National Pollutant Discharge Elimination System (NPDES) Permit Program

# F A C T  S H E E T

Regarding an NPDES Permit To Discharge to Waters of the State of Ohio
for **Rittman Paperboard**

Public Notice No.:
Public Notice Date:
Comment Period Ends:

OEPA Permit No.: **3IA00003*GD**
Application No.: (OH #) **OH0006718**

Name and Address of Applicant:

Rittman Paperboard
100 Industrial Avenue
Rittman, Ohio 44270

Name and Address of Facility Where Discharge Occurs:

Rittman Paperboard
100 Industrial Avenue
Rittman, Ohio 44270
Wayne County

Receiving Water: **River Styx**

Subsequent
Stream Network: **Chippewa Creek**
**Tuscarawas River**
**Muskingum River**
**Ohio River**

## Introduction

Development of a Fact Sheet for NPDES permits is mandated by Title 40 of the Code of Federal Regulations, Section 124.8 and 124.56. This document fulfills the requirements established in those regulations by providing the information necessary to inform the public of actions proposed by the Ohio Environmental Protection Agency, as well as the methods by which the public can participate in the process of finalizing those actions.

This Fact Sheet is prepared in order to document the technical basis and risk management decisions that are considered in the determination of water quality based NPDES Permit effluent limitations. The technical basis for the Fact Sheet may consist of evaluations of promulgated effluent guidelines, existing effluent quality, instream biological, chemical and physical conditions, and the relative risk of alternative effluent limitations. This Fact Sheet details the discretionary decision-making process empowered to the Director by the Clean Water Act and Ohio Water Pollution Control Law (ORC 6111). Decisions to award variances to Water Quality Standards or promulgated effluent guidelines for economic or technological reasons will also be justified in the Fact Sheet where necessary.

This permit renewal is proposed for a term of **five years**.

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## Procedures for Participation in the Formulation of Final Determinations

The draft action shall be issued as a final action unless the Director revises the draft after consideration of the record of a public meeting or written comments, or upon disapproval by the Administrator of the U.S. Environmental Protection Agency.

Within thirty days of the date of the Public Notice, any person may request or petition for a public meeting for presentation of evidence, statements or opinions. The purpose of the public meeting is to obtain additional evidence. Statements concerning the issues raised by the party requesting the meeting are invited. Evidence may be presented by the applicant, the state, and other parties, and following presentation of such evidence other interested persons may present testimony of facts or statements of opinion.

Requests for public meetings shall be in writing and shall state the action of the Director objected to, the questions to be considered, and the reasons the action is contested. Such requests should be addressed to:

**Legal Records Section**
**Ohio Environmental Protection Agency**
**Lazarus Government Center**
**P.O. Box 1049**
**Columbus, Ohio 43216-1049**

Interested persons are invited to submit written comments upon the discharge permit. Comments should be submitted in person or by mail no later than 30 days after the date of this Public Notice. Deliver or mail all comments to:

**Ohio Environmental Protection Agency**
**Attention: Division of Surface Water**
**Water Resource Management Section**
**Lazarus Government Center**
**P.O. Box 1049**
**Columbus, Ohio 43216-1049**

The OEPA permit number and Public Notice numbers should appear on each page of any submitted comments. All comments received no later than 30 days after the date of the Public Notice will be considered.

The application, fact sheet, public notice, permit including effluent limitations, special conditions, comments received and other documents are available for inspection and may be copied at a cost of 25 cents per page at the Ohio Environmental Protection Agency at the address shown above any time between the hours of 8:00 a.m. and 5:00 p.m., Monday through Friday. Copies of the Public Notice are available at no charge at the same address.

## Location of Discharge/Receiving Water Use Classification

Rittman Paperboard, formerly known as Packaging Corporation of America, discharges to the River Styx at River Miles (RM) 0.74 and 0.92 in Wayne County. The River Styx flows into the Chippewa Creek at RM 7.98. The approximate location of the facility is shown below in Figure 1.

Figure 1. Approximate Location of Rittman Paperboard.

This segment of the River Styx is described by Ohio EPA River Code: 17-553; U.S. EPA River Reach #: 05040001-031; County: Wayne; Ecoregion: Erie/Ontario Drift and Lake Plain. The River Styx is presently designated for the following uses: modified warmwater habitat, agricultural water supply, industrial water supply, and primary contact recreation. The River Styx study area is shown below in Figure 2.

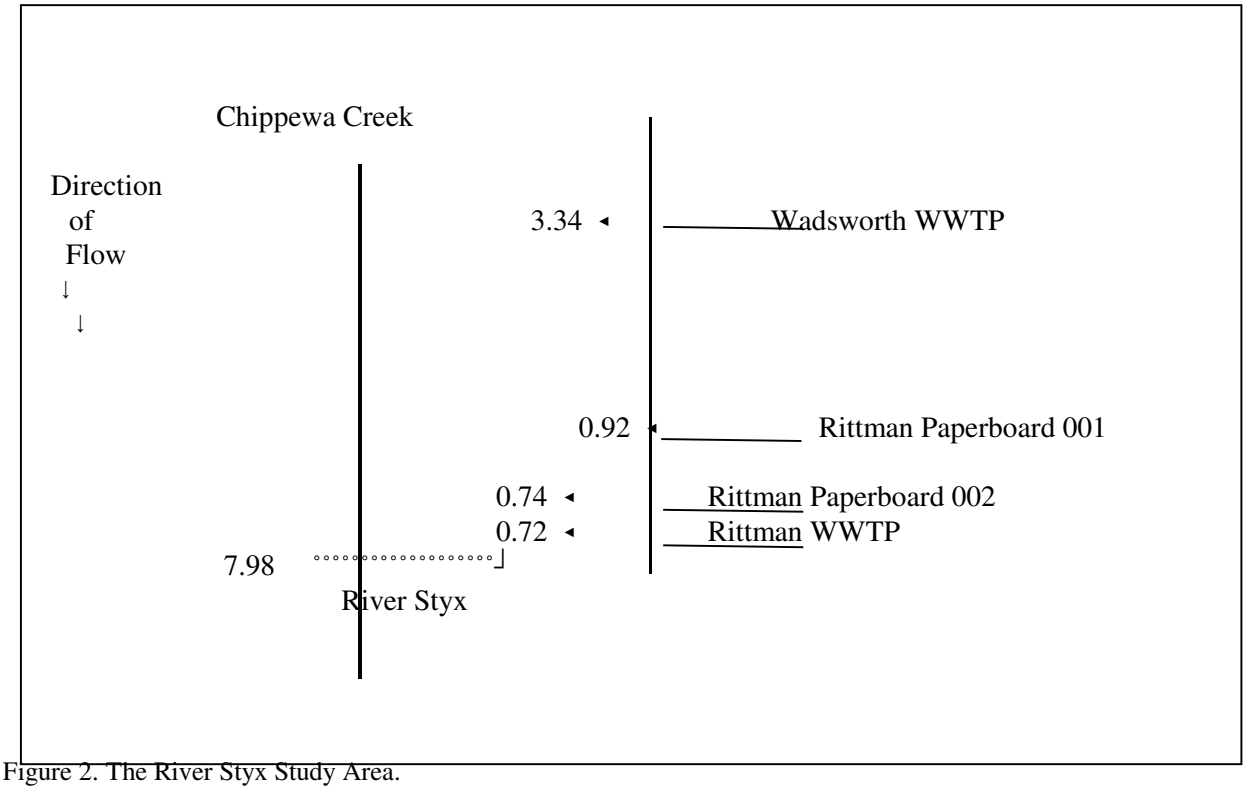


Figure 2. The River Styx Study Area.

## Facility Description

Rittman Paperboard is a paperboard mill using recycled paper. Waste paper is received from a number of different sources such as new and used brown corrugated cardboard, computer paper, newspaper, box cuts from cartons such as cereal boxes, and sorted post-consumer waste. Major processes used are pulping, cleaning and refining, processing and forming, folding, and printing. The processes performed at the Rittman Paperboard facility are classified under the Standard Industrial Classification (SIC) codes 2631 (paperboard mills) and 2651 (folding paperboard boxes). The pulp, paper and paperboard Point Source Category Effluent Limitations Guidelines (40 CFR Part 430.52; paperboard from wastepaper subcategory, subpart E, non-corrugated medium) apply to the process wastewaters at this facility.

At the Rittman Paperboard facility, high and low quality waste paper is processed separately in two hydropulpers. In each pulper the paper is broken down through the addition of heat and water. The resulting pulp is sent to individual storage chests where a desired consistency is achieved. The pulp is

then cleaned and refined in centrifugal cleaners to remove foreign material such as plastic and paperclips which are mixed with the waste paper. This waste is removed and disposed of at an approved landfill.

Two paper lines process the pulp into paperboard product. Fine mesh cylinder screens are submerged in individual vats of pulp. As the cylinder turns it picks up a layer of pulp and deposits it on a moving belt. This process is repeated and the paper is continually dried by wringers following the deposition of a layer of pulp. The paper eventually becomes a sheet capable of supporting itself without the assistance of the belts. Heat is applied to further dry the paper. The paperboard is put together much like a sheet of plywood; the interior structure is composed from the low grade pulp, while the exposed surface consists of higher grade pulp. Finally, a clay coating is applied to the paperboard using "air knives", and then is smoothed and rolled prior to shipment. The paperboard product is not bleached. Current production ranges from 450 to 508 tons/day of paperboard. (According to the facility's NPDES 2C application, Rittman Paperboard produces an average of 586 tons of paperboard each day.)

## Description of Existing Discharge

The Rittman Paperboard facility currently has two permitted wastewater discharges. Outfall 001 is permitted for an average daily flow of 2.365 MGD, and discharges to river mile (RM) 0.92 of the River Styx. Wastewaters discharged at outfall 001 consist of boiler blowdown, stormwater from coal pile runoff, flyash and bottom ash quench water, water removed from the paper via the rollers, clean up waters from the pulping areas and the paperboard lines, and overflow water from the fiber recovery system.

Outfall 002 discharges at RM 0.74 of the River Styx, and currently has no permitted limit for average daily discharge rate. Outfall 002 discharges non-contact cooling water from the two paperboard lines and from cooling a 3000 kw turbine at the facility. There is no treatment of the cooling water prior to discharge to River Styx via outfall 002. The source of the cooling water is Chippewa Creek and wells. The water is pumped from the creek and wells to surface impoundments located on site and is then utilized as cooling water within the facility. (See Table 1 for a listing of outfalls.)

### *Outfall 001 Treatment Process*

Process wastewater generated at the plant first enters two fiber recovery tanks located adjacent to the production buildings. Here, fiber-laden water is returned back to the process due to its high fiber content. Excess sludge from these tanks is wasted at a rate of approximately 9 dry tons/day to sludge lagoons located south of Salt St. Overflow is pumped to the west and across the River Styx via a pipeline, where it enters one of two aerated lagoons. The lagoons collectively have a capacity of 21 million gallons. Currently, only one lagoon is utilized for aeration with a capacity of 11 million gallons. Ammonia and phosphoric acid are added to the aeration lagoon as a nutrient source to facilitate bacterial decomposition of the paper waste. Effluent from this lagoon overflows to a collection sump. Polymer can be added to aid flocculation prior to wastewater being pumped to a secondary clarifier. Clarified water overflows by gravity to two post aeration basins, where a de-foaming agent is added. The final effluent passes through a Parshall Flume before discharging to the River Styx.

