

COMMONWEALTH OF PENNSYLVANIA
Department of Environmental Protection
Northeast Regional Office
Water Management Program

October 25, 2000

570-826-5415

SUBJECT: Phosphorus Criteria
Swiftwater Creek
Monroe County, PA

TO: Kate Crowley
Program Manager

FROM: Sherrill R. Wills *SRW/dzsc*
Water Pollution Biologist

THROUGH: Thomas E. Stauffer
Water Pollution Biologist

George M. Fetchko
Monitoring and Compliance Manager

I have completed identifying and counting the macroinvertebrate samples collected from Swiftwater Creek on August 9, 2000. Water chemistry samples have been summarized in Table I, macrobenthic samples in Table II, and the metrics in Table III (attached). The final memo for the results will be completed in the near future.

In summary, the water chemistry and macrobenthic results do not indicate any impairment of Swiftwater Creek.

I have prepared a new SERA based on the water chemistry, actual measured stream flow, macrobenthic data and habitat assessments from the August 9, 2000 stream investigation. I have included three stations in the SERA scoring: Station 1, upstream of the Pocono Manor discharge; Station 5, upstream of the Pocono Mountain School District discharge; and Station 8, upstream of the SR314 bridge, site of the June 6, 2000 SERA report.

The SERA scoring gives a score of 9 for Station 1, 13 for Station 5, and 7 for Station 8. High quality streams with a score <10 are considered low risk, with no point source phosphorus controls needed, moderate risk score is between 11 and 20 points, and high risk score is greater than 20 (Pa. DEP Doc. ID: 391-2000-018). Controls are required for moderate or high risk high quality streams.

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Phosphorus Criteria
Swiftwater Creek
Monroe County, PA

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Using this guidance, the Stations 1 and 8 do not require P limits. Station 5 is a moderate risk site, requiring a minimum P control of 2.0 mg/l to be required. Station 5 could also be applied to the Aventis permit, requiring the imposition of a 2.0 mg/l P limit.

cc: K. Crowley/G. Fetchko
RA, d²⁶ P. Swerdon/J. Scolere
S. Wills/T. Stauffer
J. Cigan
File

Phosphorus Criteria
Swiftwater Creek
Monroe County, PA

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SRW:jar
WP: R3-6684.doc
HP: 10/3/00
TP(D): 10/3/00
RP(F): 10/25/00-ajm

Department of Environmental Resources
Water Management Program
Northeast Regional Office

Subject: Aquatic Life Protection
NPDES # PA-0029149 Pocono Manor Inn, Ireland Hotels, Inc.
PA-0060071 Aventis/Pasteur Merieux Laboratories
To: PA-0040444 Pocono Mountain School District

Date: 10/2/2000
File:

From: Tom Stauffer/Sherrill R. Wills
Water Pollution Biologist

At your request, benthic macroinvertebrates and 7 chemical sample(s) were collected from Swiftwater Creek on 8-9-00. A location map is attached which identifies the sampling location(s).

STATION #1 (Sample #0287749) Upstream Pocono Manor discharge

The results indicate the stream is:

- excellent macrobenthic quality - diverse and pollution sensitive.
- average macrobenthic quality - moderately diverse and sensitive.
- marginal macrobenthic quality - low diversity and sensitivity.
- poor macrobenthic quality - few taxa, all tolerant.
- no macrobenthos.

COMMENTS ON MACROBENTHIC QUALITY: A total of 22 taxa identified, 18 taxa pollution intolerant.

- excellent water quality.
- average water quality.
- marginal water quality.
- poor water quality.

COMMENTS ON WATER QUALITY: Very low alkalinity (10.4 ppm CaCO₃) typical of streams in this region.

- aquatic life should be protected at this station.
- aquatic life should not be protected at this station.

