	4,560	209	243	234	2,370	23	211	
	18-19		814	8,230	225	589	352	2,560	112	240	
	19-20		514	5,200	196	318	214	2,140	36	178	
	20-21		731	7,380	268	439	439	4,440	69	370	
	23-24		615	6,220	249	366	296	2,990	12	284	
Average		1.21	566	5,140	208	359	271	2,590	40	231	
STOCK PREPARATION SEWER	Aug. 15-16		333	7,120	182	151	62	1,320	1	61	
	16-17		370	7,910	241	129	62	1,320	9	53	
	17-18		338	7,230	236	102	103	2,200	57	46	
	18-19		489	10,500	250	239	140	3,000	73	67	
	19-20		527	11,300	349	178	207	4,420	84	123	
	20-21		570	12,200	403	167	181	3,860	60	121	
	21-22		267	5,700	160	107	28	598	7	21	
	23-24		390	8,340	168	222	114	2,440	25	89	
Average		2.56	411	8,780	249	162	112	2,400	40	73	

TABLE I Cont.

SOLIDS CONTENT OF INTAKE AND EFFLUENTS

SOURCE	SAMPLING PERIOD 1966	FLOW M.G.D.	TOTAL SOLIDS Total mg/l	TOTAL SOLIDS Total lbs/day	TOTAL SOLIDS Fixed mg/l	TOTAL SOLIDS Vol. mg/l	SUSPENDED SOLIDS Total mg/l	SUSPENDED SOLIDS Total lbs/day	SUSPENDED SOLIDS Fixed mg/l	SUSPENDED SOLIDS Vol. lbs/day	TURB-ITITY
CONTINOUS FIBRE DEPARTMENT SEWER	Aug. 15-16		571	3,220	230	341	40	226	13	27	39
	16-17		405	2,190	161	244	29	164	10	19	30
	17-18		465	2,630	199	266	177	1,000	23	154	85
	18-19		560	3,160	339	221	33	186	33	0	47
	19-20		564	3,190	203	361	35	198	20	15	21
	20-21		954	5,380	230	724	56	316	38	18	28
	21-22		492	2,780	258	234	52	294	36	16	52
	23-24		313	1,770	123	190	22	124	15	7	
Average		0.676	541	3,040	218	323	56	314	24	32	38
INTAKE	Aug. 15-16		188		150	38	7		0	7	7
	16-17		274		147	127	6		6	0	19
	17-18		157		157	0	14		14	0	16
	18-19		355		158	197	6		6	0	23
	19-20		281		160	121	20		5	15	7
	20-21		320		261	59	7		7	0	11
Average			263		172	90	10		6	3	14

TABLE II
EFFLUENT AND INTAKE ANALYSES

SOURCE	SAMPLING PERIOD 1966	FLOW M.G.D.	PHENOL ug/l	CYAN-IDE mg/l	OIL mg/l	OIL lbs/day	SO_4 mg/l	COD mg/l	COD lbs/day	BOD mg/l	BOD lbs/day
MACHINE ROOM SEWER	Aug. 15-16	1.21					38.8	140	1,420		
	16-17		0	0	56	570	90.0	228	2,310	71	717
	17-18		0	0	17	170	104.0	230	2,320	104	1,050
	18-19				23	230	97.2	507	5,120	11[1.]	
	19-20				10	100	59.6				
	20-21				20	200	76.8				
	23-24		26				61.0	373	3,770	128	1,290
Average		1.21	9	0	25	254	75.0	296	2,988	101	1,019
STOCK PREPARATION ROOM (BEATER)	Aug. 15-16						56.0	120	2,570		
	16-17		23	0	16		54.4	100	2,140	19.2	412
	17-18		13	0	0		73.0	95	2,040	23.4	500
	18-19				0		51.4	157	3,360	32.0	685
	19-20				70		65.4				
	20-21				21		61.2				
	23-24		0				38.4	44	943	46.0	985
Average		2.56	12	0	21		57	103	2,210	30.2	646
CONTINOUS FIBRE DEPARTMENT SEWER	15-16						40.4	28	158		
	16-17		0	0	0	0	77.0	24	136	1.1	6.2
	17-18		8	0	0	0	96.0	32	181	0.7	4.0
	18-19				0	0	39.4	19	107	1.2	6.8
	19-20						31.7				
	20-21						30.6				
	23-24		12				38.0	20	113	2.2	11.3
Average		0.676	7	0	0	0	50.4	25	139	1.3	7.1

1. - Not included in average
Sample indicated toxicity to test.

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TABLE II Cont.