Sludge collected at the clarifier is either returned to the mill or wasted to one of six sludge thickening lagoons which are currently used for settling. The decant from these lagoons is returned to the aeration lagoon.

**Table 1. Description of Rittman Paperboard Outfalls**

| Outfall # | Type of Wastewater | Treatment System Used | Discharge Point | Ave. Discharge (in MGD) |
|---|---|---|---|---|
| 001 | Process wastewaters, boiler blowdown, surface water from coal pile runoff, fly ash and bottom ash quench water | - Aeration<br>- Settling | River Styx | 1.9* |
| 002 | Non-contact cooling water | none | River Styx | 0.750* |

* Flow averages are based upon information included in the NPDES permit renewal application.

Table 9 presents a summary of analytical results for each of the outfalls based upon data included in Rittman's NPDES 2C application.

Table 10 presents a summary of unaltered monthly operational report data for the period January 1995 through April 1999 for Rittman Paperboard for outfalls 001 and 002. Also included in this table are current permit limits, and monthly average $PEQ_{avg}$ and daily maximum $PEQ_{max}$ values.

## Water Quality of Receiving Stream / Environmental Hazard Assessment

An assessment of the impact of a permitted point source on the immediate receiving waters includes an evaluation of the available chemical/ physical (water column, effluents, sediment, flows), biological (fish and macroinvertebrate assemblages), and habitat data which have been collected by Ohio EPA pursuant to the Five-Year Basin Approach for Monitoring and NPDES Reissuance. Other data may be used provided it was collected in accordance with Ohio EPA methods and protocols as specified by the Ohio Water Quality Standards and Ohio EPA guidance documents. Other information which may be evaluated includes, but is not limited to, NPDES permittee self-monitoring data and effluent and mixing zone bioassays conducted by Ohio EPA, the permittee, or U.S. EPA.

Ohio EPA relies on a tiered approach in attempting to link administrative activity indicators (*i.e.,* permitting, grants, enforcement) with true environmental indicators (*i.e.,* stressor, exposure, and response indicators). Stressor indicators generally include activities which have the potential to degrade the aquatic environment such as pollutant discharges (permitted and unpermitted), land use effects, and habitat modifications. Exposure indicators include whole effluent toxicity tests, tissue residues, and biomarkers, each of which provides evidence of biological exposure to stressor or bioaccumulative agents. Response indicators include the more direct measures of community and population response and are represented here by the biological indices which comprise Ohio EPA's biological criteria. The key is in using the different types of indicators within the roles which are the most appropriate for each.

Describing the causes and sources associated with observed impairments relies on an interpretation of multiple lines of evidence including the water chemistry data, sediment data, habitat data, effluent data, biomonitoring results, land use data, and biological response signatures within the biological data itself. Thus the assignment of principal causes and sources of impairment represents the association of impairments (defined by response indicators) with stressor and exposure indicators.

Use attainment is a term which describes the degree to which environmental indicators are either above or below criteria specified by the Ohio Water Quality Standards (WQS; Ohio Administrative Code 3745-1). Assessing use attainment status for aquatic life uses involves a primary reliance on the Ohio EPA biological criteria (OAC 3745-1-07; Table 7-17). These are confined to ambient assessments and apply to rivers and streams outside of mixing zones. Numerical biological criteria are based on multimetric biological indices which include the Index of Biotic Integrity (IBI) and modified Index of Well-Being (MIwb), which indicate the response of the fish community, and the Invertebrate Community Index (ICI), which indicates the response of the macroinvertebrate community. Numerical endpoints are stratified by ecoregion, use designation, and stream or river size. Three attainment status results are possible at each sampling location - full, partial, or non-attainment. Full attainment means that all of the applicable indices meet the biocriteria. Partial attainment means that one or more of the applicable indices fails to meet the biocriteria. Non-attainment means that none of the applicable indices meet the biocriteria or one of the organism groups reflects poor or very poor performance. An aquatic life use attainment table (see Table 2) is constructed based on the sampling results and is arranged from upstream to downstream and includes the sampling locations indicated by river mile, the applicable biological indices, the use attainment status (*i.e.,* full, partial, or non), the Qualitative Habitat Evaluation Index (QHEI), and comments and observations for each sampling location.

***Compliance History***

On August 13, 1996, permit number 3IA000003 was transferred to Rittman Paperboard, a subsidiary of Caraustar Industries, which currently operates the facility. Prior to this time, the NPDES permit was held by Tenneco Corp. and the facility was operated as Packaging Corp. of America (PCA).

A history of non-compliance with NPDES permit conditions for the 001 outfall led to the issuance of Director's Findings and Orders for PCA in January of 1995. Numerous violations for the effluent limits for ammonia nitrogen, suspended solids, and heavy metals, particularly zinc, silver and mercury, necessitated the enforcement action by the Ohio EPA. For example, there were 34 documented violations of the NPDES effluent limits noted in 1993. The Findings and Orders required PCA to comply with permitted effluent limits, to correct storm water management problems at the facility, to conduct a study to determine the sources of zinc, silver and mercury within the facility, and to plant trees within the riparian corridor of the River Styx.

Following the issuance of the 1995 Findings and Orders, the number of effluent limit violations for outfall 001 decreased markedly. Only 2 violations were noted for 1995, which resulted from a single instance of elevated phenol in the discharge. Similarly, in 1996 and 1997 two violations occurred each year, including elevated loading of ammonia nitrogen (2 instances), exceedance of the ammonia nitrogen daily maximum concentration (1 instance), and elevated pH in the effluent (1 instance).

In June of 1998, problems began to arise with regard to compliance with effluent limitations for the 001 outfall. Ohio EPA staff noted that coloration of the effluent and the increased presence of large particulate matter (primarily paper fragments) were noticeable both at the outfall and downstream of the

discharge. In 1998 and 1999, Ohio EPA staff have noted eleven instances where impacts on the color and aesthetics of the stream downstream of the 001 outfall discharge were severe enough to constitute a violation of OAC 3745-1-04. In addition, in 1998 there were seven violations of the ammonia nitrogen daily maximum concentration effluent limits for the discharge, two violations of the dissolved oxygen minimum concentration and one instance where the pH in the effluent fell below the permitted limit of 6.0. Between January and July of 1999, there were three violations of the ammonia nitrogen daily maximum concentration effluent limits, two violations of the dissolved oxygen minimum concentration, and two instances where the chronic toxicity limits for the discharge were exceeded.

Compliance monitoring at the Rittman Paperboard facility was conducted for the 001 Outfall by the Ohio EPA in July and December of 1993. No acute toxicity was found in the discharge on either occasion, nor were there any exceedances of permitted effluent limitations. Chronic toxicity testing was conducted for the 001 outfall by the Ohio EPA during June of 1998. At the same time, screening bioassays for acute toxicity were conducted for the Rittman Paperboard 002 outfall and the discharge from the Rittman WWTP to the River Styx. The results of the short- term chronic toxicity tests indicate that the Rittman Paperboard Outfall 001 effluent was toxic to *Ceriodaphnia dubia*. The magnitude of the chronic toxicity found to *C. dubia* can be expressed as an 25 percent inhibition concentration (IC25) of 65.6% (55.1-72.1%), with a resulting 1.5 chronic toxicity units ($TU_c$) that incorporates survival and reproduction.

There was no chronic toxicity noted in the 001 Outfall effluent for the fathead minnow *Pimephales promelas*. Screening toxicity tests conducted with effluent from the Rittman Paperboard 002 and the Rittman WWTP effluents did not demonstrate the presence of acute toxicity. It is evident based upon results of toxicity testing by both the entity and the Ohio EPA that additional chronic toxicity testing for outfall 001 should be performed and that a toxicity reduction evaluation may be necessary in the future in order to protect aquatic life downstream of the discharge.

From year 2000 through February 2004, Rittman Paperboard continued to experience some permit violations. During the year 2000, 2002, and 2003, Rittman reported a total of four violations of the chronic toxicity limit for *Ceriodaphnia dubia*. In the year 2000 and 2001, Rittman reported 10 permit violations for $BOD_5$ and 12 for ammonia. Limits for total suspended solids were exceeded a total of nine times during 2002 and 2003, while the free cyanide limit was exceeded twice in 2002, and the pH limit of 9.0 S.U. was exceeded twice in 2003.

***Unpermitted Discharges***

In 1998 and 1999, Ohio EPA staff identified three additional discharges from the Rittman Paperboard facility to the River Styx which are not included in the current NPDES permit. The most upstream of these was an intermittent discharge from a pipe located on river right under the second railroad spur bridge north of Salt St. at approximately RM 0.77. This discharge was first noted on September 10, 1999. The discharge on that date was turbid, and there was an associated accumulation of paper sludge material located on the stream bank where the flow entered the River Styx. The discharge was sampled by the Ohio EPA on November 8, 1999. Results of the analysis of the sample is presented in Table 2. Although the analytical data for the November 8, 1999 sample did not indicate elevated concentrations of pollutants, it appeared that the characteristics of the discharge were variable based upon visual observations. This discharge was eliminated sometime during the year 2000.

**Table 2. Monitoring Results for Unpermitted Discharge to the River Styx (RM 0.77) November 8, 1999.**

| Parameter | Concentration (units) | Parameter | Concentration (units) |
|---|---|---|---|
| $BOD_5$ | 2.6 mg/l | Ammonia | 0.129 mg/l |
| $CBOD_5$ | <2.0 mg/l | Nitrate+Nitrite | 0.598 mg/l |
| Conductivity | 680 µmhos/cm | Nitrite | <0.02 mg/l |
| Total Dissolved Solids | 424 mg/l | TKN | 0.91 mg/l |
| Total Suspended Solids | 9 mg/l | Total Phosphorus | 0.2 mg/l |
| COD | <10 mg/l | Sulfate | 91 mg/l |
| Chloride | 45 mg/l | | |

The second unpermitted discharge identified on September 10, 1999 is located downstream of Salt St. on river right at approximately RM 0.43. This discharge consists of overflow from a pond used as a source of cooling water for the Rittman Paperboard facility located to the west of the River Styx and south of Salt St. Water taken from Chippewa Creek is pumped to this pond as the water supply for cooling water in the Rittman Paperboard facility which is discharged via outfall 002 after use. Excess water that is not used for cooling water exits the pond via surface drainage and then is discharged to the River Styx. Field monitoring of this discharge on September 10, 1999 found that the effluent from this discharge had a specific conductance of 2,248 µmhos/cm, significantly higher than that found either in the River Styx or in the Rittman Paperboard 002 Outfall. Analytical results for a sample of this discharge collected on November 8, 1999 are presented in Table 3. This analysis confirms the presence of elevated concentrations of total dissolved solids, sodium, strontium, and chlorides. The source of these salts is unknown, but the nature of the effluent composition indicates that regulation of this discharge through the NPDES permit is appropriate.

