GLATFELTER
Beyond Paper

November 8, 2010

U.S. Environmental Protection Agency
Chesapeake Bay TMDL
Docket ID No. EPA-R03-OW-2010-0736

Re: Comments on U. S. EPA's Draft Total Maximum Daily Load (TMDL) for the Chesapeake Bay

To Whom It May Concern:

Herein, the P. H. Glatfelter Company (Suite 500, 96 South George Street, York, PA 17401) provides comments on U. S. EPA's Draft Total Maximum Daily Load (TMDL) for the Chesapeake Bay as public noticed in Federal Register Vol. 75, No. 183 on Wednesday, September 22, 2010.

The P. H. Glatfelter Company ("Glatfelter") is global producer of specialty and engineered paper products headquartered in York, Pennsylvania. Our Specialty Papers Business Unit owns and operates two integrated bleached paper grade pulp and paper mills in Chillicothe, Ohio and Spring Grove, Pennsylvania. Glatfelter's Spring Grove, Pennsylvania facility has been located along Codorus Creek in York County, Pennsylvania since 1864. Codorus Creek is a tributary to the lower Susquehanna River, the largest source of water to the Chesapeake Bay. As such, the Spring Grove facility has been and will continue to be subject to regulatory initiatives designed to improve water quality in the Susquehanna River and the Chesapeake Bay including the subject draft TMDL proposed by US EPA.

Glatfelter agrees that the Chesapeake Bay is a unique national treasure that must be protected and improved and Glatfelter has done and is doing its part to do just that. Glatfelter's Spring Grove mill was one of the first industrial facilities and pulp and paper mills in the United States to install primary treatment in 1950 and secondary treatment in the early 1960s. US EPA has developed effluent guidelines for the pulp and paper industry three times in the last four decades. Each time, the Spring Grove mill's superior waste water treatment facilities and final effluent quality have served as the model for the New Source Performance Standards in those effluent guidelines. For these reasons and the fact that the

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Spring Grove mill discharges its effluent into a relatively small receiving water, the National Council for Air and Stream Improvement (NCASI) chose the mill as one of the four sites for intensive study in the Long Term Receiving Waters Study. This study includes extensive acute, chronic and life-cycle whole effluent toxicity testing, in-stream water quality and biological monitoring, mesocosom testing as well as relative risk assessments to properly place the impact of the paper mill within the stressors in the larger watershed.

Initiated over 15 years ago, the results of the Long Term Receiving Waters Study have been presented at national and international scientific conferences over the last decade. The results of the first nine years of study were recently summarized and published in six papers in a single volume of the journal Integrated Environmental Assessment and Management (Volume 5, Number 2, April 2009). Overall, the results of the Long Term Receiving Waters Study document that well treated pulp and paper mill effluents have a minimal effect on the water quality and biological communities in the receiving streams into which they are discharged. This includes the effluent from the Spring Grove mill discharged to Codorus Creek where the effluent concentration approaches 50 percent during the low flow periods of the year.

Non-point Sources of Nutrients are the Correct Focus of the State Watershed Implementation Plans and EPA's TMDL

The high quality effluent from the Spring Grove mill is typical of the effluents from the overwhelming majority of industrial and municipal point source dischargers in the Chesapeake Bay watershed. Over the past forty years, US EPA and their state environmental agency counterparts have worked in harmony through the effluent guidelines and NPDES permitting processes to continuously improve the waste treatment processes at industrial and municipal waste water treatment plants. This has resulted in the high quality effluents that are now discharged into the nation's receiving waters.

Accordingly, it is no surprise that most of the excess nutrients causing eutrophication in the nations waterways including the Chesapeake Bay are coming from non-point sources, not point sources. The watershed implementation plans (WIPs) submitted by the states and the District of Columbia acknowledge this fact and correctly focus most of their nutrient and sediment reduction efforts on non-point sources. While some of the state WIPs could be more comprehensive, US EPA's backstop TMDL measures to force point source dischargers to make additional reductions to their nutrient and sediment discharges are not realistic nor technological possible in most cases. Instead of threatening to force or actually forcing those dischargers that have already made significant and costly improvements to reduce nutrient and sediment discharges, US EPA should continue to work cooperatively with their state and federal partners to assist non-point source dischargers to make significant and cost effective reductions in nutrient and sediment discharges.

EPA's Backstop Waste Load Allocations for Glatfelter and Other Dischargers Are Incorrectly Calculated and Unattainable

In the text of the Executive Summary and in several chapters of the main text of the TMDL document (for example, see Table 8-6 in Section 8, page 11), EPA states that it their intent to force point source municipal and industrial waste water treatment plants to attain final effluent concentrations of 3 mg/l total N and 0.1mg/L total P at design flows in states that have been designated as having a high-level backstop allocation. EPA states that these concentrations are the "advanced wastewater treatment limits of technology" for nitrogen and phosphorous. However in the supporting document Table Q-1 - Proposed WQS - Annual Loads, EPA has calculated a total annual Phosphorous load for Glatfelter of 847 pounds per year, which translates into a final effluent concentration of less than 0.01 mg/L or an order of magnitude less concentration than EPA itself admits is technically feasible. The same difference between the EPA limit of technical feasibility and the allocated load is present for most other municipal and industrial dischargers, at least in Pennsylvania.

It is unclear if it is really EPA's intent to make municipal and industrial dischargers attain final effluent concentrations of nitrogen and phosphorous that EPA itself admits are not attainable or if EPA has made a significant error in its modeling of the waste load allocations. In any case, EPA needs to make the results of the modeling consistent with its own admission about the technological limits of waste water treatment plants to remove nutrients.

EPA Must Consider the Important Characteristics of Pulp and Paper Mill Waste Waters When Setting Nutrient Limits

Unlike untreated municipal waste waters, untreated pulp and paper mill waste waters contain very low levels of the phosphorous and nitrogen. In fact, most pulp and paper mills must add nutrients to their incoming waste waters to promote the growth of the right populations of micro-organisms needed to break down the waste material in the waste water. In the case of Glatfelter's Spring Grove mill, the waste water treatment plant receives the secondarily treated waste waters from two nearby municipal waste water treatment plants thereby providing tertiary treatment for those municipal waste waters while providing the industrial waste water with the nutrients needed to operate properly. However, even with these extra nutrients, Glatfelter must still add additional phosphorous to maintain the correct biological community in the secondary waste water treatment plant.

NCASI completed a comprehensive survey of nutrient minimization in biologically treated pulp and paper mill effluents. Mills using an activated sludge process with low final effluent concentrations of phosphorous and nitrogen had average final effluent concentrations ranging from 0.1 - 0.90 mg/L total phosphorous and 1.3 – 4.7 mg/L total nitrogen. (See Attachment A). Lowering nutrients to levels

less than these best performing mills is only accomplished at the risk of impairing the entire waste water treatment process.

Accordingly, EPA should base its final effluent nutrient requirements for pulp and paper mill effluents on the demonstrated average performance of these mills and not on the results of an arbitrary modeling exercise.

EPA's Proposed Limits on Sediments Do Not Consider the Properties of Suspended Solids Discharged from Waste Water Treatment Plants

The proposed TMDL for the Chesapeake Bay treats all sediments equally when there are significant physical and chemical differences between different types of sediments such as soil from farm land erosion and suspended solids from municipal and industrial waste water treatment plants. The sediments that settle to the bottom of the Chesapeake Bay and suffocate submerged aquatic vegetation or cloud the water column are primarily mineral in nature and are the result of soil and stream erosion associated with storm events. On the other hand, the suspended solids that are discharged from municipal and industrial waste water treatment plants are primary biological in nature.

As documented in Thacker (2010) (See Attachment B) the suspended solids discharged from pulp and paper mill waste water treatment plants are mostly biological in nature and consist of bacteria and bacteria cell fragments that typically less than 10 um in diameter and serve as a food source for aquatic organisms ranging from benthic macro-invertebrates to fish. These sediments do not travel long distances from the tributaries into which they are discharged and are thus not the cause of the sediment issues in the bay.

Accordingly, EPA should differentiate between the sediments coming from municipal and industrial waste water treatment plants and sediments from non-point sources. Waste water treatment plants that are meeting the suspended solids limits established from US EPA's effluent guidelines should not be required to further reduce suspended solids to an arbitrary level based on modeling.

EPA's Proposed TMDL Does Not Properly Account for the Removal of Nutrients in Intake Waters

Using NPDES permit effluent monitoring data and upstream and downstream water quality data collected as part of the NCASI Long Term Receiving Water Study, Glatfelter has demonstrated to Pennsylvania DEP that the mill removes more nutrients from Codorus Creek than it return to the creek in its effluent discharge.

In a response to a request from PA DEP, Glatfelter on June 12, 2008 submitted a "Significant Industrial Discharger" report to the department documenting the operation of the mill's waste water treatment plant and summarizing the available

data on nutrients. (See Attachment C) In particular, Glatfelter documented that the mill is a net sink for total nitrogen. At a location upstream of the discharge but downstream of the intake, the average total nitrogen concentration of Codorus Creek (3.90 mg/L) was higher than the water quality monitoring station downstream from the discharge (3.36 mg/L), while the average effluent concentration (2.56 mg/L) was lower than either the upstream or downstream station.

The mill updated this information in a May 21, 2010 letter to PA DEP and documented that in 2008 and 2009, the effluent concentration of total nitrogen was 2.4 mg/L while the upstream and downstream concentrations were 4.03 and 3.45 mg/L, respectively. (See Attachment D) Likewise for total phosphorous, in 2008 and 2009, the downstream concentration of total phosphorous was less than the upstream concentration of total phosphorous for 46 of 70 paired samples, while the absolute concentration differences were not as remarkable as those noted for nitrogen.