EFFLUENT AND INTAKE ANALYSES

SOURCE	SAMPLING PERIOD 1966	FLOW M.G.D.	PHENOL ug/l	CYANIDE mg/l	OIL mg/l	OIL lbs/day	SO_4 mg/l	COD mg/l	COD lbs/day	BOD mg/l	BOD lbs/day
INTAKE	Aug. 15						39.5	8			
	16		4	0	0		50.4	12		2.0	
	17		22	0	0		50.4	32		3.7	
	18				1		41.6	38		1.8	
	19				13		40.4				
	20				2		32.7				
	23		0								
Average			9	0	3		42.5	22		2.5	
RAG COOKER	Aug. 17							41,900		20,000	
	24							14,100		5,830	
ZINC CHLORIDE LEACHING	Aug. 24 (28-4)						38.0	32		0.9	
	(51-4)						36.0	8		1.3	
SPAULDITE ~~FIBER~~ TUBE GRINDING	Aug. 23		7,200				45.6				
Outfall AT RIVER	Aug. 23		0				85.2	253		104	
UPSTREAM FROM INTAKE	Aug. 23		4								

TABLE III
EFFLUENT AND INTAKE ANALYSES

SOURCE	SAMPLING PERIOD 1966	pH	ALK. mg/l $CaCO_3$	ACIDITY mg/l $CaCO_3$	HARD-NESS mg/l $CaCO_3$	CONDUCT-ANCE MHOS/cm	CHLORIDES mg/l	NITROGEN Organic N	NITROGEN Total N	PO_4 mg/l	PO_4 lbs/day
MACHINE ROOM	Aug 15-16	7.1	60	6	142	400	36	0.9	1.2	3.4	34
	16-17	7.4	62	4	166	540	51	1.1	1.5	0.27	2.7
	17-18	7.4	80	4	156	600	44			0.18	1.8
	18-19	7.2	64	6	172	430	61			0.57	5.7
	19-20	7.4	66	4	140	420	38			0.54	5.4
	20-21	7.5	78	4	146	430	38			0.11	1.1
	23-24	7.4	74	6	156	480	52			0.08	0.8
Average		7.3	69	6	154	471	46	1.0	1.4	0.74	7.4
STOCK PREP-ARATION SEWER	Aug 15-16	7.6	96	6	166	495	40	1.3	1.4	0.12	2.6
	16-17	7.2	46	6	170	480	80	2.1	2.2	0.50	11.7
	17-18	7.5	90	2	162	600	48			0.82	17.5
	18-19	7.5	90	2	158	450	47			0.43	9.2
	19-20	6.9	100	8	152	500	39			2.06	44.0
	20-21	7.7	86	2	150	560	56			0.13	2.8
	21-22	7.4	98	4	144	400	28			0.53	11.3
	23-24	7.7	114	2		510	49			0.74	15.8
Average		7.5	90	4	157	499	48	1.7	1.8	0.67	14.4
CONTINOUS FIBRE DEPARTMENT SEWER	Aug 15-16	7.0	32	6	234	590	117	0.56	0.96	0.04	0.2
	16-17	7.5	80	2	176	520	61	0.6	1.0	0.16	0.9
	17-18	6.9	60	10	160	650	61			0.14	0.8
	18-19	6.9	36	8	198	520	102			0.29	1.6
	19-20	6.8	36	10	230	650	136			0.015	0.1
	20-21	6.7	38	12	410	1,080	230			0.07	0.4
	21-22	7.1	26	6	178	570	103			3.4	19.2
	23- 24 2	7.5	54	6	160	400	54			0.68	3.8
Average		7.1	45	8	218	625	107	.58	1.0	0.60	3.4

TABLE III Cont.
EFFLUENT AND INTAKE ANALYSES

SOURCE	SAMPLING PERIOD 1966	pH	ALK. mg/l $CaCO_3$	ACIDITY mg/l $CaCO_3$	HARDNESS mg/l $CaCO_3$	CONDUCTANCE MHOS/cm	CHLORIDES mg/l	NITROGEN Organic N	NITROGEN Total N	PO_4 mg/l	PO_4 lbs/day
INTAKE	Aug 15	7.2	86	3	130	390	26	0.67	0.98	0.24	
	16	7.3	80	4	150	410	45	0.78	1.13	0.14	
	17	7.3	70	4	156	490	32			0.16	
	18	7.6	88	3	142	400	41			0.30	
	19	7.5	84	3	142	420	32			0.28	
	20	7.6	88	4	142	390	30			0.24	
Average		7.5	83	4	144	417	34	0.72	1.1	0.23	
RAG COOKER	Aug 17	11.4	13,800	0	[illegible]	23,500	1,400				
	24	12.2	26,700	0	—	86,000	2,200			0.03	
ZINC CHLORIDE LEACHING	Aug 24	7.9	76	0	114	360	29			0.04	
	24	7.5	84	4	144	410	28			0.24	
SPAULDITE TUBE GRINDING	Aug 18	7.4	108	4	164	470	37				
OUTFALL AT RIVER	Aug 23	9.5	170	0	146	730	64			0.24	