**Table 3. Monitoring Results for Unpermitted Cooling Water Supply Pond Discharge to the River Styx (RM 0.43), November 8, 1999.**

| Parameter | Concentration (units) | Parameter | Concentration (units) |
|---|---|---|---|
| $BOD_5$ | <2.0 mg/l | Cadmium | <0.2 µg/l |
| $CBOD_5$ | <2.0 mg/l | Calcium | 76 mg/l |
| Conductivity | 2,390 µmhos/cm | Chromium | <30 µg/l |
| Total Dissolved Solids | 1,260 mg/l | Copper | <10 µg/l |
| Total Suspended Solids | <5 mg/l | Iron | 391 µg/l |
| COD | 18 mg/l | Lead | <2 µg/l |
| Chloride | 566 mg/l | Magnesium | 21 mg/l |
| Ammonia | 0.146 mg/l | Manganese | 87 µg/l |
| Nitrate+Nitrite | 1.64 mg/l | Nickel | <40 µg/l |
| Nitrite | 0.05 mg/l | Potassium | 9 mg/l |
| TKN | 4.04 mg/l | Selenium | <2 µg/l |
| Total Phosphorus | 0.14 mg/l | Sodium | 386 mg/l |
| Sulfate | 110 mg/l | Strontium | 807 µg/l |
| Aluminum | <200 µg/l | Zinc | <10 µg/l |
| Arsenic | 3 µg/l | Hardness (total) | 276 mg/l |
| Barium | 38 µg/l | | |

The third unpermitted discharge identified enters the River Styx on river left at approximately RM 0.28. This discharge consists of water which enters an unnamed channel which borders the dikes of the sludge lagoons located south of Salt St. Water from this channel discharges to the River Styx via a short culvert. Field reconnaissance was conducted on November 8, 1999 to identify the source of the flow from this channel. One readily observable leachate outbreak was identified and it is evident that the source of the water in the channel is leaching through and underneath the dikes which are constructed of highly permeable coal ash. The analytical results for a sample collected from the discharge to the River Styx is presented in Table 4. It is evident that this discharge contains elevated concentrations of pollutants which should be regulated through an NPDES permit. Following a thorough characterization of this discharge, methods of collection and treatment of this water should be investigated in order to protect water quality in the River Styx.

**Table 4. Monitoring results for sludge impoundment tributary to the River Styx (RM 0.28), November 8, 1999.**

| Parameter | Concentration (units) | Parameter | Concentration (units) |
|---|---|---|---|
| $BOD_5$ | 27 mg/l | Ammonia | 2.59 mg/l |
| $CBOD_5$ | 24 mg/l | Nitrate+Nitrite | <0.10 mg/l |
| Conductivity | 2,140 µmhos/cm | Nitrite | <0.02 mg/l |
| Total Dissolved Solids | 1,270 mg/l | TKN | 0.32 mg/l |
| Total Suspended Solids | 62 mg/l | Total Phosphorus | 0.12 mg/l |
| COD | 124 mg/l | Sulfate | 14 mg/l |
| Chloride | 198 mg/l | | |

***Impacts on Water Quality***

Water quality monitoring by the Ohio EPA in 1993 found no water quality criteria violations which could be attributed to the PCA 001 Outfall. Monitoring at the mouth (RM 0.01) of the River Styx found that dissolved oxygen concentrations ranged from 6.15 to 7.5 mg/l, well above the average water quality criteria of 5.0 mg/l. Monitoring of the River Styx in 1998 did not include sampling at the station located at the mouth. Instead, the most downstream monitoring location was located at Salt St. (RM 0.75). The 1998 monitoring again revealed no exceedances of the water quality criteria for chemical parameters. Dissolved oxygen concentrations ranged from 8.3 to 11.8 mg/l at Salt St. in 1998.

On September 10, 1999, a dissolved oxygen survey of the River Styx was conducted in order to assess the impacts of declining effluent quality from the Rittman Paperboard facility on water quality. Data gathered during this survey are presented in Table 5. A severe dissolved oxygen sag was detected downstream of Salt St. indicative of loading of oxygen demanding compounds exceeding the assimilative capacity of the stream (Figure 3). Dissolved oxygen concentrations in the River Styx peaked at super-saturated concentrations upstream of the Rittman Paperboard 001 Outfall to Rittman Rd. (RM 0.93-1.2), probably due to photosynthetic activity of algae within the stream which is very wide in this segment and where shading is non-existent. Dissolved oxygen concentrations in the stream declined immediately downstream of the Rittman Paperboard 001 Outfall, and continued to decrease further downstream despite large inputs of water from the Rittman Paperboard 002 outfall and the Rittman WWTP outfall. All points monitored within the River Styx downstream of RM 0.5 had dissolved oxygen concentrations below the minimum water quality criteria of 4.0 mg/l for MWH streams, with the lowest detected reading equaling 1.67 mg/l. The inflow of low dissolved oxygen water from the River Styx caused the dissolved oxygen in Chippewa Creek to decline from super-saturated conditions upstream at RM 8.05 (15.8 mg/l) to values below the water quality criteria (1.84 mg/l) downstream of the confluence at RM 7.9.

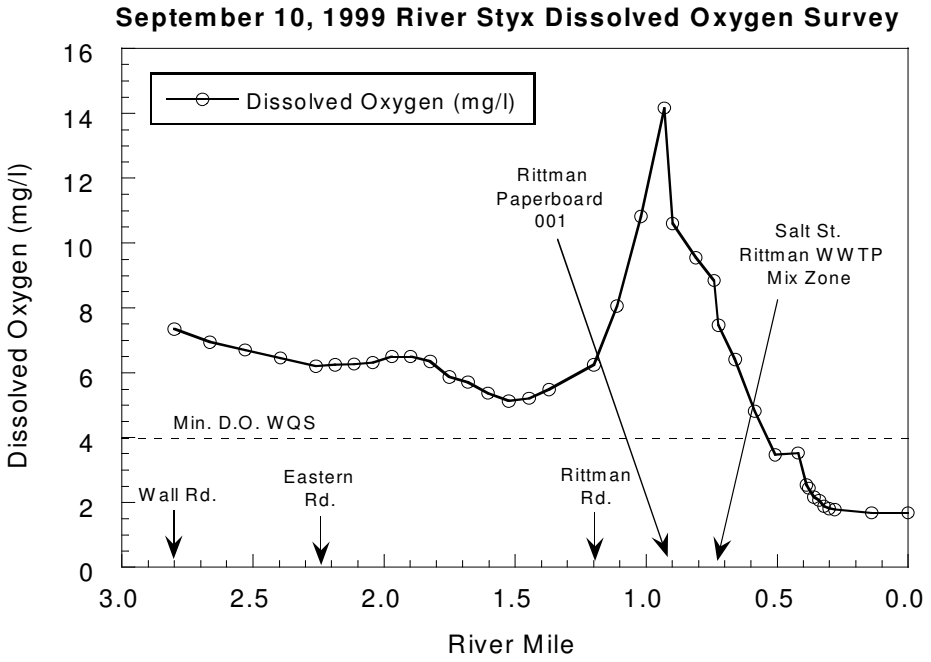


**Figure 3. Results from Field Monitoring in the River Styx Conducted on September 10, 1999.**

In order to quantify whether the dissolved oxygen sag was being caused by the discharge from the Rittman Paperboard 001 outfall, the Rittman WWTP effluent discharge, or both in combination, composite samples were collected from both discharges during the period of September 29 to September 30, 1999 for the analysis of BOD parameters. Effluent samples collected from the Rittman WWTP discharge were found to have a $BOD_5$ of 5.6 mg/l, a $BOD_{20}$ of 13 mg/l and an ultimate BOD of 15 mg/l. Composite samples collected from the effluent of the Rittman Paperboard 001 outfall had $BOD_5$ of 58-64 mg/l, a $BOD_{20}$ of 134-136 mg/l and an ultimate BOD of 155 mg/l. Based upon this comparison, it appears that the greatest contribution to the dissolved oxygen sag comes from the Rittman Paperboard 001 outfall discharge, although the discharges are interactive. In addition, several deposits of paper waste solids were observed in the River Styx within the segment where dissolved oxygen concentrations were depressed. It is likely that decomposition of these solids deposits within the stream bed also contributes to the low dissolved oxygen concentrations observed.

In order to ensure that dissolved oxygen water quality criteria can be met within the River Styx and Chippewa Creek in the future, it appears that a dissolved oxygen modeling effort is needed. Following the development of a model, appropriate permit limits for total suspended solids and BOD can be developed for the Rittman Paperboard 001 effluent. The facility should be required to develop the appropriate data and construct a model during the next permit cycle so that appropriate limits can be developed.

**Table 5. Results of DO survey for the River Styx, September 10, 1999.**

| Stream/ River Mile[1] | Landmark | Time | Temp (°C) | DO (mg/l) | pH (SU) | Conductivity (µmhos/cm) |
|---|---|---|---|---|---|---|
| ***River Styx*** | | | | | | |
| 2.8 | Wall Rd. | 927 | 18.4 | 7.35 | 7.57 | 908 |
| 2.67 | | 947 | 17.74 | 6.94 | 7.6 | 901 |
| 2.53 | | 948 | 17.58 | 6.71 | 7.57 | 900 |
| 2.4 | | 952 | 17.39 | 6.46 | 7.53 | 897 |
| 2.26 | Eastern Rd. | 954 | 17.39 | 6.2 | 7.51 | 893 |
| 2.19 | | 959 | 17.19 | 6.25 | 7.5 | 897 |
| 2.12 | | 1002 | 17.22 | 6.26 | 7.52 | 899 |
| 2.04 | | 1003 | 17.2 | 6.31 | 7.52 | 899 |
| 1.97 | | 1007 | 17.23 | 6.5 | 7.51 | 903 |
| 1.9 | | 1010 | 17.18 | 6.5 | 7.53 | 906 |
| 1.83 | | 1012 | 17.17 | 6.36 | 7.49 | 910 |
| 1.75 | | 1013 | 17.19 | 5.88 | 7.45 | 911 |
| 1.68 | | 1015 | 17.44 | 5.7 | 7.41 | 911 |
| 1.6 | | 1018 | 17.53 | 5.36 | 7.4 | 907 |
| 1.53 | | 1019 | 17.88 | 5.13 | 7.38 | 901 |
| 1.45 | | 1020 | 18.37 | 5.21 | 7.47 | 894 |
| 1.37 | Trib. in Park | 1025 | 18.55 | 5.49 | 7.54 | 890 |
| 1.2 | Rittman Rd. | 1059 | 18.39 | 6.25 | 7.61 | 890 |
| 1.11 | | 1104 | 19.22 | 8.06 | 7.8 | 889 |
| 1.02 | Pipe Bridge | 1109 | 19.78 | 10.83 | 8.17 | 893 |
| 0.93 | Just ust 001 | 1113 | 20.55 | 14.16 | 8.64 | 838 |
| 0.9 | 001 Mix Zone | 1117 | 24.77 | 10.6 | 8.42 | 1283 |
| 0.81 | RR Bridge ust Salt St. | 1120 | 24.72 | 9.56 | 8.36 | 1273 |
| 0.74 | Salt St. | 1129 | 27.72 | 8.84 | 8.29 | 1206 |
| 0.73 | 002/Rittman WWTP Mix Zone | 1132 | 27.23 | 7.47 | 8.23 | 1234 |
| 0.66 | | 1135 | 23.96 | 6.43 | 8.13 | 1445 |
| 0.59 | | 1139 | 23.61 | 4.8 | 8.05 | 1457 |
| 0.51 | | 1143 | 23.37 | 3.47 | 7.97 | 1464 |
| *0.43* | *Trib. on River Right* | *1147* | *20.43* | *7.78* | *8.02* | *2246* |
| 0.42 | | 1150 | 22.91 | 3.52 | 7.94 | 1518 |
| 0.39 | | 1154 | 22.98 | 2.54 | 7.86 | 1532 |
| 0.38 | | 1156 | 23 | 2.44 | 7.83 | 1535 |
| 0.36 | | 1158 | 22.84 | 2.17 | 7.82 | 1541 |