EPA's proposed TMDL should provide Glatfelter and other dischargers that remove nutrients, with a proper nutrient credit or at the very least should not require them to remove additional nutrients.

Additional Comments

US EPA has established an unrealistically short time line to review the comments from the many parties affected by this proposed TMDL and prepare a final TMDL. Improvements to the Chesapeake Bay will undoubtedly cost the people and businesses living in the watershed billions of dollars. Therefore, it is critical that US EPA not rush the process of determining the most cost effective solutions.

In addition to these facility-specific comments, Glatfelter incorporates by reference the comments submitted by the American Forest and Paper Association and the Federal Water Quality Coalition.

Sincerely,

P. H. GLATFELTER COMPANY

C. L. Missimer

Carroll L. Missimer, Ph.D.

Global Director – Environmental Affairs.

Attachment A

Tables 5.1 and 5.2
from

Thacker, W. E. 2007. Minimization of Nutrients in Biologically Treated Effluents from Pulp and Paper Mills, NCASI Technical Bulletin No. 944, December 2007

Table 5.1 Activated Sludge Plants at North American Pulp and Paper Mills with Low Final Effluent Phosphorus Concentrations

Mill ID	Mill Type[a]	Total P, Mean Effluent (mg/L)	Total P Permit Limit (mg/L)[b]	Nutrient Addition	P Process Monitoring[c]	Sludge Age (day)	Aeration HRT (hr)[d]	Certain WWTP Features[e]
A	UBKP - SP	0.10	1.0 AA	N & P	F-OP - 3/D	3.5	2	OAS
B	BKP, BMCP - PW, BKMP	0.11	1.0 MA	N & P	A-OP - 1/D	7	15	1ASB, 3STP, 3CL
C	NI - TT, SP	0.14	0.2 MA[f]	N & P	F-OP - 1/D	NA	12	AEQB; 2PPT
D	BKP - PW, SP	0.14	2.0 DM	P only	F-TP - 1/D; F-OP - 1/W	5	4	AEQB, HDP
E	BKP, BMCP - PW, BKMP	0.18	0.59 MA	N only	M-TP, A-OP - 3/W	7 - 15	36	BA
F	BKP, BMCP - PW, BKMP	0.19	0.60 MA	N & P	I-OP, A-OP - 3/D	8	8.5	
G	BKP - PW	0.19[g]	0.28 AA[g], 0.5 MA[g]	N only	I-TP - 1/W; A-DP, A-OP - 5/W	20	30	3CL, WTLD
H	NWP - SP, PW	0.21	0.2 MA[f], 1.0 MA[f]	N & P	I-COD - 1/D; A-OP - 1/W	3 - 10	18	
I	NDIP - TT	0.22	None	NA	NA	NA	13	
J	DIP - TT	0.24 & 0.38[h]	1.0 AA	N & P	F-OP - 1/D	NA	NA	parallel 2S-ASTs, 3FLT (one WWTP)
K	BKP - PW	0.25	2.0 MA, 3.0 DM	N only	F-TP - 3/W	NA	<12	
L	NI - TT, SP	0.26	1.0 AA	None	F-TP - 1/M	NA	NA	EQB
M	BKP, BMCP - PW, SP	0.28	1.0 AA	N & P	F-TP, F-OP - 1/M	7 - 10	60	
N	BCTMP - PW	0.33	1.0 AA	N & P	F-TP, F-OP - 1/D	NA	NA	EQB, OAS
O	NI - PW	0.34	2.0 DM	N & P	A-OP - 3/W	NA	70	
P[i]	NDIP - PKG	0.36	0.72 MA[f], 1.44 DM[f]	NA	NA	NA	NA	
Q	BKP, DIP - PW	0.38	None	N & P	F-TP - 2/M	6	20	1ASB

(Continued on next page. See notes at end of table.)

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Table 5.1 Continued

Mill ID	Mill Type[a]	Total P, Mean Effluent (mg/L)	Total P Permit Limit (mg/L)[b]	Nutrient Addition	P Process Monitoring[c]	Sludge Age (day)	Aeration HRT (hr)[d]	Certain WWTP Features[e]
R	NI - PW, SP	0.39	1.0 MA	N & P	A-OP - 1/D	NA	NA	parallel OAS & SBR
S	NI - SP	0.42	5.0 MA	N & P	M-OP - 3/D	NA	21	EQB
T	BMCP, BCMP, DIP - NSP	0.43	0.85 MA	N & P	F-TP, F-OP - 1/D	5	18	OXD
U	BMCP, BTMP - PW, SP	0.48	1.0 AA	N & P	F-OP - 3/D	NA	36	
V	BKP - PW, PKG	0.48	None	N & P	F-OP - 3/D	5	8	
W	DIP - TT	0.50	1.0 AA	N & P	F-TP - 3/D	3	19	
X	BKP - PKG	0.50	None	N & P	I-OP, A-OP, F-OP, F-TP - 1/D	NA	3	
Y	DIMP	0.56	1.0 MA	N & P	A-OP - 6/D	5	NA	3CL
Z	UBKP, NDI - PKG	0.56	None	N & P	I-OP, A-OP, F-OP - 3/W	4	4.5	OAS
AA	NDI - PKG	0.60	11 MA, 18 DM	N & P	A-OP - 1/D	40	50	SLTR, 3STP
BB	DIP - TT	0.62	1.0 AA	N & P	I-COD, A-OP - 2/D	NA	NA	3PPT
CC	NI - PW	0.64	1.6 MA	N & P	F-OP - 1/D	NA	12	2S-AST
DD	DIP - PW	0.64	None	NA	NA	NA	NA	
EE	NI - PW, SP	0.64	1.0 AA	P only	A-OP - 3/D	NA	26	
FF[i]	UBKP - SP	0.67	1.0 AA	N & P	A-OP, F-OP - 6/D	<2	1	1ASB, OAS
GG	DIP - PW	0.69	1.0 AA	N & P	F-OP - 3/D	NA	NA	2S-AST
HH	NI - PW	0.71	1.0 AA	N & P	A-OP, F-OP - 2/D	16	NA	
II	SCP, NDIP - PKG	0.71	1.8 MA	N & P	I-COD, F-OP - 1/D	13	140	
JJ	BTMP - NSP	0.71	None	N & P	F-TP, F-OP - 1/D	9	60	AEQB, SLTR
KK	BKP - PW, PKG	0.75	None	N & P	A-OP - 2/W	NA	NA	1ASB, 3STP
LL	UBK, NDI - PKG	0.77	None	N & P	F-TP - 1/M; M-OP - 6/Y	NA	5	3STP

(Continued on next page. See notes at end of table.)

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Table 5.1 Continued

Mill ID	Mill Type[a]	Total P, Mean Effluent (mg/L)	Total P Permit Limit (mg/L)[b]	Nutrient Addition	P Process Monitoring[c]	Sludge Age (day)	Aeration HRT (hr)[d]	Certain WWTP Features[e]
MM	BKP - PW, BKMP	0.83	1.0 MA	N & P	F-OP - 2/D	4	24	
NN	UBKP, NDI - PKG	0.83	None	N & P	F-OP - 12/D	5	NA	OAS
OO	BKP - PW	0.84	None	N & P	A-OP - 1/D	4	<8	OAS
PP	DIP - TT	0.90	1.0 AA	N & P	F-TP - 1/M	NA	NA	3DAF

[a] BCMP = bleached chemimechanical pulp, BCTMP = bleached chemithermomechanical pulp, BKMP = bleached kraft market pulp, BKP = bleached kraft pulp, BMCP = bleached mechanical pulp, BTMP = bleached thermomechnical pulp, DIMP = deinked market pulp, DIP = deinked pulp, NDIP = non-deinked recycled pulp, NI = non-integrated, NSP = newsprint, NWP = nonwood pulping, PKG = packaging paper and board, PW = printing and writing paper, SCP = semichemical pulp, SP = specialty papers, TT = tissue and/or toweling, UBKP = unbleached kraft pulp

[b] AA = annual average or 12-month rolling average, MA = monthly average, DM = daily maximum.

[c] Format is: location-parameter - frequency. Location: A = activated sludge aeration tank effluent or within the aeration tank, F = final effluent, I = aeration tank influent (usually primary effluent), M = multiple locations. Parameter: COD = chemical oxygen demand (BOD surrogate), DP = total dissolved phosphorus, OP = orthophosphate, TP = total phosphate. Frequency: 1/D = daily, 2/D = twice per day, 3/D = three times per day, 6/D = six times per day, 1/m = monthly, 2/M = twice per month, 1/W = weekly, 2/W = twice per week, 3/W = three times per week, 5/W = five times per week, 6/Y = six times per year (every two months).

[d] The hydraulic residence time (HRT) of the activated sludge aeration tank only.

[e] 1ASB = All or a portion of the mill effluent passes through an aerated stabilization basin before entering the activated sludge system, 2S-AST = two activated sludge systems in series, 3CL = tertiary clarifier, 3DAF = tertiary dissolved air flotation, 3 FLT = tertiary filtration, 2PPT = chemical precipitation of P in secondary clarifier, 3PPT = tertiary chemical precipitation of P, 3STP = tertiary stabilization, polishing or holding ponds. AEQB = aerated equalization or cooling basin, BA = boiler ash, ash pond decantate, or wet scrubber effluent is sent to treatment plant (P source), EQB = equalization basin, HDP = foul condensates are hard-piped to biological treatment (N source), OAS = oxygen activated sludge system, OXD = oxidation ditch, SBR = sequencing batch reactor, SLTR = selector, WTLD = portion of primary effluent can be routed to a wetland.

[f] Seasonal permit limit.

[g] Effluent concentration and permit limits are net values, taking into account the P in intake water. Without this adjustment, the effluent TP concentration would be about 0.05 to 0.1 mg/L higher.