SUBSTRATE (%): Bedrock (solid) ; Boulders (>10 in.) 20; Rubble (2.5 to 10 in.) 20; Gravel (0.1 to 2.5 in.) 35; Sand 20; Silt 5; Detritus .
Stream Width: 8-10 ft. Stream depth: Riffle 3-6"; Pools 18";
Pool/Riffle ratio ; Gradient

STREAM ENRICHMENT RISK ANALYSIS:

Alkalinity: >40mg/l (5); 20-40 mg/l (3); <20 mg/l (1)	<u>1</u>
Shading: <50% or >25 ft wide (5); 50-75% (3); >75% (1)	<u>1</u>
Velocity: <0.5 fps (3); 0.5-1.49 fps (5); 1.5-2.0 fps (3); >2.0 fps (1)	<u>1</u>
Scouring: <2/year (5); 2 - 5/year (3); >5/year (1)	<u>3</u>
Substrate: sand - silt (5); gravel - rubble (3); boulder - bedrock (1)	<u>3</u>

SUSCEPTIBILITY RANKING

9

FIELD MEASUREMENTS: pH 6.6; temp. 16°C; D.O. 9.6; Spec Cond 70

STATION #5 (Sample # 0287744) upstream Pocco Mt. SD and Avenis discharges

The results indicate the stream is:

- excellent macrobenthic quality - diverse and pollution sensitive.
- average macrobenthic quality - moderately diverse and sensitive.
- marginal macrobenthic quality - low diversity and sensitivity.
- poor macrobenthic quality - few taxa, all tolerant.
- no macrobenthos.

COMMENTS ON MACROBENTHIC QUALITY: Still has ²² total taxa but the number of pollution intolerant taxa decrease to 12 taxa. Still has many sensitive individuals. Change in habitat (fewer trees, channel modification, no riparian buffer) could account for some of the community.

- excellent water quality.
- average water quality.
- marginal water quality.
- poor water quality.

COMMENTS ON WATER QUALITY: low alkalinity (12 ppm CaCO₃), hardness of 23.19.

- aquatic life should be protected at this station.
- aquatic life should not be protected at this station.

SUBSTRATE (%): Bedrock (solid) ; Boulders (>10 in.) 15; Rubble (2.5 to 10 in) 40; Gravel (0.1 to 2.5 in) 25; Sand 15; Silt 5; Detritus .
Stream Width: 20-25 ft; Stream depth: Riffle 6"; Pools 8-24";
Pool/Riffle ration ; Gradient

STREAM ENRICHMENT RISK ANALYSIS:

Alkalinity: >40mg/l (5); 20-40 mg/l (3); <20 mg/l (1)	<u>1</u>
Shading: <50% or >25 ft wide (5); 50-75% (3); >75% (1)	<u>5</u>
Velocity: <0.5 fps (3); 0.5-1.49 fps (5); 1.5-2.0 fps (3); >2.0 fps (1)	<u>1</u>
Scouring: <2/year (5); 2 - 5/year (3); >5/year (1)	<u>3</u>
Substrate: sand + silt (5); gravel - rubble (3); boulder - bedrock (1)	<u>3</u>

SUSCEPTIBILITY RANKING 13

FIELD MEASUREMENTS: pH 7.2; temp. 16.5°C; D.O. 9.2; Spec Cond 105

Subject : Aquatic Life Protection
NPDES # PA

County:

Date:
File:

STATION #8 (Sample # 0287743) SR. 314 bridge

The results indicate the stream is:

- excellent macrobenthic quality - diverse and pollution sensitive.
- average macrobenthic quality - moderately diverse and sensitive.
- marginal macrobenthic quality - low diversity and sensitivity.
- poor macrobenthic quality - few taxa, all tolerant.
- no macrobenthos.

COMMENTS ON MACROBENTHIC QUALITY:

- excellent water quality.
- average water quality.
- marginal water quality.
- poor water quality.

COMMENTS ON WATER QUALITY:

Alkalinity increases to 18.6 ppm CaCO₃, but is still < minimum state WQ criteria of 20.0 ppm CaCO₃. Low BOD (0.70 mg/l), low conc. of nutrients i.e. P or N. Metals all measured less than detection limit except Fe and Mn which is typical for stream with many swamps, bays or marshes in its watershed and for the geology of the area.

- aquatic life should be protected at this station.
- aquatic life should not be protected at this station.

SUBSTRATE (%): Bedrock (solid) _____; Boulders (>10 in) 25; Rubble (2.5 to 10 in) 35; Gravel (0.1 to 2.5 in) 25; Sand 15; Silt _____; Detritus _____.