**Table 5. Results of DO survey for the River Styx, September 10, 1999.**

| Stream/ River Mile[1] | Landmark | Time | Temp (°C) | DO (mg/l) | pH (SU) | Conductivity (µmhos/cm) |
|---|---|---|---|---|---|---|
| 0.34 | | 1159 | 22.73 | 2.07 | 7.81 | 1541 |
| 0.32 | | 1200 | 22.71 | 1.88 | 7.77 | 1537 |
| 0.3 | | 1202 | 22.71 | 1.82 | 7.75 | 1538 |
| *0.28* | *Trib on River Left* | *1206* | *18.74* | *5.19* | *7.23* | *1144* |
| 0.14 | | 1217 | 22.68 | 1.67 | 7.66 | 1553 |
| 0 | Mouth of River Styx | 1220 | 22.8 | 1.68 | 7.7 | 1548 |
| ***Chippewa Creek*** | | | | | | |
| 8.05 | Ust. Mouth River Styx | 1224 | 23.53 | 15.8 | 9.28 | 432 |
| 7.9 | Dst. Mouth River Styx | 1226 | 23.02 | 1.84 | 7.69 | 1548 |

***Biological Water Quality***

Fish indices dropped slightly in the River Styx from upstream of the Wadsworth WWTP at RM 3.5 to downstream at RM 2.8, but macroinvertebrate index scores and MWH attainment status remained the same in 1998 (Table 6). This was an improvement over previous survey years which showed a drop in MWH attainment status from full attainment upstream from the Wadsworth WWTP to non attainment (1993) and partial attainment (1983) downstream from the plant.

Sites located immediately downstream from the PCA discharges at RMs 0.8 and 0.6 were in partial or non attainment of the MWH biocriteria. Some of the fish indices from the 1998 survey showed improvement from earlier surveys, but macroinvertebrate data remained fair and poor downstream from the PCA discharges. A significant DO sag caused by Rittman Paperboard between Salt St. and the mouth was documented (Figure 3). The fish IBI index score of 44 at RM 0.6 may act as a very small refugia for fish in the lower segment of the River Styx due to relatively clean and well oxygenated water from the Rittman WWTP discharge. However, the compounds discharged from the Rittman Paperboard 001 would most likely consume the oxygen in the stream soon after the Rittman WWTP mix zone. WQ violations of the DO standard were also observed in Chippewa Creek immediately downstream from the River Styx, compared to well oxygenated conditions immediately upstream. (See Table 4.) The site at RM 0.6 was not sampled at the same time (about a month later) as the other fish sampling sites in 1998, so caution should be employed interpreting the data.

***Biological Threshold Values***

Biological sites in the River Styx, as well as in Chippewa Creek downstream from River Styx, are mostly in non attainment of biocriteria. Table 7 lists suggested total recoverable metals limits based on the moderate risk level for a MWH stream in the EOLP ecoregion. The hardness value used in the calculations for Table 5 was 253 mg/l.

**Table 6. Aquatic Life Use Attainment Status for the Chippewa Creek Basin**

Based on sampling conducted during June-October, 1983-1998. NE= sample not evaluated yet, NA= MIwb not appropriate for sites less than 20 sq. mi. drainage.

| RIVER MILE Fish/Invert. | IBI | Mod. Iwb | ICI[a] | QHEI[b] | Use Attainment Status[c] | Comments |
|---|---|---|---|---|---|---|
| ***Chippewa Creek (17-550) 1998*** | | | | | | |
| | | *Erie Ontario Lake Plain - MWH Use Designation* | | | | |
| 17.2$^{W}$/ | 32 | 5.6* | NE | 33.0 | (**NON**) | Ust Seville |
| 6.4$^{W}$/ | 18* | 2.7* | 14* | 38.0 | **NON** | Dst. River Styx |
| 0.5$^{W}$/ | 34 | 5.6* | 8* | 34.5 | **NON** | Near mouth |
| ***Chippewa Creek (17-550) 1984*** | | | | | | |
| | | *Erie Ontario Lake Plain - MWH Use Designation* | | | | |
| 2.2$^{B}$/- | 22* | 6.0 | -- | -- | (**NON**) | |
| ***Chippewa Creek (17-550) 1983*** | | | | | | |
| | | *Erie Ontario Lake Plain - MWH Use Designation* | | | | |
| 20.2$^{B}$/19.6 | 30 | 6.6 | 18* | -- | PARTIAL | Ust. Medina #1 WWTP |
| 19.2$^{W}$/19.2 | 26 | 6.5 | 4* | -- | **NON** | Dst. Medina #1 WWTP |
| 17.2$^{B}$/16.3 | 26 | 5.7* | 20* | 29.0 | **NON** | Dst. SR 3 (Ust. Seville) |
| 14.2$^{W}$/14.4 | 26 | 5.6* | 12* | -- | **NON** | Doylestown Rd (Dst Seville) |
| 8.9$^{B}$/8.9 | 22* | 5.2* | 10* | -- | **NON** | Ust SR 57A |
| 7.8$^{B}$/7.9 | 21* | 5.6* | F* | -- | **NON** | SR 57 (dst. River Styx) |
| 6.5$^{B}$/6.6 | 25 | 6.0 | 14* | 23.0 | **NON** | SR 585 |
| 0.5$^{B}$/0.8 | 27 | 5.7* | P* | 32.0 | **NON** | Near mouth |
| ***River Styx (17-553) 1998*** | | | | | | |
| | | *Erie Ontario Lake Plain - MWH Use Designation* | | | | |
| 3.5$^{W}$/3.9 | 28 | 7.0 | 30 | 49.5 | FULL | Ust Wadsworth WWTP |
| 2.8$^{W}$/2.8 | 24 | 6.5 | 30 | 41.0 | FULL | Dst Wadsworth WWTP |
| 0.8$^{W}$/0.8 | 26 | 4.8* | 18* | 37.0 | **NON** | Dst. PCA 001,003,004 |
| 0.6$^{W}$/-- | 44 | 6.0* | -- | 38.5 | (PARTIAL) | Dst PCA 002, Ritt. WWTP |
| -- /0.4 | -- | --- | 12* | -- | (**NON**) | Dst PCA trib |
| 0.1$^{W}$/- | 28 | 6.2 | - | 37.0 | (FULL) | Near mouth |
| ***River Styx (17-553) 1993*** | | | | | | |
| | | *Erie Ontario Lake Plain - MWH Use Designation* | | | | |
| 3.5$^{W}$/3.5 | 27 | 7.9 | F[e] | 37.5 | FULL | Ust Wadsworth WWTP |
| 2.8$^{W}$/2.8 | 26 | 5.9* | P* | 44.0 | **NON** | Dst Wadsworth WWTP |
| 0.8$^{W}$/0.8 | 23* | 4.1* | P* | 32.5 | **NON** | Dst. PCA 001,003,004 |
| 0.1$^{W}$/0.1 | 17* | 4.3* | P* | 31.0 | **NON** | Near mouth |

**Table 6. (Continued)**

| RIVER MILE Fish/Invert. | IBI | Mod. Iwb | ICI[a] | QHEI[b] | Use Attainment Status[c] | Comments |
|---|---|---|---|---|---|---|
| ***River Styx (17-553) 1983*** | | | | | | |
| | | *Erie Ontario Lake Plain - MWH Use Designation* | | | | |
| -- /5.1 | -- | -- | 36 | -- | (FULL) | Ust Wadsworth WWTP |
| 3.9[W]/ -- | 29 | 8.6 | -- | 37.0 | (FULL) | Ust Wadsworth WWTP |
| 2.2[W]/2.3 | 38 | 7.4 | 18* | -- | PARTIAL | Dst Wadsworth WWTP |
| 1.2[W]/ -- | 26 | 8.6 | -- | -- | (FULL) | |
| 0.7[W]/0.7 | 32 | 7.8 | 10* | -- | **NON** | Ust Rittman WWTP |
| 0.1[W]/0.1 | 19* | 4.2* | 12* | -- | **NON** | Near mouth |

***Ecoregional Biological Criteria:***

| | ***Erie Ontario Lake Plain (EOLP)*** | | |
|---|---|---|---|
| INDEX - Site Type | WWH | EWH | MWH[d] |
| IBI - Headwaters | 40 | 50 | 24 |
| IBI - Wading | 38 | 50 | 24 |
| IBI - Boat | 42 | 48 | 24 |
| Mod. Iwb - Wading | 7.9 | 9.4 | 6.2 |
| Mod. Iwb - Boat | 8.7 | 9.6 | 5.8 |
| ICI | 34 | 46 | 22 |

* Significant departure from ecoregional biocriteria; poor and very poor results are underlined.

ns Nonsignificant departure from ecoregional biocriteria for WWH or EWH (≤4 IBI, ≤4 ICI, ≤0.5 MIwb units).

NA Not applicable.

[a] Narrative evaluation used in lieu of ICI (E=Exceptional; VG= Very Good; G=Good; MG=Marginally good; F=Fair; P=Poor; VP=Very Poor).

[b] Qualitative Habitat Evaluation Index (QHEI) values based on Rankin (1989).

[c] Attainment status based on one organism group is parenthetically expressed.

[d] Channel modified.

[e] Fair evaluation judged as attaining the MWH biocriterion. Fair evaluations judged as not attaining the MWH biocriterion are marked with an asterisk (*).

B Fish sampled using the Boat Method.

H Headwater site (drainage area < 20 square miles) fish sampling was conducted using a wadeable method.

W Fish sampled using the Wading Method.