[h] The mill has parallel treatment plants, each with its own outfall.

[i] Mill has recently closed.

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Table 5.2 Activated Sludge Plants at North American Pulp and Paper Mills with Low Final Effluent Nitrogen Concentrations

Mill ID	Mill Type[a]	Total N, Mean Effluent (mg/L)	Total N Permit Limit (mg/L)[b]	Nutrient Addition	N Process Monitoring[c]	Sludge Age (dy)	Aeration HRT (hr)[d]	Certain WWTP Features[e]
K	BKP - PW	1.3	4.0 MA, 8.0 DM	N only	F-TKN, F-NH3, F-NO3 - 3/W	NA	<12	
V	BKP - PW, PKG	1.4	None	N & P	I-COD - 1/D; A-NH3 - 6/D; F-NH3 - 1/D	5	8	
JJ	BTMP - NSP	1.5	None	N & P	F-TKN, F-NH3, F-NO3 - 1/D	9	60	AEQB, SLTR
QQ	BKMP	1.7	None	None	F-TKN, F-NH3, F-NO3 - 1/M	40	34	AEBQ
D	BKP - PW, SP	1.9[f]	None	P only	M-NH3 - 1/D	5	4	AEQB, HDP
Q	BKP, DIP - PW	2.5	None	N & P	F-NH3 - 1/W; F-TKN, F-NO3 - 1/M	6	20	1ASB
X	BKP - PKG	2.8	None	N & P	A-NH3, F-NH3 - 1/D	NA	3	
RR	NDIP, SCP - PKG	3.2	None	N & P	A-NH3, A-NO3 - 3/W	>50	70	EQB, 3STP
H	NWP - SP, PW	3.8	None	N & P	I-COD - 1/D; A-NH3 - 1/D	3 - 10	18	
AA	NDIP - PKG	4.7	None	N & P	A-NH3, A-NO3 - 1/D	40	50	SLTR, 3STP

[a] BKMP = bleached kraft market pulp, BKP = bleached kraft pulp, DIP = deinked pulp, NDIP = non-deinked recycled pulp, NSP = newsprint, NWP = nonwood pulping, PKG = packaging paper and board, PW = printing and writing paper, SP = specialty papers, TMP = thermomechnical pulp

[b] MA = monthly average, DM = daily maximum

[c] Format is: location-parameter - frequency. Location: A = activated sludge aeration tank effluent or within the aeration tank, F = final effluent, I = aeration tank influent, M = multiple locations. Parameter: COD = chemical oxygen demand (BOD surrogate), NH3 = ammonia, NO3 = nitrate, TKN = total Kjeldahl nitrogen. Frequency: 1/D = daily, 6/D = six times daily, 1/m = monthly, 1/W = weekly, 3/W = three times per week

[d] The hydraulic residence time (HRT) of the activated sludge aeration tank only.

[e] 1ASB = All or a portion of the mill effluent passes through an aerated stabilization basin before entering the activated sludge system, 3STP = tertiary stabilization, polishing or holding ponds, AEQB = aerated equalization or cooling basin, EQB = equalization basin, HDP = foul condensates are hard-piped to biological treatment (N source), SLTR = selector

[f] Monitoring of total nitrogen is recent requirement, and the data are limited.

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Attachment B

A Review of the Characteristics and Fate of Suspended Solids Discharged with Biologically Treated Effluents from Pulp and Paper Mills

Dr. William E. Thacker
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October 2010

A Review of the Characteristics and Fate of Suspended Solids Discharged with Biologically Treated Effluents from Pulp and Paper Mills

Dr. William E. Thacker
October 2010

Introduction

Wastewater treatment plants with even the best design and operation discharge some suspended solids in the treated effluent. Once these solids enter a receiving water there are several possibilities regarding their behavior and fate. They may, in whole or in part: remain suspended, become dissolved, settle out, become re-suspended, associate with other suspended matter, or become part of the food chain. Fate is influenced by characteristics of the solids, such as particle size, density, and chemical composition.

Questions and assertions are raised periodically by regulatory agencies and others regarding the fate of suspended solids discharged from wastewater treatment plants. In the 1970s, as one example, the Corps of Engineers claimed that suspended solids released by biological treatment plants behaved in the same manner as sediment from land erosion, and thus point dischargers should bear some of the costs of dredging projects (NCASI 1978c; NCASI 1978d).

This report summarizes readily available information on the characteristics and fate of suspended solids discharged with biologically treated effluents from pulp and paper mills. Biological treatment, generally either by activated sludge plants or aerated stabilization basins (ASBs), is standard practice for paper industry wastewater that is to be discharged to surface water. An overall summary of the findings is presented below, followed by more detailed summaries of individual references.

Executive Summary

In general, suspended solids in biologically treated effluents from pulp and paper mills are mostly biological in origin, consisting of bacteria and bacterial cell fragments, and small amounts of mineral matter. The solids are of very small particle size, typically less than 10 μm in diameter. This small size contributes to the difficulty in settling the solids in a treatment plant and constrains settling in receiving waters. The nitrogen and phosphorus contents of the solids are on the low end of the levels found in bacteria.

Information from laboratory, artificial-stream, and field studies, as well as empirical evidence, strongly indicates that suspended solids in mill effluents do not easily settle in receiving waters, are easily re-suspended if they do settle, and do not accumulate to a noticeable degree on the beds of receiving waters. As they are largely organic in composition, the solids serve as food for aquatic organisms and thus are incorporated into the tissues of the organisms.

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Characteristics of Suspended Solids in Biologically Treated Pulp and Paper Mill Effluents

Characteristics of suspended solids in treated effluents from three pulp and paper mills as well as a pilot unit treating diluted kraft black liquor have been described (NCASI 1978a). Two of the mills were integrated bleach kraft operations utilizing activated sludge treatment with long hydraulic retention times (HRTs) in the aeration units, namely 3.5 and 10 days. Clarifier HRTs were 2.7 hours at one mill and 7.0 hours at the other. Coagulant was added to the secondary clarifiers at each mill (alum in one case and alum plus polymer at the other). The third mill produced paperboard from recovered paper and had a 10-day HRT ASB and settling ponds with an HRT of 2.5 days. The pilot ASB treating diluted black liquor had an aeration HRT of 5 days and two sedimentation units with a combined HRT of 10 days. Suspended solids in all final effluent samples examined were not reported, but for those that were, they varied from 20 mg/L to more than 100 mg/L.

Suspended solids characterization was mostly directed at the determination of particle size using scanning electron and optical microscopy with "sieve analysis," i.e., fractionation with membranes (NCASI 1978a). Solids were also characterized by Zeta potential measurements, qualitative elemental analysis, and determination of deoxyribonucleic acid (DNA) content. It was concluded that solids discharged from secondary treatment facilities were primarily organic and compressible in nature and were generated during biological treatment. The solids were generally less than 8 μm in size[1]. Viability of this material determined by DNA analysis was found to be less than 25 % by weight, the remainder consisting of non-living cell fragments and inorganic matter. The dispersed form of the solids were likely due to steric hindrance and/or adsorption of hydrated hydrophilic colloids rather than charge repulsion, which would explain the difficulty encountered in coagulating the particles at reasonable chemical doses.

The suspended solids from a laboratory biological reactor and in the discharge of a mill ASB treating the same bleached kraft mill effluent were analyzed using a phase microscope and a hemacytometer (NCASI 1978c). A hemacytometer is a ruled and calibrated glass slide for counting cells. The findings indicated that the suspended solids from both sources were almost entirely biological in origin, being either individual or flocculated bacteria. The bacteria comprised over 95 percent of the suspended solids when either number or volume was considered. It was estimated that seventy-five percent or more of the particles were less than 1.5 μm in size and nearly all were 10 μm or less in size. Overall, the two effluents exhibited many similarities such as the abundance of small particles, small flocs, and rod shaped bacteria single or in pairs, and some filamentous bacteria.

Biskner, Millican, and Barton (1976) provided information on the particle size of suspended solids present in the effluent discharged from two mills. One mill engaged in sulfite pulping and treated its wastewater with an activated sludge system, and the other produced bleached kraft pulp and had an ASB for wastewater treatment. In both cases, a large majority of the suspended

[1] As bacteria of spherical and rod-like shape typically vary from 0.3 to 10 μm in size (Metcalf and Eddy 2003), the information presented in this report suggests that the solids are of a size expected for single bacteria or for flocs of a few bacteria.

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solids in the final effluents were less than 5 μm in size with few if any particles large than 20 μm. The small particle sizes made granular, mixed-media filtration ineffective in significantly reducing the level of suspended solids in the effluents.

The Academy of Natural Sciences of Philadelphia studied the suspended solids in treated effluent from an integrated sulfite pulp mill with an activated sludge plant, including an examination of particle size (ANSP 1977). The solids were found to be principally within the narrow size range of 0.83 to 1.4 μm, with some larger particulate matter also present.

The particle size distributions in activated sludge effluents from two mills in Finland have been presented by Kasko (1996). One of the mills produced kraft pulp, and the other was a nonintegrated paper mill. Particle size was measured using a laser diffractometer. Most of the suspended solids were smaller than 1.5 μm in the paper mill effluent and less than 0.5 μm in the pulp mill effluent, but some particles were greater than 50 μm in size.

Levels of settleable solids in treated mill effluents have been reported by NCASI (1986). Settleable solids were measured using the standard laboratory procedure involving an Imhoff cone and a quiescent settling period of 60 minutes. The study was conducted in light of the possibility that state regulatory agencies might place limits on discharged settleable solids in NPDES permits, rather than evaluating the procedure as a simulation of solids behavior in receiving waters. Sixteen mills representing eleven categories of pulp and paper production participated in the twelve month study to characterize the settleable portion of the total suspended solids in treated discharges. Thirteen of the mills provided some form of biological treatment while the remaining three facilities practiced chemically assisted clarification. Collectively, the volumetric settleable solids measured during the study were 3.0 ml/L, 15.5 ml/L, and 26 ml/L (0.3%, 1.55%, and 2.6% by volume) respectively for long-term average, maximum monthly, and maximum daily performance periods. The level of settleable solids in treated effluent did not appear to be function of the type of treatment. On a mass basis, settleable solids obtained from the laboratory procedure typically represented 40% to 60% of the total suspended solids.