Stream width: 30-40 ft; Stream depth: Riffle 4"; Pools 18-24"; Pool/ riffle ratio _____; Gradient _____.

STREAM ENRICHMENT RISK ANALYSIS:

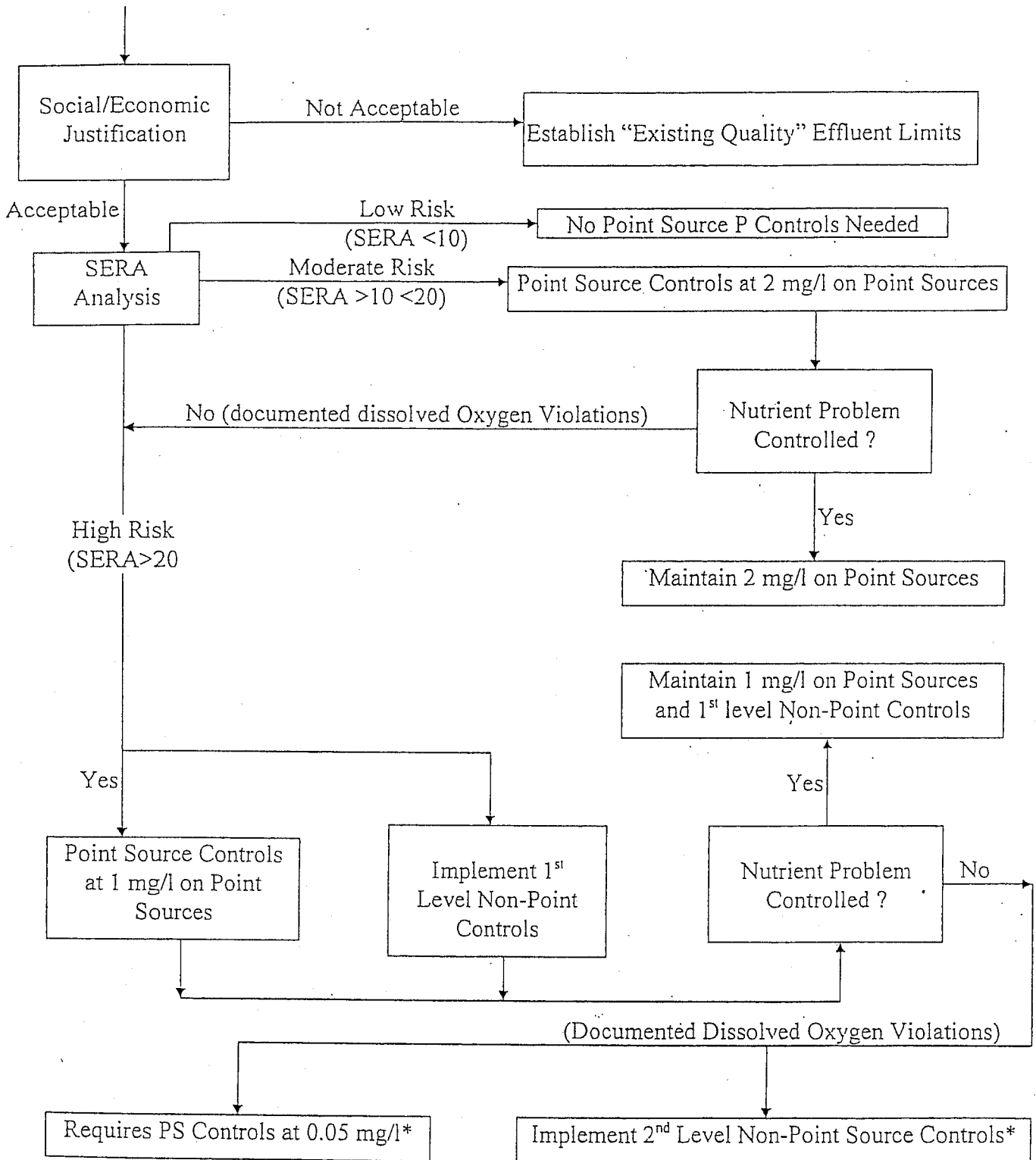
Alkalinity: > 40 mg/l (5); 20-40 mg/l (3); < 20 mg/l (1)	<u>1</u>
Shading: < 50% or > 25 ft wide (5); 50-75% (3); > 75% (1)	<u>1</u>
Velocity: < 0.5 fps (3); 0.5-1.49 fps (5); 1.5-2.0 fps (3); > 2.0 fps (1)	<u>1</u>
Scouring: < 2/year (5); 2-5/year (3); > 5/year (1)	<u>1</u>
Substrate: sand-silt (5); gravel-rubble (3); boulder-bedrock (1)	<u>3</u>
	<u>7</u>

