BAMR AMD Project OMR Report

Project #	**BF 386-101.1** (Non-Primacy Bond Forfeiture)
Project Name	Pengrove Coal Coal - Hortert Site
Municipality	Eau Claire Borough
County	Butler County
USGS Quad	Eau Claire
Site Lat./Long.	41° 08' 12" N 79° 48' 27" W (NAD 83)
Problem Area	Site lies approx 1500' south (outside) of PA6591
Feature Number(s)	N/A
Receiving Stream	South Fork to Little Scrubgrass Creek (Sandy Creek Watershed)
DEP Labs SIS Project ID	BF 386-101.1
SIS Monitoring Point ID Alias	PC4-1, PC4-2, PC4-3, PC4-4, PC4-5, PC4-6, PC4-7
Raw Water Quality (Design)	Net Acidic Discharge
pH **Iron (total)** **Aluminum** **Alkalinity** **Hot Acidity** **Sulfate**	*Note: The design was primarily based on the recommendations of a report prepared by the U. S. Department of interior's Bureau of Mines, Pittsburgh Research Center. A copy of this report is available in the project design file.*
Design Flow	**12.5 gpm**
System Type	100' X 100' X 10.5' SAPS pond; 100' X 80' X 10' aerobic/settling pond
Design Methodology	U S Bureau of Mines recommendations of 1500 tons of (3" to 4" dia.) limestone with a 1.5' layer of spent mushroom compost in a 0.23 acre (SAPS) pond with perforated PVC piping to a second (settling) aerobic pond of 0.17 acre. USBR's criteria based on a 14-hour contact time, 30-year life, and 50 gpm flow. A limestone ditch, 0.25-acre SAPS with 1500 tons limestone, 1.5' layer of spent mushroom compost, with perforated PVC piping and water level control to a second (settling) aerobic pond for iron removal was installed.
Date Project Completed	**March 10, 1999**
Project Cost	**$113,457.00**
Project Engr./Designer	George Steiner/Dick Brenneman
Construction Engr./Inspector	Tom Malesky, Larry Mohney, Dale Yingling
O & M and/or Water Sampler	P.J. Shah & Dale Eury
Property Owner 1	**1.** Dennis M. and Barbara L. Sloan, P.O. Box 204, 438 Gibson Street, Eau Claire, PA 16030; Phone 724-791-2776
Property Owner 2	
Property Access Status	Perpetual access for maintenance assumed as Supplemental "C" used in place of Construction Easement Agreement. As of 10/02/08 there is adequate access ***to*** the fenced-in area of the treatment facility; however the area ***inside the fencing*** around the treatment ponds is totally overgrown with thick thorny brush which has not been maintained. Property owner Dennis Sloan has contacted GMS on 10/17/08 to express his request for DEP to remove the undesirable brush from this area.
Directions to Site	**From Route 80:** At Exit 42, take Route 38 to EauClaire. Make right on to Route 58 and go approximately 0.5 mile to access road on right. Access road is gated, as project area lies within fenced area used for cattle.