In conducting research to quantify the rates and extents to which organic nitrogen and phosphorous in biologically treated mill effluents degrade to bioavailable inorganic forms, NCASI developed data on suspended solids concentrations in discharged effluents as well as other information that allow for some chemical characterization of the suspended solids (NCASI 2004, 2009). In particular, the volatile and nutrient contents (phosphorus and nitrogen) of the solids can be estimated. Data were obtained from ten mills representing several types of production, and they encompassed both of the major types of biological treatment in the industry - activated sludge systems and aerated stabilization basins. The average levels of suspended solids among individual mills ranged from approximately 10 mg/L to 80 mg/L with a collective average for the mills of 30 mg/L. Average volatile contents of the suspended solids among individual mills ranged from 56% to 87% with a collective average of 74%. Similarly, the phosphorus content of the solids varied from 0.5% to 1.9% with a collective average of 1.1%. For nitrogen, the values ranged from 2.4% to 18% with a collective average of 7.8%. The nutrient contents are on the low end for the levels found in bacteria (Egli 2000).

Behavior and Fate of Suspended Solids in Biologically Treated Pulp and Paper Mill Effluents

The Academy of Natural Sciences conducted preliminary work on the effects of suspended solids in biologically treated wastewaters from facilities in the Northeast (ANSP 1977). The work was performed mostly with effluent solids from an integrated sulfite pulp mill having activated sludge treatment, but solids from a municipal treatment plant and from a chemical plant were also investigated. The findings were as follows: (a) the suspended solids were not at a concentration high enough to interfere with photosynthesis in a stream, (b) nutrients associated with the solids stimulated the growth of the algae Scenedesmus abundans but with no deleterious effect found, (c) bacterial cells in the effluent did increase in number upon entering stream water but the increase was not substantial and was limited by the nutrient content of the stream water, and (d) the suspended solids proved to be a satisfactory food for protozoa.

NCASI (1978c) described an investigation into the fate of biological solids from the treatment of kraft mill effluent in warm-water artificial streams. Artificial streams provide controlled conditions that are very close to conditions existing in nature, and they offer easy accessibility for timely sampling and study. Suspended solids used in this work were C-14 labeled and generated in a laboratory biological reactor simulating an ASB (no sludge recycle) receiving whole-mill effluent from a bleached kraft pulp mill. The solids were introduced to artificial streams having pool and riffle areas and to which water from the Neuse River in North Carolina was already being fed. The in-stream concentration of suspended solids from the solids introduction was between 1 and 2 mg/L. The streams previously were stocked with several types of organisms such as caddis flies, snails, amphipods, leeches, and beetle larvae, after periphyton had been established. It was found that some solids were ingested by a variety of invertebrates including both grazing and filter feeding organisms, and were incorporated into their tissues. In turn, consumption of the invertebrates by fish occurred with a demonstration that C-14 was incorporated into fish tissue. A comparison of the amount of organic benthic matter accumulated in the pools of control streams and those receiving the effluent suspended solids for a period of more than two years showed no measurable difference.

The findings were reported for a study in which effluent from an unbleached kraft linerboard mill was introduced into cold-water artificial streams containing many pools and riffles (NCASI 1977). The streams, including control streams receiving no effluent, utilized water from the Willamette River in Oregon. One of the objectives of the study was to evaluate the impact of suspended solids in the ASB treated effluent on the benthic community. No measurable changes in benthic organisms, including filter feeding organisms, indicated that an incremental increase of 2 to 3 mg/L of suspended solids from biologically treated mill effluent had no detrimental effects on benthic populations.

NCASI (1978b) investigated at three sites the extent of deposition of solids discharged with treated mill effluent via diffusers into relatively quiescent areas of receiving streams. Effluent at each site had undergone biological treatment and secondary clarification before discharge. At each of sites, several sample locations downstream but near the outfall were examined as was an upstream location. Sensory observations were made by divers, core samples were taken, and

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sediment traps were installed for the accumulation of deposition over a one year period. These examinations of benthal conditions revealed no sludge layers, and no evidence of a definitive impact from effluent solids was found.

NCASI (1978d) conducted a field study on the fate of suspended solids discharged from the treatment plant at a mill in New York State producing boxboard from wastepaper. Features of the treatment plant included an aerated stabilization basin with a 10-day hydraulic retention time followed by two settling ponds with a combined retention time of 2.75 days. The final effluent had a flow rate and suspended solids concentration ranging from 0.5 to 1.0 MGD and 10 to 20 mg/L, respectively. With a dilution factor at the point of discharge of 6:1, the in-stream concentration of suspended solids was initially about 2 mg/L. Carbon-14 labeling of the suspended solids provided a means of tracking the fate of the solids in the river system. The river reach studied had a length of 10 miles and a time of travel of 7 days, and it offered conditions consisting of intermittent riffle and free flowing areas interspersed with impoundments. The investigators determined that over 96% of the discharged solids either remained suspended or were metabolized, even with velocities an order of magnitude lower than normally associated with scouring of organic particles. Sediment traps placed in pools behind dams, where earlier work found no discernible bottom deposits of mill solids, captured less than 4% of the material. It was also determined that mill solids were ingested by a variety of invertebrates including both grazing and filter feeding organisms.

Velinsky et al. (2003) employed the isotopic signature (C-13 and N-15) of solids (> 0.7 μm) in a biologically-treated discharge from a pulp mill on the Jackson River in Virginia to determine the influence of the solids on isotopic compositions of material transported downstream and the potential incorporation of the solids into benthic algae, macroinvertebrates, and fish. Effluent solids consisted predominantly of biological material, and had unique and easily traceable isotopic markers. Suspended effluent solids decreased substantially by 19 miles downstream of the mill, and this information combined with the biological data suggested that solids were a source of food and were integrated into the food chain.

The Water Research Laboratory (WRL) at the University of New South Wales recently completed a project that investigated the physical properties of suspended solids expected to be present in the effluent discharged from a pulp mill proposed for Bell Bay in Australia (www.wrl.unsw.edu.au/site/projects/ effluent- particle-dynamics-gunns-pulp-mill). Effluent is to be treated with an activated sludge system before discharge into Bass Strait via a diffuser three miles from the coast. The study was designed to simulate with laboratory physical models the movement of suspended solids during their transport in the discharge pipe and in the marine environment within the near-field zone, including settling and re-suspension dynamics. The work was conducted at the Veracel pulp mill in Brazil, which was identified as producing an effluent equivalent to the one expected at the proposed mill. The researchers studied floc size evolution, settling rates of flocculated material, critical shear velocity for floc re-suspension, and partitioning studies of flocs under various mixing levels. WRL also collaborated with a consulting firm to develop a dynamic sediment transport model for assessing particle transport and concentrations within the near-field. The results indicated that suspended solids discharged from the proposed outfall were unlikely to settle in the near-field zone of the outfall. Further,

any solids that might settle would be quickly re-suspended and transported away from the site. Note that this research examined physicochemical behavior only, ignoring the effects of fauna on the fate of the solids[2].

References

Academy of Natural Sciences of Philadelphia (ANSP). 1977. *1976 studies: Fate and effects of suspended solids from secondary biological treatment of wastewater*. Report No. 77-31. Philadelphia: Academy of Natural Sciences of Philadelphia.

Biskner, C.D., Millican, J.H., and Barton, C.A. 1976. Granular media filtration of a pulp plant secondary effluent at the Buckeye Cellulose Corporation plant, Perry, Florida. In *Proceedings of the 1976 NCASI Southern Regional Meeting*, 65-77. New York: National Council of the Paper Industry for Air and Stream Improvement, Inc.

Egli, T. 2000. Nutrition of microorganisms. *Encyclopedia of Microbiology.* Volume 3. 2nd ed. J. Lederberg, ed. New York: Academic Press.

Kasko, J. 1996. Particle size distribution as a factor in designing the tertiary stage of pulp and paper mill wastewater treatment. *Paperi ja Puu* 78(4):195-201.

Metcalf and Eddy, Inc. 2003. *Wastewater engineering, treatment and reuse*, 4th ed. New York: McGraw-Hill.

National Council [of the Paper Industry] for Air and Stream Improvement, Inc. (NCASI). 1977. *Effects of unbleached kraft mill effluents on growth and production of fish in experimental stream channels*. Technical Bulletin No. 290. New York: National Council of the Paper Industry for Air and Stream Improvement, Inc.

———. 1978a. *Characterization of dispersed residual solids in biologically treated pulp and paper mill effluents*. Technical Bulletin No. 303. New York: National Council of the Paper Industry for Air and Stream Improvement, Inc.

———. 1978b. *An investigation of the extent of residual biosolids deposition in quiescent receiving waters.* Technical Bulletin No. 304. New York: National Council of the Paper Industry for Air and Stream Improvement, Inc.

[2] The description of the WRL research is based on the limited information provided at the WRL website. Although the website for the planned Bell Bay Pulp Mill contains numerous documents, a report on the WRL research did not appear to be available, possibly because the project was recently completed. The website does have a document about of the scope of hydrodynamic modeling and field measurements to be conducted for the proposed outfall (www.gunnspulpmill.com.au/permits/epbc/L/Appendix D - Hydrodynamic Modelling and Measurement Scope and Plan.pdf).