SUSCEPTIBILITY RANKING:

FIELD MEASUREMENT: pH 7.1; temp 17.0°C; D.O. 9.0; Spec cond 145.0

ADDITIONAL COMMENTS: Total P conc of 0.02 mg/l.

FIGURE 2: DETERMINATION OF P CONTROLS FOR HIGH QUALITY WATERSHEDS



*If nutrient problems persist after implementation, the BWC and BSWC will jointly determine what further actions will be necessary

Name of Stream: Swillwater Creek

County: Monroe

Date: August 9, 2000

Water Chemistry Data

Parameter (mg/l unless noted)	Sta. 1	Sta. 2	Sta. 3	Sta. 4	Sta. 5	Sta. 6	Sta. 7
Temperature (°C).....	16.0	22.0	19.0	16.0	16.5*	30.0	18.0
pH (Field).....	6.6	6.4	6.8	6.6	7.2*	8.0	7.6
Dissolved Oxygen.....	9.6	6.0	8.0	9.6	9.2*	7.2	8.8
Spec. Cond.(Field).....	70		190	70	105*	1600	150
Cl Total (Field).....		0.60				0.30	
Cl Free (Field).....							
Flow (cfs).....	5.279	0.774	3.2		6.82*	0.312	7.1
pH (Lab).....	6.3	6.3	6.7	6.3	6.3	7.9	6.4
Spec. Cond. (Lab).....							
Alkalinity (ppm CaCO ₃).....	10.4	26.0	19.6	10.4	12.0	170.0	17.0
pH _a (Hot).....							
Turbidity(NTU).....							
T.O.C.							
5-Day BOD.....	0.60	8.4	2.4	0.60	0.60	1.5	0.60
COD.....	<10.0	38.0	20.0	<10.0	<10.0	<10.0	<10.0
P (Total).....	0.01	2.44	1.73	0.02	0.02	0.17	0.02
P (Dissolved).....							
Total Solids.....	26.0	218.0		54.0	68.0		
Suspended Solids.....	<2.0	10.0	2.0	8.0	<2.0	<2.0	
Settleable Solids.....							
Total Dissolved Solids.....	26.0	208.0	196.0	46.0	68.0	776.0	
NH ₃ -N.....	<0.02	1.89	0.02	<0.02	<0.02	0.07	
NO ₂ -N.....	<0.01	0.04	<0.01	<0.01	<0.01	0.02	
NO ₃ -N.....	0.24	6.19	4.43	0.28	0.36	8.20	
Total N.....	0.33	9.97	5.43	0.41	0.49	9.61	
Hardness (ppmCaCO ₃).....	14.8			14.4	23.19	143.32	28.75
Ca (Total).....	3.94			3.83	6.26	39.2	7.86
Mg (Total).....	1.2			1.17	1.83	11.0	2.21
SO ₄							
Cl.....	17.0	50.0		16.0	23.0	258.0	36.0
F.....							
MBAs.....							
Fecal Coliforms (per 100ml)...	<10	20	80	<20	20	140	<20
Fecal Strep (per 100 ml).....	120			<20	110		40
Al _{TOT} (µg/l).....	<200.0			<200.0	<200.0	617.0	<200.0
Cu _{TOT} (µg/l).....	<10.0			<10.0	14.0	<10.0	<10.0
Fe _{TOT} (µg/l).....	55.0			49.0	34.0	41.0	31.0
Ni _{TOT} (µg/l).....	<50.0			<50.0	<50.0	<50.0	<50.0
Pb _{TOT} (µg/l).....	<1.0			<1.0	<1.0	<1.0	<1.0
Zn _{TOT} (µg/l).....	<10.0			<10.0		157.0	<10.0
Mn _{TOT} (µg/l).....	17.0			17.0	10.0	26.0	10.0
Ag _{TOT} (µg/l).....							
Cd _{TOT} (µg/l).....	<10.0			<10.0	<10.0	<10.0	<10.0
Cr + 6 _{TOT} (µg/l).....	<50.0			<50.0	<50.0	<50.0	<50.0
Hg _{TOT} (µg/l).....	<1.0			<1.0	<1.0	<1.0	<1.0