**Table 7. Suggested Limits for Total Recoverable Metals**
**Based on Accepting a Moderate Risk of Further Impairment to the Biological Communities for MWH Streams in the EOLP Ecoregion.**

| Biological Threshold Value | Total Recoverable Criteria From Table 33-1 of the WQS | Ambient Hardness in mg/l |
|---|---|---|
| TR_Cd | Cd_WQS | |
| 1.8 | 5.1 | 253 |
| | | |
| TR_Cu | Cu_WQS | |
| 52.4 | 20.6 | 253 |
| | | |
| TR_Pb | Pb_WQS | |
| 33.8 | 20.9 | 253 |
| | | |
| TR_Zn | Zn_WQS | |
| 253 | 263 | 253 |

## Consent Order

In June 2004, Rittman Paperboard signed a Consent Order designed to address the problems identified in the previous pages of this document. By signing the Consent Order, the company has agreed to comply with a number of requirements, including the following:

- the terms and conditions of the existing NPDES permit until the permit renewal for the facility becomes effective;

- cease any unidentified unpermitted discharges not authorized by the existing NPDES permit or the permit renewal;

- selection of treatment option "A" or "B". Option "A" requires Rittman Paperboard to send their process wastewater discharge to the City of Rittman's WWTP by September 30, 2005. Option "B" requires the company to construct the necessary upgrades to comply with the final limits contained in this document (Table 16-001) and in the draft NPDES permit. Both options require the submittal of a schedule for the closure of treatment units that will no longer be needed after implementation of the selected option, and submittal of a sludge management plan. Although Rittman Paperboard has indicated their intention to pursue option "A", this decision has not been finalized as of July 15, 2004; and

- temporary effluent limits for outfalls 001 and 002 which are established as interim limits in the permit renewal, and will remain in effect until September 30, 2005 or November 30, 2005, depending upon the treatment option implemented ("A" or "B").

## Wasteload Allocation Results

Determining appropriate effluent concentrations is a multiple-step process in which parameters are identified as likely to be discharged by a facility, evaluated with respect to Ohio water quality criteria, and examined to determine the likelihood that the existing effluent could violate the calculated limits.

The assimilative capacity was divided among Rittman Paperboard, Wadsworth WWTP, and Rittman WWTP in order to account for possible interactivity of the discharges. The CONSWLA program for conservative parameters was used to model those parameters requiring allocation. The study area is depicted in Figure 2.

Effluent data for Rittman Paperboard WWTP were used to determine what parameters should undergo wasteload allocation. The sources of effluent data are as follows:

| | |
|---|---|
| Self-monitoring data (LEAPS) | January 1994 through July 1999 |
| 2C data | April 1999 |

The effluent data were checked for outliers and the following values were eliminated from the data set: NH3-N 17. ug/l, NO2+NO3 100. mg/l and Zinc 340. ug/l. The average and maximum projected effluent quality (PEQ) values are presented in Table 11. For a summary of the screening results, refer to the parameter groupings in Table 15 on page 34.

For those parameters that require a wasteload allocation (WLA), the results are based on the uses assigned to the receiving waterbody in OAC 3745-1. The applicable waterbody uses for this facility's discharge and the associated stream design flows are as follows:

| | | |
|---|---|---|
| Aquatic life (WWH) | | |
| Toxics (metals, organics, etc.) | Average | Annual 7Q10 |
| | Maximum | Annual 1Q10 |
| Agricultural Water Supply | | Harmonic mean flow |
| Human Health (nondrinking) | | Harmonic mean flow |

Allocations are developed using a percentage of stream design flow (as specified in Table 13), and allocations cannot exceed the Inside Mixing Zone Maximum criteria. The data used in the WLA are listed in Tables 12 and 13. The wasteload allocation results to maintain all applicable criteria are presented in Table 14.

### *Dissolved Metals Translators*

A dissolved metals translator (DMT) is the factor used to convert a dissolved metal aquatic life criterion to an effective total recoverable aquatic life criterion with which a total recoverable aquatic life allocation can be calculated as required in the NPDES permit process. Currently, a DMT is based on site- or area-specific field data; each field data sample consists of a total recoverable measurement paired with a dissolved metal measurement. For the River Styx, there were 5 such paired samples available applicable to cadmium, chromium, copper, lead, nickel, silver, and zinc. To account for the limited quantity of data, the DMT for each of these metals was determined as the lower end of the 95% confidence interval (1-tail) about the geometric mean of the total recoverable-to-dissolved ratios of the sample pairs. Each DMT is metal-specific and is applied by multiplying the dissolved criteria by the DMT, resulting in effective total recoverable criteria which can be used in the wasteload allocation procedures.

In some cases, it is possible that the use of a DMT may result in instream concentrations of metals that may increase the risk of non-attainment of the aquatic life use designation. This was evaluated for Rittman Paperboard. The application of the dissolved metal translators resulted in effective total recoverable criteria for copper, lead, and zinc that were higher than the total recoverable criteria listed in OAC 3745-1. The River Styx near Rittman Paperboard is not attaining its designated use; however, the non-attainment can not be attributed to metals from the facility. In addition, Rittman Paperboard has not requested any increase in permitted load. Therefore, the facility can receive permit limits that maintain all numeric criteria, up to their current limits, without undergoing any further review to ensure that the limits for the metals will protect the aquatic life and other uses.

## Effluent Limits/Hazard Management Decisions

After appropriate effluent limits are calculated by wasteload allocation, the lowest most restrictive average and maximum values are selected from Table 14 and are referred to as Preliminary Effluent Limits ($PEL_{avg}$ and $PEL_{max}$ respectively). The reasonable potential of the discharger to exceed the wasteload allocation (PEL values) is determined by comparing the $PEQ_{avg}$ (Table 11) to the $PEL_{avg}$ and the $PEQ_{max}$ to the $PEL_{max}$ for each parameter. Based on this comparison, each parameter is placed in a defined "group". Parameters that do not have a water quality standard (WQS) or do not require a WLA based on the initial screening are assigned to either group 1 or 2. Parameters are assigned to group 3, 4, or 5 depending on how close the PEQ value is to the allocated value or PEL. The groupings listed in Table 15 reflect the reasonable potential hazard assessment done according to WLA procedures.

The final effluent limits are determined by evaluating the groupings in conjunction with other applicable rules and regulations. Tables 16-001, 16-002, 16-006, 16-007, 16-008, and 16-009 show the draft NPDES permit limits for Rittman Paperboard.

Federal and State laws/regulation require that dischargers meet both treatment-technology-based limits and any more stringent standards needed to comply with state WQS. Permit limits are based on the more restrictive of the two. Treatment-technology-based limits for Rittman Paperboard, found in 40 CFR Part 430, are based on the kilograms of pollutant allowed to be discharged per 1000 kilograms of product produced. The estimated plant production as given in Rittman Paperboard's NPDES 2C application is 586 tons per day, or 531,760 kilograms per day. An example of treatment-technology-based limits are calculated as follows:

Total Suspended Solids (kg./day) = BPT (allowed discharge of pollutant in kilograms/ 1000 kilograms of production) x production (in kilograms/day)

= 5 kilograms/ 531.8 (1000 kilograms)

= 2659 kilograms per day

The limits and monitoring requirements for each outfall are discussed in detail below and the corresponding "Final Effluent Limits" table is referenced.

**Outfall 001: Table 16-001**

The final limits for this outfall, as shown in Table 16-001, will become effective if Rittman Paperboard chooses option "B", described previously under the "Consent Order." The Ohio EPA risk assessment (Table 15) places chlorine, copper, and free cyanide in Group 5. For copper and cyanide, this placement as well as the data in Tables 10 and 11 indicate that an environmental hazard exists and limits are necessary to protect water quality. The limits for cyanide are proposed to continue from the existing permit. Although chlorine has been placed in Group 5, this placement is based upon only one sample which may not accurately reflect the characteristics of the effluent. In order to determine if this pollutant is discharged at levels of concern, monitoring for chlorine demand has been included in the permit.

The Ohio EPA risk assessment (Table 15) places zinc in Group 4. This placement indicates that the limits in the existing permit are not necessary for inclusion in the permit renewal, but monitoring is appropriate for this parameter.

The Ohio EPA risk assessment (Table 15) places arsenic, beryllium, fluoride, and iron in Group 3. This placement indicates that limits are not necessary and monitoring is optional for these parameters. Since placement of these parameters in Group 3 is based upon one sample for each pollutant, it has been determined that monitoring is not necessary and has not been included in the permit.

The $BOD_5$ and total suspended solids limits in the permit have been reduced based upon the determination that the Rittman Paperboard discharge has severely impacted the water quality of the receiving stream network downstream from the facility. Based upon best professional judgement, these more restrictive limits should allow the streams to recover from the impact of previous pollutant loadings associated with these parameters. The draft permit provides the facility two years to meet these more restrictive limits.

Limits for ammonia, dissolved oxygen, and pH are proposed to continue from the existing permit. The pH limits are based upon water quality standards while the ammonia and dissolved oxygen limits are designed to protect stream water quality.

Mercury monitoring has been included in the permit in order to compile a database of sampling results using EPA Method 1631. Although Rittman Paperboard has reported no detections of mercury since 1995, this sampling has been conducted using a less sensitive analytical method than EPA Method 1631.

Monitoring requirements for flow, turbidity, color, COD, and temperature are all designed to provide information regarding the performance of the treatment systems at the facility. Temperature limits are proposed to be imposed at this outfall after a two-year compliance schedule in order to ensure that Rittman Paperboard's effluent meets water quality criteria for temperature in the receiving stream. Reported data from year 2000 through 2003 shows that this discharge continues to exceed both summer and winter maximum instream criteria on occasion.

Limits for whole effluent toxicity are proposed to continue based upon testing that has been conducted since 1997. (See the section on Whole Effluent Toxicity for a detailed discussion of testing results.) Toxicity has continued to be observed since 1999 with the most recent evidence of chronic toxicity occurring in June 2003.

**Outfall 002: Table 16-002**

The limits and monitoring requirements included in the existing permit for this outfall are proposed to continue in the draft permit. Temperature limits have been added to this outfall since the reported data since the year 2000 shows that Rittman Paperboard exceeded the instream water quality standards for temperature on numerous occasions, especially during the winter months.

**Outfall 006: Tables 16-006**

This outfall is one of Rittman Paperboard's unpermitted discharges described on pages 11 and 12, and is defined in the draft permit as storm water discharge into the River Styx from a landfill drainage ditch. In order to accurately characterize this discharge, the draft permit requires Rittman Paperboard to monitor precipitation, pH, ammonia, iron, and the flow rate.

**Outfall 007: Tables 16-007**

This outfall is the second unpermitted discharge discovered which flows from Rittman Paperboard property, and is described in the draft permit as overflow from a pond used to hold non-contact cooling water from Little Chippewa Creek. In order to accurately characterize this discharge, the draft permit requires Rittman Paperboard to monitor pH, total dissolved residue, and the flow rate.

**Outfall 008: Tables 16-008**

Outfall 008 has been defined as the third unpermitted discharge described on pages 11 and 12, and is defined in the draft permit as discharge from a swale located at the base of the Rittman Paperboard sludge impoundments south of Salt Street. In order to accurately characterize this discharge, the draft permit requires Rittman Paperboard to monitor $BOD_5$, COD, pH, ammonia, total dissolved residue, flow rate, total suspended solids, total nitrogen Kjeldahl, nitrite+nitrate, phosphorus, cyanide, chloride, sulfate, fluoride, arsenic, iron, selenium, nickel, zinc, cadmium, lead, chromium, copper, phenol, temperature, and conductivity.