———. 1978c. *A study of the fate of biosolids from biologically treated effluent in laboratory and constructed streams.* Technical Bulletin No. 308. New York: National Council of the Paper Industry for Air and Stream Improvement, Inc.

———. 1978d. *A study of the fate of suspended solids from a full scale treatment plant in receiving waters.* Technical Bulletin No. 313. New York: National Council of the Paper Industry for Air and Stream Improvement, Inc.

———. 1986. *A cooperative study to examine treated pulp and paper industry effluents for settleable solids.* Technical Bulletin No. 488. New York: National Council of the Paper Industry for Air and Stream Improvement, Inc.

———. 2004. *Biodegradability of organic nitrogen and phosphorus in pulp mill effluents.* Technical Bulletin No. 879. Research Triangle Park, NC: National Council for Air and Stream Improvement, Inc.

———. 2009. *Summary of NCASI's effluent nutrient biodegradation study results.* Technical Bulletin No. 967. Research Triangle Park, NC: National Council for Air and Stream Improvement, Inc.

Velinsky, D.J., Flinders, C.A., Saxe, N.E., and Thomas, R.L. 2003. Incorporation of pulp mill effluent solids in aquatic food webs: Use of carbon and nitrogen stable isotopes. *Bulletin of the North American Benthological Society* 20(1): 232. (Abstract also available at www.benthos.org/Other-Publications/NABStracts/2003/168.aspx)

Attachment C

GLATFELTER
Beyond Paper

June 12, 2008

CERTIFIED MAIL – Return Receipt Requested

Mr. John Wetherell
NPDES Permitting Section
Division of Planning and Permits
Bureau of Water Standards and Facility Reg.
Rachael Carson Building
400 Market Street
Harrisburg, PA 17101

Dear Mr. Wetherell:

P. H. Glatfelter Company (Glatfelter) has performed an evaluation of its nutrient loading. Glatfelter's total phosphorus loading is less than 25 lbs per day and therefore is not classified as "Significant Industrial Discharger" as defined by the Department.

Attached is a copy of our nutrient loading evaluation which focuses on total nitrogen.

If you have questions or require additional information, please feel free to contact me at 717-225-4711 Ext. 2616

Sincerely,

GLATFELTER

Phyllis D. Chant

Phyllis D. Chant
Environmental Director

cc: Mr. Lee McDonnnel
Ms. Crystal Newcomer

Spring Grove Facility 228 South Main Street Spring Grove, PA 17362 U.S.A. Phone 717-225-4711 Fax 717-225-6834
www.glatfelter.com

Nutrient Report
P. H. Glatfelter Company
228 S. Main Street
Spring Grove, PA

I. PROCESS AND WASTEWATER TREATMENT

A. Processes

The P.H. Glatfelter Company (Glatfelter) operates an integrated pulp and paper kraft mill in Spring Grove PA. The mill receives wood which is debarked, chipped, and then made into pulp. The pulp is screened, washed and bleached. The pulp is then converted into finished paper products on five paper machines and two off-machine coaters.

Process wastewater is the combination of flows discharged from the pulp mill, paper machines, and coater operations to the Wastewater Treatment Plant. Pulp mill effluents consist primarily of bleaching effluent and pulping process condensates from the digester system, turpentine recovery system, and evaporator system. Paper machine effluent consists primarily of the portion of whitewater (machine process water that has been processed to remove most of the fiber and solids) that is not reused on the machines or as dilution water in the pulp mill. Coater effluent consists primarily of wash waters generated when switching from one coating to another or to clean equipment of contaminants.

In addition, treated and disinfected municipal effluents are accepted by Glatfelter's secondary treatment plant for tertiary treatment from the Jackson Township and Spring Grove Borough POTWs.

Effluent from Glatfelter's Wastewater Treatment Plant is discharged to the Codorus Creek from Outfall 001.

B. Waste Treatment – Primary and Secondary Waste Treatment

The Glatfelter Wastewater Treatment Plant includes both primary and secondary waste treatment. The paragraphs below present a brief description of the process components of these treatment systems.

1. Primary Wastewater Treatment

The main process sewer flows to Primary Treatment, where settleable solids are removed in three clarifiers. The sludge that is generated is pumped to the sludge thickeners for dewatering. Primary effluent is pumped to the equalization basin.

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2. Equalization Basin

The equalization basin is used to reduce the variation in the strength of wastewater going to the secondary treatment process. The equalization basin is an aerated and mixed basin with a detention time of approximately 24 hours.

3. Secondary Wastewater Treatment

Secondary waste treatment is designed to reduce BOD and toxicity. Micro-organisms digest organic material in wastewater under aerobic conditions.
The effluent of the equalization basin is directed sequentially through the No. 1 and No. 2 aeration basins. Intense aeration is provided to ensure the aerobic conditions necessary to provide adequate BOD removal. The biomass utilized in this process is separated from the treated effluent in four secondary clarifiers. The majority of the biomass is returned to the process, with the remainder pumped to the sludge thickener for dewatering. The clarified secondary effluent then flows through a flow measuring device and is discharged to Codorus Creek.

4. Dewatering & Sludge Handling

Solids from both primary and secondary waste treatment are directed sequentially through a gravity thickener, rotary screen, and screw press to reduce water content. The sludge generated in this process is burned in Power Boiler No. 5 or is shipped off-site.

C. Nutrient Loadings to Wastewater Treatment

The following are sources of nutrients to Glatfelter's Wastewater Treatment Plant.

1. Foul Condensates

Pulpmill process condensates (also called foul condensates) are collected and conveyed in a closed pipe system (hardpipe) to the No. 1 Aeration Basin at Secondary Waste Treatment. Foul condensates include significant concentrations of methanol, ammonia and reduced sulfur compounds such as hydrogen sulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide. They are discharged below the liquid level surface as required by 40 CFR 63.446(e)(2). The foul condensate sources are collectively known as Source 197 - Pulping Process Condensates in the PA DEP Title V Permit and annual AIMS report.

2. Phosphorus Addition

Phosphorus is added to the wastewater as a nutrient supplement to support the microorganisms in the secondary waste treatment process. Glatfelter has

determined that a small addition of phosphorous enhances secondary treatment efficiency without significantly increasing effluent phosphorous concentrations.

3. Paper Coater Wastewater

   Wastewater from the paper coating operations contains nitrogen and phosphorus compounds

4. Municipal POTW Effluents

   Glatfelter's Secondary Wastewater Treatment Plant provides tertiary treatment to the effluent flows received from both the Jackson Township and Spring Grove POTWs

D. Process Map

Figure 1.0 presents a schematic of the Wastewater Treatment processes.

E. NPDES Permit Limits –Permit # PA0008869

Parameter/contaminant	**Monitoring Frequency -Limit**
Effluent Temperature	Monitor daily maximum – 110 degree F
Upstream Temperature	Monthly average, Daily maximum
Downstream Temperature	Weekly average - month-specific
Instream Temperature Change	Maximum -2 degrees F/hour
Raw Sewage Influent Color	Monthly average, Daily maximum
Effluent Color	Monthly average - 140/123 pcu
	Daily maximum - 280/246 pcu
Upstream Color	Monthly average, Daily Maximum
Downstream Color	Monthly average, Daily Maximum
Dissolved oxygen	Instantaneous minimum – 5.0 mg/l
BOD_5 Loading	Monthly average – 1168/1751 lbs/day
	Daily maximum – 2335/3503 lbs/day
BOD_5 Concentration	Monthly average – 14/17 mg/l
	Daily maximum – 25/34 mg/l
COD – Raw Sewage	Monthly average, Daily maximum
COD – Effluent	Monthly average, Daily maximum
pH	Minimum, maximum, continuous – 6.0 – 9.0
TSS Loading	Monthly average – 2057 lbs/day
	Daily maximum – 4113 lbd/day
TSS concentration	Monthly average – 30 mg/l
	Daily maximum - 60 mg/l
Total Nitrogen	Monthly average, Daily Maximum

Initial investigations indicated that there was no observed benefit when adding more than 300 lbs per day. This was the lowest level ever attempted. However, efforts to reduce ammonia loading continued. Aqua ammonia was then lowered incrementally from that point to 0 lbs per day, which is where it has remained to date.

IV. CODORUS CREEK NUTRIENT STUDY

A. Codorus Creek In-stream Sampling

Water quality samples were collected from various points in the Codorus Creek watershed as part of the Long-term Receiving Water Study by the National Council for Air and Stream Improvement (NCASI). Total nitrogen and total phosphorus were two of the parameters studied. Monthly total nitrogen data are available for the period from September 1997 to October 2007. Upstream (from Outfall 001) water samples were taken at Oil Creek (Oil Creek), and in the Codorus Creek at Menges Mill (Menges), and the USGS stream gage (USGS). Downstream samples were taken at Martins Bridge (Martin), the Route 616 bridge (Graybill), and Codorus Furnace (Furnace).

Figure 2 provides a map of the sample point locations. USGS is located approximately 0.4 miles upstream from Glatfelter's Outfall 001. Martin is located 1.2 miles downstream of Outfall 001.

This analysis uses only data generated after March 1999; prior data were collected before Glatfelter significantly reduced the ammonia addition rate to its waste water treatment process. Table 1.0 presents the results of 77 sampling events conducted between April 1999 and October 2007. The lowest mean TN concentration was at Menges (3.07 mg/L). The highest was in Oil Creek (7.60 mg/L). Oil Creek enters Codorus Creek just downstream from Menges.[1]

[1] Similar results were obtained for Total Phosphorus sampling. Mean Total Phosphorus concentration was lowest at Menges Mill (.067 mg/L) and highest at Oil Creek (0.426 mg/L). Furnace (0.131 mg/L) had the highest mean concentration in the Codorus.