Name of Stream: Swiftwater Creek

County: Monroe

Date: August 9, 2000

Water Chemistry Data

Parameter (mg/l unless noted)

Sta.
8

Sta.
9

Parameter (mg/l unless noted)	Sta. 8	Sta. 9							
Temperature (°C).....	17.0	19.0							
pH (Field).....	7.1	7.4							
Dissolved Oxygen.....	9.0	8.6							
Spec. Cond. (Field).....	145.0	145							
Cl Total (Field).....									
Cl Free (Field).....									
Flow (cfs).....	8.638	15.593							
pH (Lab).....	6.5	6.4							
Spec. Cond. (Lab).....									
Alkalinity (ppm CaCO ₃).....	18.6	18.8							
pH _a (Hot).....									
Turbidity (NTU).....									
T.O.C.									
5-Day BOD.....	0.70	1.5							
COD.....	<10.0	<10.0							
P (Total).....	0.02	0.01							
P (Dissolved).....									
Total Solids.....	74.0	92.0							
Suspended Solids.....	4.0	<2.0							
Settleable Solids.....									
Total Dissolved Solids.....	70.0	92.0							
NH ₃ -N.....	<0.02	<0.02							
NO ₂ -N.....	<0.01	<0.01							
NO ₃ -N.....	.050	0.24							
Total N.....	0.64	0.46							
Hardness (ppm CaCO ₃).....	30.74	28.86							
Ca (Total).....	8.39	7.92							
Mg (Total).....	2.37	2.2							
SO ₄									
Cl.....	34.0								
F.....									
MBAs.....									
Fecal Coliforms (per 100ml)...	<10	20							
Fecal Strep (per 100 ml).....	130	<10							
Al _{TOT} (µg/l).....	<200.0	<200.0							
Cu _{TOT} (µg/l).....	<10.0	<10.0							
Fe _{TOT} (µg/l).....	<20.0	169.0							
Ni _{TOT} (µg/l).....	<50.0	<50.0							
Pb _{TOT} (µg/l).....	<1.0	<1.0							
Mn _{TOT} (µg/l).....	<10.0	<10.0							
Mn _{TOT} (µg/l).....	<10.0	48.0							
Ag _{TOT} (µg/l).....									
Cd _{TOT} (µg/l).....	<10.0	<10.0							
Hg + Cr _{TOT} (µg/l).....	<50.0	<50.0							
Zn _{TOT} (µg/l).....	<1.0	<1.0							