**Outfall 009: Tables 16-009**

Outfall 009 is the discharge from the storm water retention pond at the residual waste landfill. Monitoring at this outfall is proposed for flow rate, pH, and total suspended solids. Limits are proposed for total suspended solids based upon best professional judgement.

In addition to permit compliance, this data is used to assist in the evaluation of effluent quality and treatment plant performance and for designing plant improvements and conducting future stream studies.

## Whole Effluent Toxicity

Whole effluent toxicity or "WET" is the total toxic effect of an effluent on aquatic life in the receiving stream measured directly with a toxicity test. Acute WET measures short term effects of the effluent while chronic WET measures longer term and potentially more subtle effects of the effluent. WET values are then compared to a calculated allowable effluent toxicity "AET" value. This comparison along with an assessment of the instream community are two ways in which whole effluent toxicity is evaluated.

AET calculations are similar to aquatic life criteria wasteload allocation calculations. The $Q_{7,10}$ flow and chronic toxicity units ($TU_c$) are used to calculate the average allowable AET, and the $Q_{1,10}$ flow and acute toxicity units ($TU_a$ ) are used to calculate the maximum allowable AET. For Rittman Paperboard, the AET values for outfall 001 is as follows:

| | |
|---|---|
| Chronic Toxicity (in $TU_c$) | 2.75 |
| Acute Toxicity (in $TU_a$) | 0.81 |

The chronic toxicity unit ($TU_c$) is defined as 100 divided by the $IC_{25}$:

$$TU_c = \frac{100}{IC_{25}}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations except when the following equation is more restrictive (*Ceriodaphnia dubia* only):

$$TU_c = \frac{100}{\text{geometric mean of NOEC and LOEC}}$$

The acute toxicity unit ($TU_a$) is defined as 100 divided by the LC50 for the most sensitive test species:

$$TU_a = \frac{100}{LC50}$$

This equation applies outside the mixing zone for warmwater, modified warmwater, exceptional warmwater, coldwater, and seasonal salmonid use designations.

Under the existing permit, this facility was required to initiate a toxicity reduction evaluation (TRE) in order to determine the source of toxicity and take steps to minimize it. Some of the findings reported as a result of the TRE include:

- the effluent was generally non-toxic to fathead minnows;
- chronic toxicity was observed in all of the tests involving *Ceriodaphnia dubia*;
- well water and boiler blowdown wastewater were toxic to *Ceriodaphnia dubia*;
- the likely source of the toxicity was not identified.

The TRE final report suggested that aeration as the final step prior to discharge is effective in reducing the toxicity. However, a laboratory test conducted after conclusion of the TRE failed to provide evidence that aeration reduces effluent toxicity.

Two additional tests conducted in 1998 examined: 1) the use of a polymer designed to improve settling characteristics of the wastewater, and 2) using filtration of the effluent to reduce toxicity. While neither of these tests eliminated the toxicity, both the polymer and filtration reduced toxicity in the effluent.

Table 8 shows the results of continued chronic toxicity test results reported by Rittman Paperboard. These tests illustrate on-going toxicity to *Ceriodaphnia dubia*, especially related to reproduction and growth.

Ohio EPA also conducted toxicity tests on the effluent from outfall 001 in 1998. Chronic tests indicated that the effluent was toxic to *Ceriodaphnia dubia*. The calculated toxicity value for reproduction was 1.4 $TU_c$, while the IC25 value was 65.5 percent (or *Ceriodaphnia dubia* experienced a 25 percent reduction in the rate of reproduction in a 65.5 percent concentration of effluent).

**Table 8. Summary of Chronic Toxicity Test Results for Outfall 001**

| Test Date/ Species | *7-Day Tests* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | UP[a] | C[b] | % M[c] | Survival | | | Reproduction | | | FF[h] |
| | | | | LOEC[e] | NOEC[f] | $TU_c$[g] | LOEC[e] | NOEC[f] | $TU_c$[g] | |
| 11/16/97 | | | | | | | | | | |
| Ceriodaphnia | 0 | 10 | 90 | 100 | 50 | 1.4 | 12.5 | 6.25 | 11.3 | 10 |
| Fathead Min. | 68 | 7 | 5 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | 50 |
| 01/19/98 | | | | | | | | | | |
| Ceriodaphnia | 0 | 0 | 0 | > 100 | 100 | <1.0 | | < 6.25 | | |
| Fathead Min. | 32 | 7 | 20 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| 06/24/98 | | | | | | | | | | |
| Ceriodaphnia | | | | | | | | | | |
| Fathead Min. | 0 | 0 | 0 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| 09/22/98 | | | | | | | | | | |
| Ceriodaphnia | 0 | 0 | 0 | > 100 | 100 | <1.0 | 100 | 50 | 1.4 | |
| Fathead Min. | 56.7 | 0 | 10 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| 09/29/98 | | | | | | | | | | |
| Ceriodaphnia | 0 | 0 | 20 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| Fathead Min. | 73 | 2 | 7 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| 12/01/98 | | | | | | | | | | |
| Ceriodaphnia | 0 | 10 | 10 | > 100 | 100 | <1.0 | 100 | 50 | 1.4 | |
| Fathead Min. | 89.7 | 0 | 6.7 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| 02/15/99 | | | | | | | | | | |
| Ceriodaphnia | 0 | 0 | 0 | > 100 | 100 | <1.0 | 12.5 | 6.25 | 11.3 | |
| Fathead Min. | 3.3 | 27.6 | 10 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| 03/09/99 | | | | | | | | | | |
| Ceriodaphnia | 0 | 0 | 0 | > 100 | 100 | <1.0 | 25 | 12.5 | 5.6 | |

**Table 8. Summary of Chronic Toxicity Test Results for Outfall 001**

| Test Date/ Species | *7-Day Tests* | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | UP[a] | C[b] | % M[c] | Survival | | | Reproduction | | | FF[h] |
| | | | | LOEC[e] | NOEC[f] | $TU_c$[g] | LOEC[e] | NOEC[f] | $TU_c$[g] | |
| Fathead Min. | 3.3 | 0 | 0 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |
| 03/30/99 | | | | | | | | | | |
| Ceriodaphnia | 30 | 10 | 0 | > 100 | 100 | <1.0 | 100 | 50 | 1.4 | |
| Fathead Min. | 0 | 13.3 | 3.3 | > 100 | 100 | <1.0 | > 100 | 100 | <1.0 | |

[a]UP = upstream control water
[b]C = laboratory water control
[c]M%= Percent mortality at 100 % effluent concentration
[d]NF = Near field sample
[e]NOEC = no observed effects concentration
[f]LOEC = lowest observed effects concentration
[g]$TU_c$ = chronic toxicity units
[h]FF = far-field effect (mortality)

## Table 9. Concentrations of Chemicals Found in Effluent

| Parameter | 1999 Permit Application Renewal Form 2C ----------Effluent---------- No. of Samples | Average | Maximum |
|---|---|---|---|
| ***Outfall 001*** | | | |
| BOD (mg/l) | 144 | 10.3 | 59 |
| COD | 1 | | 150 |
| Total Organic Carbon (mg/l) | 1 | | 39 |
| Total Suspended Solids (mg/l) | 310 | 39.6 | 230 |
| Ammonia- N (mg/l) | 310 | 1.07 | 6.6 |
| Chlorine (mg/l) | 1 | | 0.9 |
| Fluoride (mg/l) | 1 | | 0.33 |
| Nitrate-Nitrite as N (mg/l) | 1 | 1.4 | 8.2 |
| Nitrogen, Total Organic as N (mg/l) | 1 | | 5.4 |
| Oil and Grease (mg/l) | 1 | | 1 |
| Sulfate (mg/l) | 1 | | 150 |
| Surfactants (mg/l) | 1 | | 0.43 |
| Aluminum (mg/l) | 1 | | 0.24 |
| Arsenic (mg/l) | 1 | | 0.01 |
| Barium (mg/l) | 1 | | 0.079 |
| Beryllium (mg/l) | 1 | | 0.013 |
| Boron (mg/l) | 1 | | 0.84 |
| Bromide (mg/l) | 1 | | 0.17 |
| Iron (mg/l) | 1 | | 0.4 |
| Magnesium (mg/l) | 1 | | 19 |
| Manganese (mg/l) | 1 | | 0.25 |
| Copper (mg/l) | 1 | 0.027 | 0.074 |
| Zinc (mg/l) | 27 | 0.061 | 0.13 |
| ***Outfall 002*** | | | |
| Ammonia (mg/l) | 1 | | 0.4 |
| BOD (mg/l) | 1 | | 12 |
| Total Organic Carbon (mg/l) | 1 | | 12 |
| Total Residual Chlorine (mg/l) | 26 | 0.1 | 0.15 |
| COD (mg/l) | 1 | | 24 |
| Total Suspended Solids (mg/l) | 1 | | 22 |

**Table 10. Effluent Characterization and Decision Criteria**

Summary of analytical results for Outfalls 001, 002, 003, and 004. All values are in µg/l unless otherwise indicated. ND = below detection (detection limit); NA = not analyzed. Decision Criteria: $PEQ_{avg}$ = monthly averages; $PEQ_{max}$ = daily maximum analytical results.