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TABLE 1.0

Total Nitrogen Concentrations for 77 Monthly Samples Collected between April 1999 – October 2007		
Sample Location	Mean (mg/L)	Range (mg/L)
Menges	3.07	0.05-7.42
Oil Creek	7.60	2.80-23.3
USGS	3.90	0.06-7.98
Martin	3.36	1.41-6.33
Graybill	3.86	1.85-7.44
Furnace	4.66	1.79-7.02

The mean total nitrogen concentration at USGS (3.90 mg/L) reflects the combination of Codorus Creek and Oil Creek, and whatever influence is exerted by the minor tributary Bunch Creek, which was not sampled directly as part of study. Glatfelter draws its process water from Codorus Creek approximately 1.5 miles upstream from USGS. There are no significant tributaries between Glatfelter's intakes and USGS, therefore, it is reasonable to assume that total nitrogen concentrations at the two sites are approximately the same. From Glatfelter's perspective, the most striking feature of the data presented in Table 1.0, is the significant reduction in total nitrogen concentration that occurs between USGS (3.90 mg/L) and Martin (3.36 mg/L). This reduction in total nitrogen concentration is attributed to Glatfelter's Outfall 001 discharge, as there are no significant tributaries in that reach. A comparison of the mean and range data for USGS and Martin strongly suggest that Glatfelter is on average a net total nitrogen sink, with only occasional instances when Glatfelter increases total nitrogen concentrations in Codorus Creek. A review of the 77 sample pairs showed that downstream total nitrogen concentrations (at Martin) exceeded upstream concentrations (at USGS) on only 9 occasions. This data suggests that on average, the total nitrogen concentration of Glatfelter's effluent is significantly lower than the concentrations at both its intake upstream and Martin downstream.

B Glatfelter's Effluent Sampling (Outfall 001)

Quarterly nutrient sampling from Outfall 001 was performed 15 times during the period from April 1999 through October 2004 as part of the Long-term Receiving Water Study. Additional weekly effluent total nitrogen data have been collected from July 2007 to the present per the requirements of Glatfelter's NPDES permit. Data summaries from both of these sources are provided in Table 2.0 below:

TABLE 2.0

Total Nitrogen Concentrations of Outfall 001 Effluent

Data	Average TN mg/L	Range TN mg/L	# of Samples
NCASI	2.53	1.1 – 8.4	16
NPDES	< 2.6	0.55 – 7.1	45

The data in Table 2.0 confirm that the average total nitrogen concentration in Outfall 001 effluent has been significantly lower than the average total nitrogen concentration at both the upstream (USGS) and downstream (Martin) sample sites. The average total nitrogen concentrations measured for each data set are very similar, indicating the total nitrogen concentration of Glatfelter effluent has not changed significantly between April 1999 and the present.

Unfortunately, effluent sampling was conducted independently of the stream sampling program, with only five dates on which both effluent and stream samples were both collected. Those data are provided in Table 3.0 below.

TABLE 3.0

TOTAL NITROGEN – MASS BALANCE ON CODORUS CREEK
USGS-Martin

Date	Effluent TN mg/L	Effluent Q cfs	USGS TN mg/L	Stream Q cfs	Total Q cfs	Estimated Martins mg/L	Actual Martins mg/L	Estimated GLT Contribution
6/21/1999	1.23	19.3	3.46	24.9	44.2	2.49	3.23	-
4/17/2000	5.56	20.1	4.15	77.2	97.3	4.44	4.33	147.1
9/24/2001	1.5	19.5	2.6	43.7	63.2	2.26	2.20	-114.7
5/06/2002	1.6	17.5	3.1	19	36.5	2.38	2.40	-156.5
10/25/2004	1.5	16.9	5.26	25	41.9	3.74	3.74	-392.2

Glatfelter estimated total nitrogen concentration at Martin (by flow-proportioning of upstream and effluent concentrations) in order to test the validity of the assumptions used to estimate Glatfelter's total nitrogen contribution for each of the five dates. The assumptions were: 1) Glatfelter effluent flow was equal to its intake flow (excluding non-contact cooling water), and 2) the total nitrogen concentration at Glatfelter's intakes was equal to the concentration measured at USGS. Validation was poor (-23% error) for the 6/21/99 sample date, therefore it was not considered further. However, there was a strong correlation between the estimated and actual measured concentrations at Martin for the remaining four sample dates ($\leq$2.7 % error). On those four dates, Glatfelter was a net contributor of total nitrogen on only one occasion (147.1 #/d), and removed an average of 221.1 #/d from Codorus Creek on the remaining three sample dates.

Preliminary Evaluation for Industrial Dischargers to the Bay

Introduction

This document describes how the industrial facility should perform a preliminary evaluation on the nutrient load to their facility. The following will help the facility and the Department better understand the source of the nutrient loading and pinpoint potential nutrient reductions. It will also provide information on measures the facility may have already taken in their own efforts to reduce their nutrient loading.

A significant industrial discharger is defined as an industrial facility that has been identified as discharging either 75 lbs/day of Total Nitrogen or 25 lbs/day of Total Phosphorus. If you feel that you have mistakenly been placed in the "Significant Industrial Discharger" list provide the argument against being placed in this category and documentation supporting your claim. The Department will make a determination based on the information presented.

Ultimately, the preliminary findings will be used in the Nutrient Reduction Evaluation (NRE). The NRE will be used to determine methods to reduce the facilities nutrient loading to surface waters via their NPDES-permitted discharges.

The objectives of an NRE are to evaluate options for a permittee to reduce its nutrient load to the receiving water, to select the most cost-effective options, and to propose an implementation plan for review and approval by the Department. An NRE comprises the following components:

- Facility, process, and wastewater treatment description.
- Sources and characteristics of wastewater, and operational performance of treatment systems.
- Nutrient reduction options.
- Implementation plan.

The preliminary evaluation should consist of the following:

Previous Reduction in Nutrient Loading

A number of facilities have voluntarily reduced the nutrient loading of their discharge. Provide documentation of the reduction in loading which may include but is not limited to:

1. Source Reduction – Source reduction may include changes to quantity or type of raw materials, reduction in volume of wastewater through waste minimization, substitution of chemical cleaners, detergents and other maintenance products that have reduced concentrations of phosphorus and nitrogen compounds and any other reduction in the source of nutrients the facility may have performed.

2. Operational Process Changes – The facility may have instituted reuse of process waters or changed the process control of the wastewater treatment that has reduced the nutrient loading in the effluent.

FIGURE 1.0

Waste Treatment Plant Layout

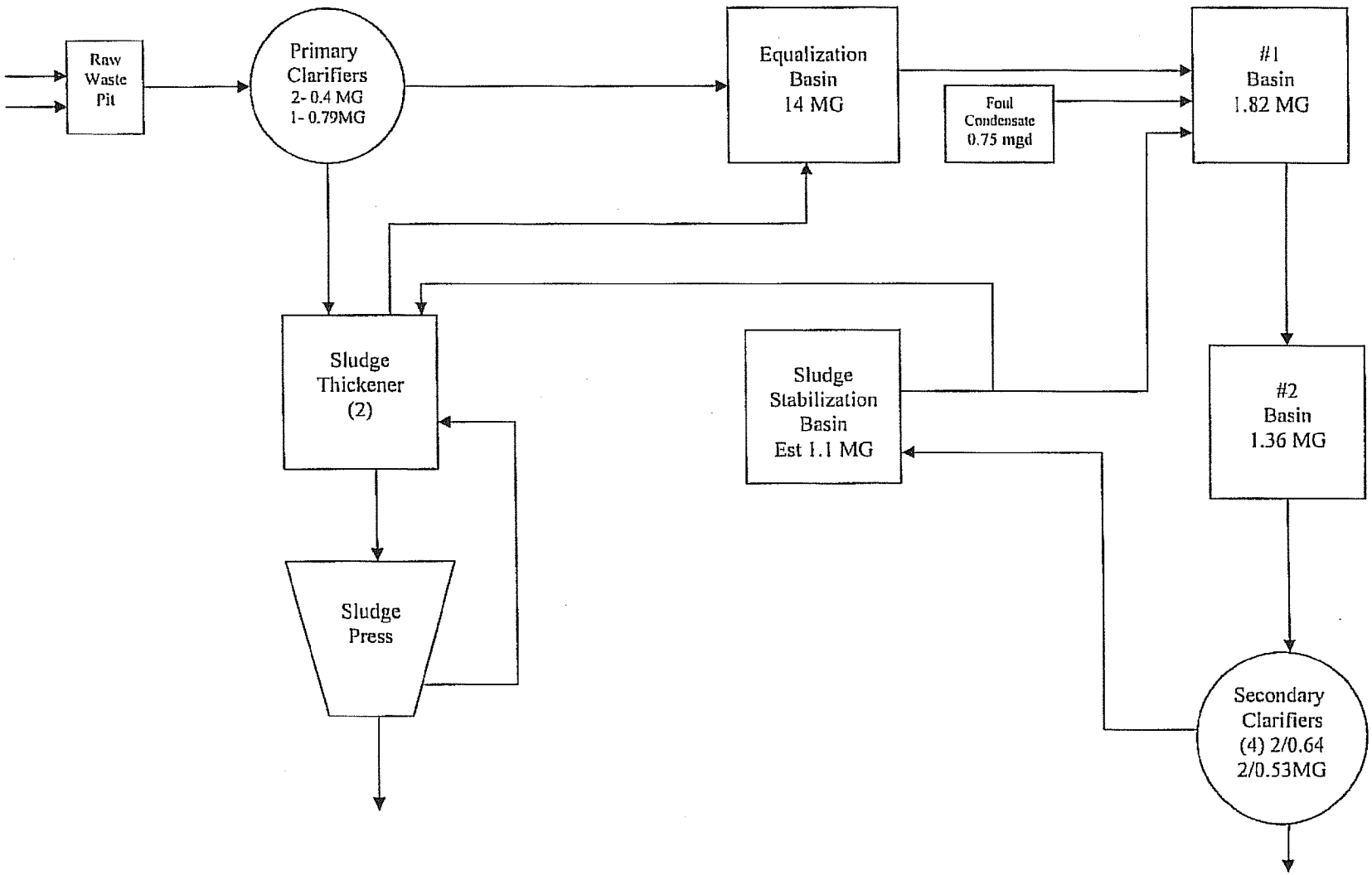

FIGURE 2
Sample Locations

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Attachment D

GLATFELTER
Beyond Paper

May 21, 2010

CERTIFIED MAIL - Return Receipt Requested

Mr. Lee A. McDonnell, P. E.
Program Manager
Water Management Program
Pennsylvania Department of Environmental Protection
909 Elmerton Avenue
Harrisburg, PA 17110-8200

RE: Outfall 001 Nutrient Concentrations/Loading

Dear Mr. McDonnell,

The Department's letter dated 2/26/10 proposed caps on both nitrogen and phosphorus effluent loading for the P.H. Glatfelter Company (Glatfelter) Spring Grove mill. Glatfelter acknowledges the importance of controlling nutrient levels to support the health of the Chesapeake Bay, but believes it is unjustified to propose caps on industrial dischargers that actually maintain or reduce stream nutrient loading.