ENUMERATION

TAXA	HSCO	FPG	Sta. 1	Sta. 4	Sta. 5	Sta. 5A	Sta. 7	Sta. 8	Sta. 9
TURBELLARIA	7	P							
HYDRACARINA	7	P		1	6	2		1	4
OLIGOCHAETA	10	CG			1	1		1	
SPHAERIIDAE	8	FC					3	1	5
PHYSA	8	SC			1	1	7	2	38
ANCYLIDAE	7	SC			1				
HIRUDINEA	8	P			1				
TALLAPERLA	0	SH	9						
LEUCTRA	0	SH	8	8	2				
ALLOPERLA	0	CG	2	1			1	1	1
CULTUS	2	P						1	
SWELTSA	0	P						1	
AGNETINA	2	P			7	4			
ISOPERLA	2	P	2		1			2	
MALIREKUS	2	P	3						
YUGUS	2	P							
PTERONARCYS	0	SH	2	2			1		
EURYLOPHELLA	4	SC						2	
DRUNELLA	1	SC					1	1	1
SERRATELLA	2	CG		1		1		1	
ISONYCHIA	3	CG							
ARTHROPLEA		3 FC				1		1	1
EPEORUS	0	SC							
STENONEMA	3	SC	2	2	1				1
ACERPENNA	6	CG			11	1		6	3
BAETIS	6	CG	4	15	14	8	16	12	7
PARALEPTOPHLEBIA	1	CG	2	1	1		1	4	
TRICORYTHODES	4	CG				1		1	
RHYACOPHILA	1	P	3	5			7		1
LEPIDOSTOMA	1	SH	2						
HYDROPSYCHE	5	FC			1	3	5	1	
CERATOPSYCHE	5	FC			2	1		10	27
CHEUMATOPSYCHE	6	FC	3	3	6	5	34	1	10
BRACHYCENTRUS	1	FC	7	11	5	1	11	2	
DOLOPHILODES	0	FC	6	2	11	8	38	25	
LEUCOTRICHIA	6	SC							
GLOSSOSOMA	0	SC		1	3				1
POLYCENTROPUS	6	FC	3						
MYRNELLUS	8	FC		7					
MYCNOPSYCHE	4	SH		1					
ARAPOYNX	5	SH		1					
TRIGONIA	2	P							
ANTHUS	5	P	1				1	3	1
PTIOSERVUS	4	SC	1			1			
ROMORESIA	2	SC	1						
TENELMIS	5	SC	1						
LEPHARICERA	0	SC							
ANTOCHA	3	CG	1				1		
EXATOMA	2	P			7	9	1		1
EDICIA	6	P			1	3		1	
PULA	4	SH	1		1				
ZZIA	6	P							
ELIFERA	6	P		1					
MULIUM	6	FC					1		
IRONOMIDAE	6	CG	100	59	153	99	114	38	51

Metric	Sta. 1	Sta. 4	Sta. 5	Sta. 5A	Sta. 7	Sta. 8	Sta. 9
Subsample size	164	125	237	152	265	126	154
No. of grids	2	8	2	6	2	4	4
Total Taxa	22	19	22	19	18	25	17
HBI*	4.35	4.70	5.21	5.20	4.77	3.66	6.28
*EPT	12	10	10	8	8	15	7
*%EPT	29.3	27.2	14.3	13.2	24.5	50.8	22.7
%Dominant	61.0	47.2	64.6	65.1	43.0	30.2	33.1
ShannonDiversity	1.76	1.98	1.58	1.53	1.90	2.39	1.91
Intolerant taxa(<6)	18	11	12	11	11	17	9
*%Mayflies	2.4	2.4	0.8	2.0	0.8	11.1	3.9

	Reference		SCORING (25 Pa Code Ch.93,5/19/99)				
	Sta. 1	Sta. 4	Sta. 5	Sta. 5A	Sta. 7	Sta. 8	Sta. 9
Total Taxa ^a	100.00	86.4%	100.0%	86.4%	81.8%	113.6%	77.3%
*HBI Index ^d	0.00	0.35	0.86	0.85	0.42	-0.69	1.93
*EPT Index ^a	100.00	83.3%	83.3%	66.7%	66.7%	125.0%	58.3%
%Dominant ^d	0.00	-13.80	3.60	4.10	-18.00	-30.80	-27.90
%Modified mayfly ^b	0	0.0	1.6	0.4	1.6	-8.7	-1.5

Total Taxa ^a	6	6	6	6	6	6	4
*HBI Index ^d	6	6	4	4	6	6	0
*EPT Index ^a	6	6	6	4	4	6	2
%Dominant ^d	6	6	6	6	6	6	6
%Modified mayfly ^b	6	6	6	6	6	6	6
TOTAL	30	30	28	26	28	30	18
% Reference	100%	100%	93%	87%	93%	100%	60%
	NON	NON	NON	NON	NON	NON	SL

IN COMPARISON TO REFERENCE SCORE: (From EPA/440/4-89/001, pg. 6-27)

Non=Nonimpaired >83%
 Sl=Slightly impaired 54-79%
 Mod=Moderately impaired 21-50%
 Impaired=Severely impaired <17%

^a=candidate/referenceX100.

^b=reference-candidate site value

^d candidate-reference site value