| PARAMETER | SEASON | UNITS | CURRENT PERMIT 30 DAY | CURRENT PERMIT DAILY | ---PERIOD = JAN95 THRU APR99--- N | 50 PCTL | 95 PCTL | RANGE | DECISION CRITERIA N | $PEQ_{ave}$ | $PEQ_{max}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Outfall 001*** | | | | | | | | | | | |
| AMMONIA NH3-N | MAY-OCT | MG/L | 1.5 | 2.25 | 620 | 0.3 | 2.5 | 0-25 | | | |
| | | KG/DAY | 13 | 20 | 620 | 2.7559 | 18.986 | 0-214.89 | | | |
| | NOV-APR | MG/L | 5.5 | 8.25 | 659 | 0.9 | 4 | 0.1-23 | | | |
| | | KG/DAY | 49 | 74 | 659 | 6.4337 | 33.127 | 0-239.04 | | | |
| BOD 5 DAY | MAY-OCT | MG/L | 41 | 81 | 306 | 11 | 25 | 1-44 | | | |
| | | KG/DAY | 367 | 725 | 306 | 84.81 | 240.27 | 0-346.55 | | | |
| | NOV-APR | MG/L | 80 | 160 | 327 | 13 | 35 | 1-130 | | | |
| | | KG/DAY | 716 | 1432 | 327 | 99.788 | 312.06 | 0.2233-1356.1 | | | |
| CONDUIT FLOW | ANNUAL | MGD | - | - | 1519 | 2.148 | 2.824 | 0-5.202 | | | |
| | MAY-OCT | MGD | | | 736 | 2.168 | 2.841 | 0-3.59 | | | |
| | NOV-APR | MGD | | | 783 | 2.114 | 2.804 | 0-5.202 | | | |
| COPPER TOT REC | ANNUAL | UG/L | - | - | 98 | 20 | 40 | 0-74 | 98 | 32 | 45 |
| | | KG/DAY | - | - | 98 | 0.15507 | 0.39553 | 0-0.709 | | | |
| CYANIDE FREE | ANNUAL | MG/L | 0.013 | 0.048 | 194 | 0 | 0 | 0-0.03 | 194 | 0.02 | 0.027 |
| | | KG/DAY | 0.116 | 0.429 | 194 | 0 | 0 | 0-0.3139 | | | |
| DISS. OXYGEN | MAY-OCT | MG/L | 5.0 (min.) | | 622 | 6.4 | 5.3** | 0-56 | | | |
| | NOV-APR | MG/L | 5.0 (min.) | | 657 | 7.6 | 5.8** | 4.8-74 | | | |
| MERCURY HG,TOT | ANNUAL | UG/L | | | 36 | 0 | 0 | 0-0 | | | |
| MERCURY TOT REC | ANNUAL | UG/L | 0.014 | 1.2 | 89 | 0 | 0 | 0-0 | 176 | - | - |
| NO2&NO3 N-TOT | ANNUAL | MG/L | - | - | 71 | 0.3 | 8.2 | 0-24.5 | 120 | 9.06 | 10.81 |
| | | KG/DAY | - | - | 71 | 2.4436 | 61.865 | 0-148.09 | | | |
| PH | ANNUAL | S.U. | 6.5 to 9.0 | | 1284 | 7.8* | 8.4 | 0-9.1 | | | |
| PHENOLIC 4AAP TOT | ANNUAL | UG/L | | | 39 | 11 | 98 | 0-134 | 91 | 36 | 60 |
| | | KG/DAY | | | 39 | 0.08631 | 0.90915 | 0-1.2279 | | | |

**Table 10. Effluent Characterization and Decision Criteria (continued)**

| PARAMETER | SEASON | UNITS | CURRENT PERMIT 30 DAY | CURRENT PERMIT DAILY | ---PERIOD = JAN95 THRU APR99--- N | 50 PCTL | 95 PCTL | RANGE | DECISION CRITERIA N | $PEQ_{ave}$ | $PEQ_{max}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Outfall 001*** *(continued)* | | | | | | | | | | | |
| RESIDUE TOT NFLT | ANNUAL | MG/L | 75 | 150 | 1279 | 42 | 104 | 2-776 | | | |
| | | KG/DAY | 671 | 1342 | 1279 | 332.2 | 902.56 | 0-5886.1 | | | |
| SILVER AG,TOT | ANNUAL | UG/L | | | 30 | 0 | 0 | 0-0 | | | |
| SILVER TOT REC | ANNUAL | UG/L | - | - | 40 | 0 | 0 | 0-0 | 121 | - | - |
| WATER TEMP. | ANNUAL | DEG C | - | - | 1285 | 26 | 34 | 0-38 | | | |
| TOX-UNIT AC-CERI T | ANNUAL | TUA | | 1.0 | 4 | 0.2 | 1 | 0-1 | | | |
| TOX-UNIT ACU-PIME | ANNUAL | TUA | | 1.0 | 4 | 0 | 1 | 0-1 | | | |
| TOX-UNIT CHR-CERI | ANNUAL | TUC | 2.7 | | 4 | 1.4 | 11.3 | 0-11.3 | | | |
| TOX-UNIT CHR-PIME | ANNUAL | TUC | 2.7 | | 4 | 0 | 1 | 0-1 | | | |
| ZINC TOT REC | ANNUAL | UG/L | 324 | 353 | 88 | 65 | 130 | 9-210 | 176 | 123 | 173 |
| | | KG/DAY | 2.9 | 3.159 | 88 | 0.55751 | 1.4152 | 0.0322-1.8051 | | | |
| ZINC ZN,TOT | ANNUAL | UG/L | | | 36 | 78 | 130 | 29-180 | | | |
| | | KG/DAY | | | 36 | 0.52789 | 1.1642 | 0.2242-1.2536 | | | |
| ***Outfall 002*** | | | | | | | | | | | |
| CHLORINE TOT RESD | ANNUAL | MG/L | - | - | 150 | 0.1 | 0.45 | 0-2 | | | |
| | | KG/DAY | | | 150 | 0.47532 | 3.305 | 0-320.78 | | | |
| CONDUIT FLOW | ANNUAL | MGD | - | - | 1510 | 1.132 | 2.274 | 0.024-745 | | | |
| | MAY-OCT | MGD | | | 727 | 1.316 | 2.244 | 0.024-3.475 | | | |
| | NOV-APR | MGD | | | 783 | 0.965 | 2.32 | 0.025-745 | | | |
| PH | ANNUAL | S.U. | 6.5 to 9.0 | | 214 | 7.6* | 8.5 | 7-9.7 | | | |
| WATER TEMP. | ANNUAL | DEG C | - | - | 216 | 21 | 34 | 1-46 | | | |

**Table 11. Effluent Data for Rittman Paperboard**

| Parameter | Units | # of Samples | # > MDL | Average PEQ | Maximum PEQ |
|---|---|---|---|---|---|
| **Self-Monitoring (LEAPS)** | | | | | |
| Copper | ug/l | 98 | 82 | 32. | 45. |
| Cyanide, free | mg/l | 194 | 2 | 0.02 | 0.027 |
| Mercury | ug/l | 176 | 0 | -- | -- |
| NO2+NO3 | mg/l | 120 | 111 | 9.06 | 10.81 |
| Phenolic | mg/l | 91 | 81 | 36. | 60. |
| Silver | ug/l | 121 | 0 | -- | -- |
| Zinc | ug/l | 176 | 176 | 123. | 173. |
| **OEPA & PT** | | | | | |
| Aluminum | mg/l | 1 | 1 | 1.1 | 1.5 |
| Arsenic | ug/l | 1 | 1 | 45. | 62. |
| Barium | ug/l | 1 | 1 | 360. | 490. |
| Beryllium [C] | ug/l | 1 | 1 | 59. | 80. |
| Boron | mg/l | 1 | 1 | 3.8 | 5.2 |
| Bromide | mg/l | 1 | 1 | 0.77 | 1.05 |
| Chlorine, total residual | mg/l | 1 | 1 | 4.07 | 5.58 |
| Fluoride | mg/l | 1 | 1 | 1.49 | 2.05 |
| Iron | ug/l | 1 | 1 | 1810. | 2480. |
| Magnesium | mg/l | 1 | 1 | 86. | 118. |
| Manganese | ug/l | 1 | 1 | 1130. | 1550. |
| Sulfate | mg/l | 1 | 1 | 679. | 930. |

[C] Carcinogen

**Table 12. Water Quality Criteria for the River Styx**

| | | Outside Mixing Zone Criteria | | | | Inside |
|---|---|---|---|---|---|---|
| | | Average | | | Maximum | Mixing |
| **Parameter** | **Units** | **Human Health** | **Agri-culture** | **Aquatic Life** | **Aquatic Life** | **Zone Maximum** |
| Arsenic | ug/l | – | 100. | 150. | 340. | 680. |
| Beryllium | ug/l | 280. | – | 103. | 2300. | 4600. |
| Copper | ug/l | – | 500. | 23. [A] | 37. [A] | 74. [A] |
| Chlorine, total residual | ug/l | -- | -- | 11. | 19. | 38. |
| Cyanide, free | mg/l | – | – | 0.012 | 0.046 | 0.092 |
| Fluoride | mg/l | – | 2. | -- | -- | -- |
| Iron | ug/l | -- | 5000. | – | – | – |
| Manganese | ug/l | – | -- | 100. | 980. | 2000. |
| NO2+NO3 | mg/l | – | 100. | – | – | – |
| Silver | ug/l | -- | -- | 1.3 | 7.9 | 16. |
| Zinc | ug/l | – | 25000. | 300. [A] | 300. [A] | 600. [A] |

[A] The aquatic life criteria for this parameter reflect the use of a site-specific dissolved metal translator for the River Styx.

**Table 13. Instream Conditions and Discharger Flow**

| Parameter | Units | | Value | Basis |
|---|---|---|---|---|
| *7Q10* | cfs | annual | 0.82 | USGS gage #03116200, 1960-78 data |
| *1Q10* | cfs | annual | 0.66 | USGS gage #03116200, 1960-78 data |
| *Harmonic Mean Flow* | cfs | annual | 4.22 | USGS gage #03116200, 1960-81 data |
| *Instream Hardness* | mg/l | annual | 253. | STORET; 54 value,0<MDL,1983-98 |
| *Dissolved Metal Translator* | | | | |
| Cadmium | | | 1.0509 | OEPA;5 values,0<MDL,1998 |
| Copper | | | 1.1439 | OEPA;5 values,0<MDL,1998 |
| Lead | | | 2.6945 | OEPA;5 values,0<MDL,1998 |
| Nickel | | | 1.0128 | OEPA;5 values,0<MDL,1998 |
| Zinc | | | 1.1640 | OEPA;5 values,0<MDL,1998 |
| *Background Water Quality* | | | | |
| Arsenic | µg/l | annual | 2.25 | STORET;4 values, 2<MDL,1993 |
| Beryllium | µg/l | annual | 0. | No representative data available |
| Copper | µg/l | annual | 5. | STORET; 13 value,6<MDL,1983-93 |
| Chlorine, total residual | µg/l | summer | 0. | No representative data available |
| Cyanide, free | µg/l | annual | 0. | No representative data available |
| Fluoride | mg/l | annual | 0. | No representative data available |
| Iron | µg/l | annual | 2379. | STORET;7 values, 0<MDL,1983-93 |
| Manganese | µg/l | annual | 0. | STORET; 1value,1<MDL,1993 |
| Zinc | µg/l | annual | 10. | STORET; 12 value,4<MDL,1983-93 |
| *Discharge Flows* | | | | |
| Wadsworth WWTP | cfs | design | 5.57 | DSW |
| Rittman Paperboard - 001 | cfs | design | 3.66 | DSW |
| - 002 | cfs | average | 1.16 | DSW |
| Rittman WWTP | cfs | design | 2.48 | DSW |

**Table 14. Summary of Effluent Limits to Maintain Applicable Water Quality Criteria**

| Parameter | Units | Average Human Health | Average Agri Supply | Average Aquatic Life | Maximum Aquatic Life | Inside Mixing Zone Maximum |
|---|---|---|---|---|---|---|
| Arsenic | µg/l | – | 146. | 163. | 364. | 680. |
| Beryllium | µg/l | 1029. | – | 283. | 6215.[A] | 4600. |
| Chlorine, total residual | µg/l | -- | -- | 12. | 20. | 38. |
| Copper | µg/l | – | 726.[A] | 25. [B] | 39. [B] | 74.[B] |
| Cyanide, free | mg/l | – | – | 0.013 | 0.049 | 0.092 |
| Fluoride | mg/l | – | 7.35 | – | – | – |
| Iron | µg/l | – | 12011. | – | – | – |
| Zinc | µg/l | – | 36430. [A] | 326. [B] | 321. [B] | 600. [B] |

[A] Allocation must not exceed the Inside Mixing Zone Maximum.