As you are aware, Glatfelter uses large quantities of water in its production of pulp and paper. Water used in pulp and paper making processes is directed to the mill's wastewater treatment plant and treated prior to its discharge at Outfall 001.

The National Council for Air and Stream Improvement (NCASI) has been conducted a long term receiving water study of the Codorus Creek. Nutrient concentrations are being examined in this long term study. NCASI conducted instream sampling along the Codorus Creek from 1997 to 2009. Laboratory testing for both Total Nitrogen and Total Phosphorus was analyzed at each sampling point. An examination of the lab results upstream and downstream of Glatfelter's effluent outfall provides information regarding the impact of Glatfelter's effluent discharge on nutrient loading.

The map provided in Attachment I present the location of specific sampling points discussed in this summary. The USGS sampling point is located 0.4 miles upstream from Glatfelter's Outfall 001. The Martin sampling point is located 1.2 miles downstream of Outfall 001. Glatfelter draws it process water from the Codorus Creek approximately 1.5 miles upstream from Outfall 001. There are no significant tributaries between Glatfelter's intake and USGS sampling point, therefore it is reasonable to assume that nutrient levels at the two points are nearly the same.

Spring Grove Facility 228 South Main Street • Spring Grove, PA 17362 U.S.A. • Phone 717-225-4711 • Fax 717-225-6834
www.glatfelter.com

This analysis only uses data collected after January 2000 because, during the 1999 operating year, Glatfelter significantly reduced the ammonia addition rate to its wastewater treatment process. Attachment II presents the results of eighty one sampling events conducted between January 2000 and October 2009.

A review of Attachment II indicates that instream Total Nitrogen concentrations are typically higher than those of the effluent discharge point. On average, the downstream concentrations are approximately 0.58 mg/L lower than upstream concentrations. Downstream samples were shown to have lower concentrations than upstream samples in 89% of the data points (or 72 of the 81 samples).

Results for Total Phosphorus indicate average downstream Total Phosphorus concentrations are nearly identical to upstream concentrations differing by only 0.01 mg/L or within analysis margin of error. Downstream samples were shown to have lower concentrations than upstream samples in 66% of the data points (or 46 of the 70 samples). Of the twenty-four samples with higher downstream concentrations, fourteen (58%) were higher by only 0.01 mg/L. The Total Phosphorus loading is essentially the same as that coming into the mill intake.

The mill's Wastewater Treatment Plant uses biological treatment and does not include processes for the physical or chemical removal of phosphorus. The water quality data indicates, however, that this treatment does reduce nitrogen loading to the Codorus Creek relative to the mill's intake water.

Finally, in reviewing the Total Nitrogen and Total Phosphorus concentrations reported on Glatfelter's Discharge Monitoring Reports from 2008 and 2009, the average Total Nitrogen concentration from the mill's effluent is 2.4 mg/l. The mill's average Total Phosphorus concentration was 0.15 mg/l for this period. See Attachment III for a summary of the Total Nitrogen and Total Phosphorus concentrations discharged at Outfall 001.

The long term average instream Total Nitrogen concentrations with the mill 2008-2009 effluent values are as follows:

	Upstream USGS	Effluent Outfall 001	Downstream Martin
TN	4.03 mg/l	2.4 mg/l	3.45 mg/l

A review of the effluent flows during the 2008 and 2009 operating years indicates an average flow of 14.2 MGD. If one were to assume a decrease of 1.63 mg/l of Total Nitrogen per day (i.e. 4.03 -2.4) the reduction in Total Nitrogen loading would be roughly 193 lbs per day. This would result in an estimated annual reduction of 70,445 lbs per year. It should also be noted that the mill's wastewater treatment plant receives the effluent flows from both Jackson Township and Spring Grove Borough. Flows from the

municipalities have increased during the past several years (particularly due to residential and industrial development in Jackson Township), and the mill's Wastewater Treatment Plant has continued to effectively treat these waste streams.

On June 12. 2008, as part of the Department's work group process, Glatfelter provided the Department with a Nutrient Report that explained that the mill's Wastewater Treatment Plant served as a nutrient sink on the Codorus Creek. The information provided with this letter further substantiates this view, and Glatfelter continues to believe that it does not qualify as a Significant Industrial Discharger of Total Nitrogen or Total Phosphorus under the Department's Chesapeake Bay Industrial Wastewater Compliance Plan (Feb.1, 2010) (the "Compliance Plan"). The Compliance Plan provides that dischargers that withdraw water and discharge effluent into the the same surface water are to be credited for background nutrient loads, provided that the discharger demonstrates the annual average daily background nutrient level. This, in effect, is a load netting analysis that, when applied to the Spring Grove mill, yields a credit to Glatfelter for at least Total Nitrogen. Glatfelter understands that the Department's Nutrient Trading Policy is significantly more complicated that this simplistic approach, and is examining the Department's guidance documents now to determine whether its reduction in Total Nitrogen would qualify for certification.

In any event, at this point, Glatfelter believes that the most appropriate action to be taken with regard to the Compliance Plan and Glatfelter's NPDES permit is to amend it to include monitoring requirements of upstream, effluent and downstream nutrient levels. Glatfelter does not believe that is justified or appropriate to amend its NPDES permit to add load caps for nutrients.

Please feel free to contact me at 717-225-4711 (Ext. 2616) if you have any questions regarding the information summarized in this letter.

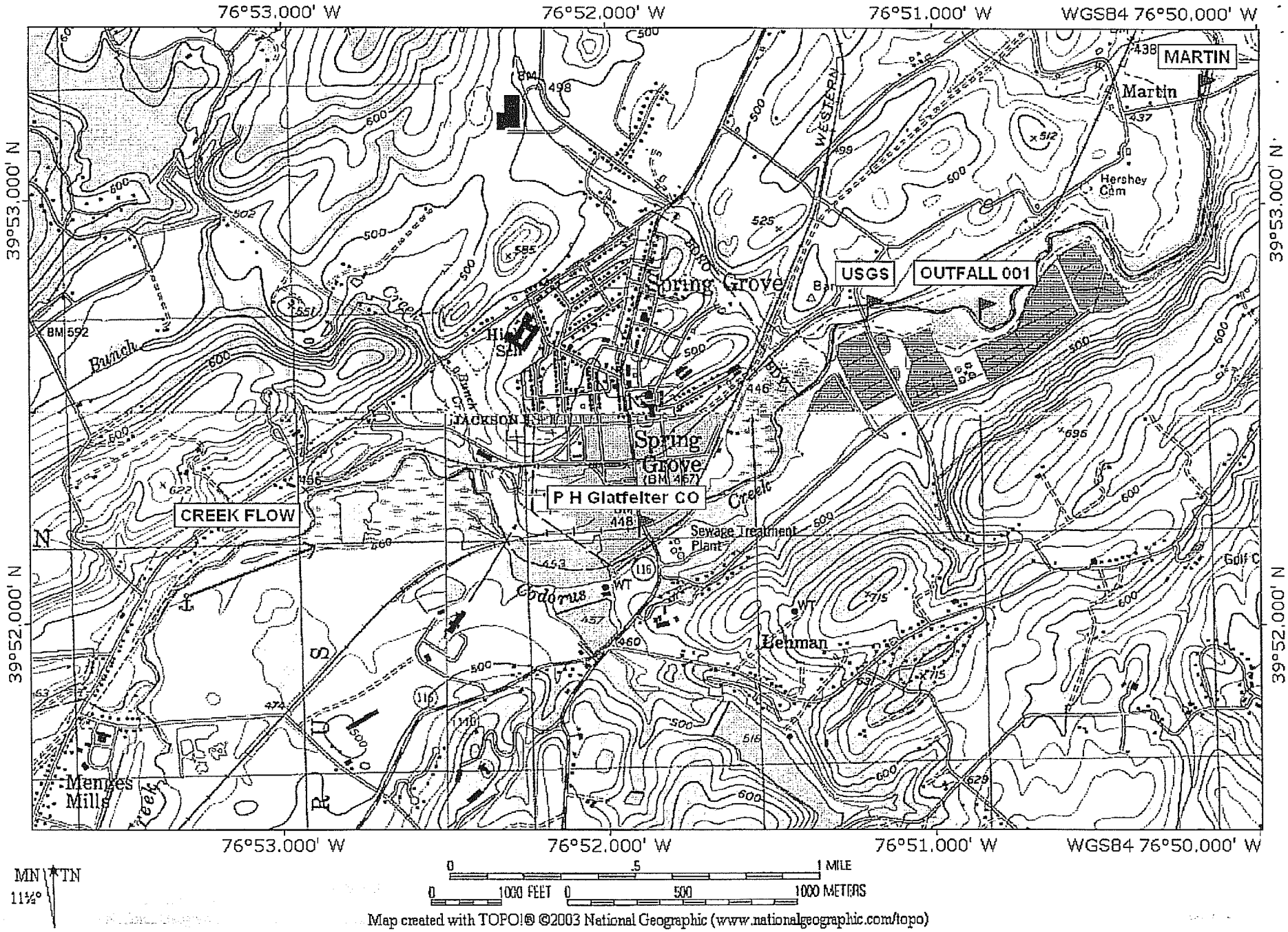
Sincerely,

GLATFELTER

Phyllis D. Chant

Phyllis D. Chant
Environmental Director

ATTACHMENT I



Map created with TOPO!® ©2003 National Geographic (www.nationalgeographic.com/topo)