TABLE IV

SUMMARY OF NET WASTE DISCHARGES OR CHARACTERISTICS

	INTAKE	MACHINE ROOM			STOCK PREPARATION			FIBRE DEPT			TOTAL NET
		mg/l		Net							
			Net	Discharge							Discharge
	mg/l	Gross	Increase	lbs/day	Gross	Net	lbs/day	Gross	Net	lbs/day	lbs/day
TOTAL SOLIDS	263	566	303	3,060	411	148	3,170	541	278	1,570	7,800
FIXED	172	208	36	364	249	77	1,650	218	46	260	2,274
VOLATILE	90	359	269	2,720	162	72	1,540	323	233	1,310	5,570
TOTAL SUSPENDED SOLIDS	10	271	261	2,630	112	102	2,180	56	46	260	5,070
FIXED	6	40	34	344	40	34	727	24	18	102	1,173
VOLATILE	3	231	228	2,300	73	70	1,500	32	29	163	3,963
TURBIDITY	14							38	24		
PHENOL	9	9	0		12	3	0.06	7	-		0
CYANIDE	0	0	0		0	0	0	0	0	0	0
EXTRACTABLES	3	26	23	232	21	18	385	0	-		617
SO_4	42.5	75	32	324	57	14	300	50.4	8	45	669
COD	22	296	274	2,770	103	81	1,730	25	3	17	4,517
BOD	2.5	101	98	990	30.2	28	600	1.3	1.2	7	1,583
ph	7.5	7.3	0.2		7.5	0		7.1			
ALKALINITY	83	69	-14	-142	90	7	150	45	-38	-214	-206
ACIDITY	4	6	2	20	4	0	0	8	4	23	43
HARDNESS	144	154	10	101	157	13	278	218	74	417	796
CONDUCTANCE	417	471	54		499	82		625	208		344
CHLORIDES	34	46	12	121	48	14	300	107	73	412	833
ORG. NITROGEN	0.72	1.0	0.3	3	1.7	1.0	21	0.58	-0.14	-0.8	23.2
TOTAL NITROGEN	1.1	1.4	0.3	3	1.8	0.7	15	1.0	-0.1	-0.6	17.4
PO_4	0.23	0.74	0.51	5.2	0.67		0.44	9.4	0.6	2.1	16.7

Copy for Mr. Creighton

March 16, 1967

Mr. Eugene Seebald, Regional Engineer
N.Y. State Dept. of Health
Gen. W. J. Donovan State Office Bldg.
125 Main Street
Buffalo 3, New York

Dear Sir:

Enclosed is a copy of a letter to me from Metcalf & Eddy, with reference to progress on their work on sewage treatment for the City of Tonawanda.

In the letter they request that I consult with you about setting up a meeting with you and other officials in your Albany Office. They suggest that the meeting be held in your Albany Office.

To be discussed are the City's design and construction schedule and items noted in the letter and also discussions on combined sewer overflows.

The City is also considering the possibility of treating all the wastes from Spaulding Fibre, Continental Can Company, Columbus McKinnon Corporation and other industries in the City. The meeting could possibly correlate the Health Department schedules for these industries with the plans for the City in general.

Your suggestions would be appreciated.

Normally I would give you a call but I thought you might want time to think this over and possibly talk to Albany. My Telephone Number is 693-0782.

Yours truly,

Perry A. Wilson,
City Engineer

PAW:sg
Enc.

EXHIBIT 10

May 31, 1967

Mr. Perry Wilson
City Engineer
City of Tonawanda
Tonawanda, N. Y.

Dear Mr. Wilson:

The possible desirability of having the City of Tonawanda treat the wastes from Spaulding Fibre Co. has been discussed at some length with you in the past.

We know that you have retained the consulting firm of Metcalf and Eddy to make a survey to determine if industrial wastes such as ours can be handled by the City and the magnitude of equipment involved.

We were contacted by phone about two weeks ago by Mr. Barrons of Metcalf and Eddy regarding their visiting our plant for the purpose of making a water survey. No firm date has been set for their visit, but we assured Mr. Barrons that we would cooperate fully with them. As you know, we have been working internally in this area since 1964 and have developed considerable data which we will make available to them.

If there is anything further Spaulding Fibre can do in either working with the City directly or through Metcalf and Eddy, please let us know.

Very truly yours,

SPAULDING FIBRE COMPANY, INC.

R A Preibisch

R. A. Preibisch
Technical Director
Tonawanda Division

RAP/sjm

cc: R. F. Oleksiak
T. C. Drees
J. M. Ludemann

EXHIBIT 11