[B] WLA based on applicable dissolved metal translator.

**Table 15. Parameter Assessment for Outfall 001**

*Group 1*: Due to a lack of criteria, the following parameters could not be evaluated at this time. The facility may be required to generate toxicity data so that the parameters may be reevaluated.

| | | |
|---|---|---|
| Aluminum | Barium | Boron |
| Bromide | Magnesium | Manganese |
| Phenolic | Sulfate | |

*Group 2*: PEQ < 25% of WQS or all data below minimum detection limit; WLA not required. No limit recommended, monitoring optional.

| | | |
|---|---|---|
| Mercury | NO2+NO3 | Silver |

*Group 3*: $PEQ_{max}$ < 50% of maximum PEL and $PEQ_{avg}$ < 50% of average PEL. No limit recommended, monitoring optional.

| | | |
|---|---|---|
| Arsenic | Beryllium | Fluoride |
| Iron | | |

*Group 4*: $PEQ_{max} \geq 50\%$ but <100% of the maximum PEL or $PEQ_{avg} \geq 50\%$ but < 100% of the average PEL. Monitoring is appropriate.

Zinc

*Group 5*: Maximum PEQ ≥ 100% of the maximum PEL or average PEQ ≥ 100% of the average PEL, or either the average or maximum PEQ is between 75 and 100% of the PEL and certain conditions that increase the risk to the environment are present. Limit recommended.

Limits to Protect Numeric Water Quality Criteria

| Parameter | Units | Applicable Period | Recommended Effluent Limits Average | Recommended Effluent Limits Maximum |
|---|---|---|---|---|
| Chlorine, total residual | ug/l | summer | 12. | 20. |
| Copper | ug/l | annual | 25. | 39. |
| Cyanide, free | ug/l | annual | 13. | 49. |

**Table 16-001. Final Effluent Limits and Monitoring Requirements for Outfall 001**

| | | Effluent Limits | | | | |
|---|---|---|---|---|---|---|
| | | Concentration | | Loading (kg/day)[a] | | |
| | | 30 Day | Daily | 30 Day | Daily | |
| Parameter | Units | Average | Maximum | Average | Maximum | Basis[b] |
| Flow | MGD | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] |
| Temperature | °F | | | | | |
| Summer | | 85 | 89 | -- | -- | M[c]/BPJ |
| Winter | | 65 | 70 | -- | -- | M[c]/BPJ |
| Turbidity, Transmissometer - NTU | | - - - - - - - - - | Monitor | - - - - - - - - - - - - - - | | M[c] |
| Color, Severity | Units | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] |
| Dissolved Oxygen | mg/l | – | 5.0 (min.) | – | -- | EP |
| $BOD_5$ | mg/l | 30 | 45 | 269 | 403 | BPJ |
| COD | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | EP |
| Chlorine demand | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | WLA |
| pH | S.U. | - - - - - - - - - - - - - | 6.5 to 9.0 | - - - - - - - - - - - - - | | M[c]/WQS |
| Suspended Solids | mg/l | 30 | 45 | 269 | 403 | BPJ |
| Nitrogen, Ammonia | mg/l | | | | | |
| June - September | | 1.5 | 2.25 | 13 | 20 | EP |
| Oct., November, March - May | | 3.5 | 5.25 | 31 | 47 | EP |
| Dec. - Feb. | | 5.5 | 8.25 | 49 | 74 | EP |
| Cyanide, free | mg/l | 0.013 | 0.048 | 0.116 | 0.429 | ABS/WLA |
| Zinc, Total Rec. | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M/EP/RP |
| Copper, Total Rec. | µg/l | 25 | 39 | 0.22 | 0.35 | WLA |
| Mercury | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | RP |
| Acute Toxicity | $TU_a$ | | | | | |
| Ceriodaphnia dubia | | -- | 1.0 | -- | -- | WET |
| Chronic Toxicity | $TU_c$ | | | | | |
| Ceriodaphnia dubia | | 2.75 | -- | -- | -- | WET |
| Acute Toxicity | $TU_a$ | | | | | |
| Pimephales promelas | | -- | 1.0 | -- | -- | WET |
| Chronic Toxicity | $TU_c$ | | | | | |
| Pimephales promelas | | 2.75 | -- | -- | -- | WET |

[a] Effluent loading is based upon a flow of 2.365 MGD.
[b,c] See page 38 for definition of terms and explanation of monitoring requirements.

**Table 16-002. Final Effluent Limits and Monitoring Requirements for Outfall 002**

| | | Effluent Limits | | | | |
|---|---|---|---|---|---|---|
| | | Concentration | | Loading (kg/day)[a] | | |
| | | 30 Day | Daily | 30 Day | Daily | |
| Parameter | Units | Average | Maximum | Average | Maximum | Basis[b] |
| Temperature | °F | | | | | |
| Summer | | 85 | 89 | -- | -- | WQS/BPJ |
| Winter | | 65 | 70 | -- | -- | WQS/BPJ |
| Flow | MGD | - - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - - | | | | M[c] |
| pH | S.U. | - - - - - - - - - - 6.5 to 9.0 - - - - - - - - - - - - - - - - - | | | | M[c] |
| Chlorine, Total Residual | | | | | | |
| Summer only | mg/l | -- | – | – | – | M[c]/EP |

[b,c] See page 38 for definition of terms and explanation of monitoring requirements.

**Table 16-006. Final Effluent Limits and Monitoring Requirements for Outfall 006**

| | | Effluent Limits | | |
|---|---|---|---|---|
| | | Concentration | Loading (kg/day)[a] | |
| | | 30 Day | Basis[b] | |
| Total Precipitation | Inches | - - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - - | | M[c] |
| Flow | MGD | - - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - - | | M[c] |
| pH | S.U. | - - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - - | | M[c] |
| Nitrogen, Ammonia | mg/l | - - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - - | | M[c] |
| Iron, Total | µg/l | - - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - - | | M[c] |

[b,c] See page 38 for definition of terms and explanation of monitoring requirements.

**Table 16-007. Final Effluent Limits and Monitoring Requirements for Outfall 007**

| | | Effluent Limits | | | | |
|---|---|---|---|---|---|---|
| | | Concentration | | Loading (kg/day)[a] | | |
| | | 30 Day | Daily | 30 Day | Daily | |
| Parameter | Units | Average | Maximum | Average | Maximum | Basis[b] |
| Flow | MGD | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] |
| pH | S.U. | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Residue, Total Dissolved | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |

[b,c] See page 38 for definition of terms and explanation of monitoring requirements.

**Table 16-008. Final Effluent Limits and Monitoring Requirements for Outfall 008**

| | | Effluent Limits | | | | |
|---|---|---|---|---|---|---|
| | | Concentration | | Loading (kg/day)[a] | | |
| | | 30 Day | Daily | 30 Day | Daily | |
| Parameter | Units | Average | Maximum | Average | Maximum | Basis[b] |
| Temperature | °F | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Conductivity | umho/cm | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| $BOD_5$ | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| COD | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| pH | S.U. | ---------- | 6.5 to 9.0 | ---------- | | M[c] / BPJ |
| Residue, Total Dissolved | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Total suspended solids | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Nitrogen, Ammonia | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Nitrogen Kjeldahl, Total | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Nitrite+Nitrate | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Phosphorus | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] / BPJ |
| Cyanide, Total | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Chloride, Total | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Sulfate | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Fluoride, Total | mg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Arsenic | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Iron | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Selenium | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Nickel | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Zinc | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Cadmium | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Lead | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Chromium | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Copper | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Phenol | µg/l | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | BPJ |
| Flow | MGD | - - - - - - - - - - - - | Monitor | - - - - - - - - - - - - - - - | | M[c] |

[b,c] See page 38 for definition of terms and explanation of monitoring requirements.

**Table 16-009. Final Effluent Limits and Monitoring Requirements for Outfall 009**

| | | Effluent Limits | | | | |
|---|---|---|---|---|---|---|
| | | Concentration | | Loading (kg/day)[a] | | |
| | | 30 Day | Daily | 30 Day | Daily | |
| Parameter | Units | Average | Maximum | Average | Maximum | Basis[b] |
| Flow | MGD | - - - - - - - - - - - - Monitor - - - - - - - - - - - - - - - | | | | M[c] |
| pH | S.U. | ---------- 6.5 to 9.0 ---------- | | | | M[c] / BPJ |
| Total Suspended Solids | mg/l | 30 | 45 | -- | -- | M[c] / BPJ |

[b,c] See below for definition of terms and explanation of monitoring requirements.

[b] Definitions: **ABS** = Antibacksliding Rule (OAC 3745-33-05(E) and 40 CFR Part 122.44(l)); **AD** = Antidegradation (OAC 3745-1-05);
**BPJ** = Best Professional Judgment;
**EP** = Existing Permit;
**FEG-BAT** = Federal Effluent Guidelines-Best Available Control Technology Currently Available, 40 CFR Part 426.113;
**FEG-BPT** = Federal Effluent Guidelines-Best Practicable Waste Treatment Technology, 40 CFR Part 426.112;
**M** = Monitoring;
**PD** = Plant Design Criteria;
**RP** = Reasonable Potential for exceeding water quality standards, and requiring water quality-based effluent limits and monitoring requirements in NPDES permits (3745-33-07(A));
**WET** = Whole Effluent Toxicity (OAC 3745-33-07(B)) ;
**WLA** = Wasteload Allocation procedures (OAC 3745-2);
**WLA/IMZM** = Wasteload Allocation limited by Inside Mixing Zone Maximum;
**WQS** = Ohio Water Quality Standards (OAC 3745-1).

[c] Monitoring of flow and other indicator parameters is specified to assist in the evaluation of effluent quality and treatment plant performance.

[d] Daily maximum limit.

## Attachment A. Federal Effluent Guidelines Applicable to Rittman Paperboard

**40 CFR 430.52** **Pulp, Paper, and Paperboard Point Source Category**

Subpart E - Paperboard from Wastepaper Subcategory

Best Practicable Control Technology Currently Available (BPT)

| | --------Kg/kkg (or lbs./1000 lbs.) of product------ | |
|---|---|---|
| Parameter | Daily Maximum | 30-Day Average |
| $BOD_5$ | 3.0 | 1.5 |
| Total Suspended Solids | 5.0 | 2.5 |
| pH | ----------6.0 to 9.0---------- | |

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**40 CFR 430.54** **Pulp, Paper, and Paperboard Point Source Category**

Subpart E - Paperboard from Wastepaper Subcategory

Best Available Technology Economically Achievable (BAT)

| | ----------Maximum for any 1 day---------- | |
|---|---|---|
| Parameter | Kg/kkg (or lbs./1000 lbs.) | Milligrams/liter |
| Pentachlorophenol | 0.00087 | (0.029)(7.2)/y |
| Trichlorophenol | 0.00030 | (0.010)(7.2)/y |

y = wastewater discharged in kgal per ton of product.

1 **.** Italicized entries indicate that the sample was taken from an effluent source **.**