ATTACHMENT II
NCASI INSTREAM DATA

Date	Total Nitrogen Concentration (mg/L)				Total Phosphorus Concentration (mg/L)		
	USGS (Upstream) TN	Martin (Downstream) TN	Diff		USGS (Upstream) TP	Martin (Downstream) TP	Diff
1/24/2000	3.18	2.80	0.38		No Reading	No Reading	NA
2/28/2000	4.08	4.15	(0.07)		0.17	0.17	0.00
3/27/2000	5.53	4.66	0.87		NA	NA	NA
4/17/2000	4.15	4.33	(0.18)		0.02	NA	NA
5/22/2000	4.52	3.23	1.29		0.06	0.02	0.04
6/26/2000	5.94	4.75	1.19		0.27	0.16	0.11
7/24/2000	2.78	2.26	0.52		0.01	NA	NA
8/28/2000	2.31	2.00	0.31		0.07	0.06	0.01
11/27/2000	3.30	2.40	0.90		0.13	0.09	0.04
1/29/2001	5.30	4.70	0.60		NA	0.03	NA
2/26/2001	5.90	5.20	0.70		0.14	0.05	0.09
3/26/2001	5.20	4.60	0.60		0.10	0.11	(0.01)
4/30/2001	5.40	4.80	0.60		0.08	NA	NA
5/21/2001	3.60	3.40	0.20		0.20	0.21	(0.01)
6/20/2001	3.50	3.90	(0.40)		0.12	0.11	0.01
7/30/2001	2.90	2.90	0.00		0.03	NA	NA
8/27/2001	2.60	2.20	0.40		NA	0.04	NA
9/24/2001	2.60	2.20	0.40		0.14	0.13	0.01
10/29/2001	2.60	2.70	(0.10)		0.07	0.02	0.05
11/26/2001	3.10	3.10	0.00		0.06	0.02	0.04
1/28/2002	3.50	3.20	0.30		0.08	0.07	0.01
2/25/2002	2.50	2.20	0.30		0.03	0.05	(0.02)
3/25/2002	4.60	3.50	1.10		0.09	0.07	0.02
5/6/2002	3.10	2.40	0.70		0.05	NA	NA
6/10/2002	3.90	4.00	(0.10)		0.03	NA	NA
7/29/2002	3.90	3.10	0.80		0.10	0.19	(0.09)
8/26/2002	2.70	2.30	0.40		0.11	0.16	(0.05)
9/30/2002	3.70	2.40	1.30		0.16	0.11	0.05
10/28/2002	5.70	4.00	1.70		0.12	0.14	(0.02)
11/18/2002	4.60	4.50	0.10		0.22	0.31	(0.09)
1/27/2003	8.00	6.30	1.70		0.05	0.06	(0.01)
2/24/2003	5.25	5.05	0.20		0.45	0.42	0.03
3/31/2003	4.40	4.21	0.19		0.10	0.11	(0.01)
4/28/2003	5.08	3.91	1.17		0.06	0.07	(0.01)
5/12/2003	4.35	1.75	2.60		0.06	0.04	0.02
6/30/2003	4.56	4.11	0.45		0.06	0.24	(0.18)
7/28/2003	3.71	3.04	0.67		0.04	0.05	(0.01)
8/11/2003	3.69	3.45	0.24		0.16	0.16	0.00
9/29/2003	3.51	3.37	0.14		0.07	0.07	0.00
10/27/2003	4.09	3.54	0.55		0.12	0.09	0.03
11/17/2003	4.79	4.27	0.52		0.06	0.05	0.01

ATTACHMENT II
NCASI INSTREAM DATA
(CONTINUED)

Date	Total Nitrogen Concentration (mg/L)				Total Phosphorus Concentration (mg/L)		
	USGS (Upstream) TN	Martin (Downstream) TN	Diff		USGS (Upstream) TP	Martin (Downstream) TP	Diff
1/26/2004	4.60	4.21	0.39		0.02	0.06	(0.04)
2/23/2004	3.83	3.81	0.02		0.06	0.07	(0.01)
3/22/2004	4.19	3.88	0.31		0.04	0.04	0.00
4/19/2004	4.06	4.08	(0.02)		0.09	0.11	(0.02)
6/28/2004	4.03	3.37	0.66		0.06	0.03	0.03
7/19/2004	4.60	3.77	0.83		0.06	0.06	0.00
8/30/2004	3.82	3.38	0.44		0.10	0.10	0.00
9/27/2004	4.02	3.48	0.54		0.13	0.11	0.02
10/25/2004	5.26	3.74	1.52		0.17	0.11	0.06
11/15/2004	5.01	3.40	1.61		0.21	0.14	0.07
4/18/2005	4.26	3.78	0.48		0.04	0.04	0.00
5/16/2005	4.29	3.31	0.98		0.10	0.07	0.03
6/6/2005	4.82	3.58	1.24		0.26	0.14	0.12
8/15/2005	3.35	3.17	0.18		0.14	0.11	0.03
9/19/2005	2.77	2.46	0.31		0.07	0.04	0.03
10/18/2005	4.98	3.92	1.06		0.13	0.08	0.05
4/10/2006	5.13	3.99	1.14		0.09	0.08	0.01
5/15/2006	4.75	3.73	1.02		0.17	0.14	0.03
6/26/2006	3.76	3.97	(0.21)		0.29	0.32	(0.03)
8/14/2006	3.05	2.64	0.41		0.16	0.11	0.05
9/25/2006	3.11	2.44	0.67		0.07	0.03	0.04
10/30/2006	4.29	3.20	1.09		0.15	0.14	0.01
4/16/2007	3.74	3.68	0.06		0.12	0.13	(0.01)
5/14/2007	3.72	3.02	0.70		0.14	0.13	0.01
6/25/2007	2.80	2.04	0.76		0.09	0.07	0.02
8/6/2007	2.11	1.75	0.36		0.09	0.10	(0.01)
9/17/2007	2.06	1.42	0.64		NA	0.09	NA
10/29/2007	2.67	1.52	1.15		0.13	0.08	0.05
3/31/2008	5.72	5.93	(0.21)		0.15	0.13	0.02
5/12/2008	9.62	9.79	(0.17)		0.38	0.39	(0.01)
6/9/2008	3.65	3.26	0.39		0.06	0.07	(0.01)
8/4/2008	2.36	2.02	0.34		0.12	0.12	0.00
9/15/2008	3.17	2.44	0.73		0.10	0.10	0.00
10/27/2008	2.64	2.55	0.09		0.16	0.19	(0.03)
4/27/2009	4.38	3.17	1.21		0.08	0.08	0.00
5/11/2009	4.45	3.68	0.77		0.07	0.10	(0.03)
6/1/2009	3.50	2.77	0.73		0.07	0.08	(0.01)
8/24/2009	2.77	2.12	0.65		0.10	1.53	(1.43)
9/14/2009	3.33	2.99	0.34		0.13	0.12	0.01
10/26/2009	3.95	3.26	0.69		0.12	0.11	0.01
Average	**4.03**	**3.45**	**0.58**		**0.12**	**0.13**	**0.01**

ATTACHMENT III
DMR NUTRIENT SUMMARY

P.H. Glatfelter Company Discharge Monitoring Report Data Operating Years 2008-2009			
Month/Year	Total Nitrogen mg/l Averages	Total Phosphorus mg/l Averages	Total Phosphorus mg/l Weekly Max.
January 2008	< 2.5	0.15	0.20
February 2008	< 5.2	0.15	0.16
March 2008	< 3.3	0.15	0.17
April 2008	< 2.7	0.14.	0.15
May 2008	< 2.2	0.12	0.18
June 2008	< 2.9	0.15	0.18
July 2008	< 1.5	0.11	0.18
August 2008	< 2.0	0.11	0.14
September 2008	< 1.4	0.20	0.23
October 2008	< 1.7	0.22	0.31
November 2008	< 6.0	0.20	0.26
December 2008	< 1.5	0.15	0.18
2008 Averages	**< 2.7**	**0.14**	**0.20**
January 2009	< 1.4	0.18	0.20
February 2009	< 1.3	0.16	0.20
March 2009	< 2.8	0.13	0.13
April 2009	< 1.5	0.12	0.15
May 2009	< 2.3	0.14	0.18
June 2009	< 3.0	0.16	0.29
July 2009	< 1.2	0.22	0.45
August 2009	< 1.5	0.11	0.13
September 2009	< 1.6	0.09	0.16
October 2009	< 1.6	0.17	0.21
November 2009	< 1.6	0.15	0.15
December 2009	< 5.1	0.22	0.36
2009 Averages	**< 2.1**	**0.15**	**0.22**

2008	2.7	0.15	0.20
2009	2.1	0.15	0.22
Average	**2.4**	**0.15**	**0.21**