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Goals/Reason for Project	To increase pH and Alkalinity, & decrease metals loading to Little Scrubgrass Creek. Project site is one of the 16 "Adobe discharge" sites where the bonds were pooled to provide passive treatment.
Project Description & How Influent and Effluent is Measured	**1.** Raw water enters 160 LF R-4 rock lined ditch. **2.** Ditch conveys water to (~100' X 100' X 10.5') SAPS pond; **3.** Water exits SAPS pond via a series of parallel perforated 6" PVC pipes to a main (collector) solid (non-perforated) 6" PVC pipe. **4.** Water flows through 6" PVC collector pipe to an in-line water level control. **5.** Water enters existing (~100' X 80' X 10') aerobic (settling) pond. **6.** Water exits pond via of 12" PVC riser pipe to 12" PVC (barrel/horizontal) pipe. **7.** Pipe outlet enters ~375 LF R-4 rock-lined channel. **8.** Channel outlets into South Fork. **9.** South Fork drains to Little Scrubgrass Creek. The 7 water sampling SIS monitoring Point Alias ID's are PC4-1 through PC4-7. Sampling points PC4-1, PC4-3, PC4-4, and PC4-7 are in H-Flumes installed in rock lined channels. PC4-2 is located at outlet pipe to aerobic pond. PC4-5 and PC4-6 were sampled from upstream (PC4-5) and downstream (PC4-6) on the receiving stream. BAMR CO sampled initially, then Cambria took over sampling.
O, M & R History	Project was completed 03/10/99. Water sampling was performed primarily on a monthly basis from 3/1999 through 12/2001. Brent Means performed evaluation of site on 1/19/06. At that time the system was functioning properly. In August of 2008, PJ Shah attempted to perform additional sampling but was unable to access sampling points due to the large amounts of thick, overgrown thorny brush in the vicinity of the treatment area. Site was re-evaluated by G. Steiner and Mike Lazorcik on 10/02/08.
Watershed Restoration Efforts & Partner Viability	
Evaluation Date	**December 19, 2005**
Evaluator(s)	Brent Means
Water Quality Data Trends	(See attached graphs)
Results of Field Review	System evaluated as part of Brent Means Power Point Presentation to DAMDA on 4/13/06. (Actual date of site evaluation - 12/19/05). Brent's comments: **1.** ~2.63 Tons of limestone have been dissolved (lots left). **2.** System is large enough to provide treatment during high flows. **3.** $/ton acidity removed = $511,000. **4.** $/gal H2O Trearted = $ 0.00705 or $/1000 gal H2O Trearted = $ 7.05. **5.** Cattle/cows grazing project area have been a nuisance to access and O&M of this site.
Performance	System working well, and generally has been since it was constructed.
Evaluation Date	**October 2, 2008**
Evaluator(s)	George Steiner, Mike Lazorcik
Water Quality Data Trends	Increase pH and Alkalinity, & decrease metals. (See attached water sample results)
Results of Field Review	George Steiner and Mike Lazorcik performed site investigation and inspected the system. The rock lined ditch directing flow to the system has been totally overgrown with scrub brush. Vegetation is so thick and overgrown in this area it was not possible to locate the H-Flume (if it is still intact?). The 15" PVC pipe directing flow from the rock lined ditch into the SAPS is clogged. It was not possible to locate the inlet end of this 15" pipe, as this area was overgrown with brush and may have been subject to possible siltation and/or displaced rock lining . Dense, thorny brush has overgrown much of the area inside the fencing making access to the area between the treatment ponds, and access to the aerobic pond area extremely difficult, if not impossible. The H-Flume at station 0+35"C" (located 35' downslope of the outlet pipe from the aerobic pond) was badly damaged and not fuctional. All other H-Flumes could not be located due to densley overgrown brush. It appears the property owner has removed all cattle from this site.

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Current Performance	System continues to be treating water adequately, although there are maintenance items to be addressed.
Were Project Goals met?	Project goals to increase pH and Alkalinity, & decrease metals loading were met. Water quality exiting the site to South Fork has improved.
RECOMMENDATIONS	Although the system appears to be working, the following maintenance items should be considered: ***1. Clear brush along Ditch "B" directing flow to system and revegetate with mixed grasses, where necessary.*** ***2. After clearing is performed, inspect ditch and repair/replace R-4 rock where required.*** ***3. Remove brush, sediment, and/or displaced R-4 rock from both inlet and outlet ends of 15" PVC pipe (directing flow to SAPS), clean-out clogged pipe and add R-4 rock as needed.*** ***4. Clear and grub brush located along the north side of both treatment ponds inside fenced in area, and clear and grub brush between ponds. Construct stone roadway/pathway for permanent future access and revegetate all other cleared areas with mixed grasses*** ***5. Clean out entire piping system of SAPS and Aerobic ponds.*** ***6. Property owner, Mr. Dennis Sloan has requested that the outlet portion of Ditch "A" be redirected. (possibly to the location reflected by the original plan). The owner's request should be given consideration.*** *Note: Although all flumes have either been damaged, overgrown with brush, or displaced by sediment and/or rock, it is not recommended that they be replaced, as it likely that if replaced, they will again become in-operable in the future*

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Access gate and fencing around treatment ponds.
Date of Photo: 10-2-08.

Area inside the fencing around the SAPS pond. Note the large amount of brush.
Date of Photo: 10-2-08.

Rock lined ditch (looking down slope) directing flow to the SAPS pond. Note the amount of overgrown brush on ditch invert and side slopes.
Date of Photo: 10-2-08.

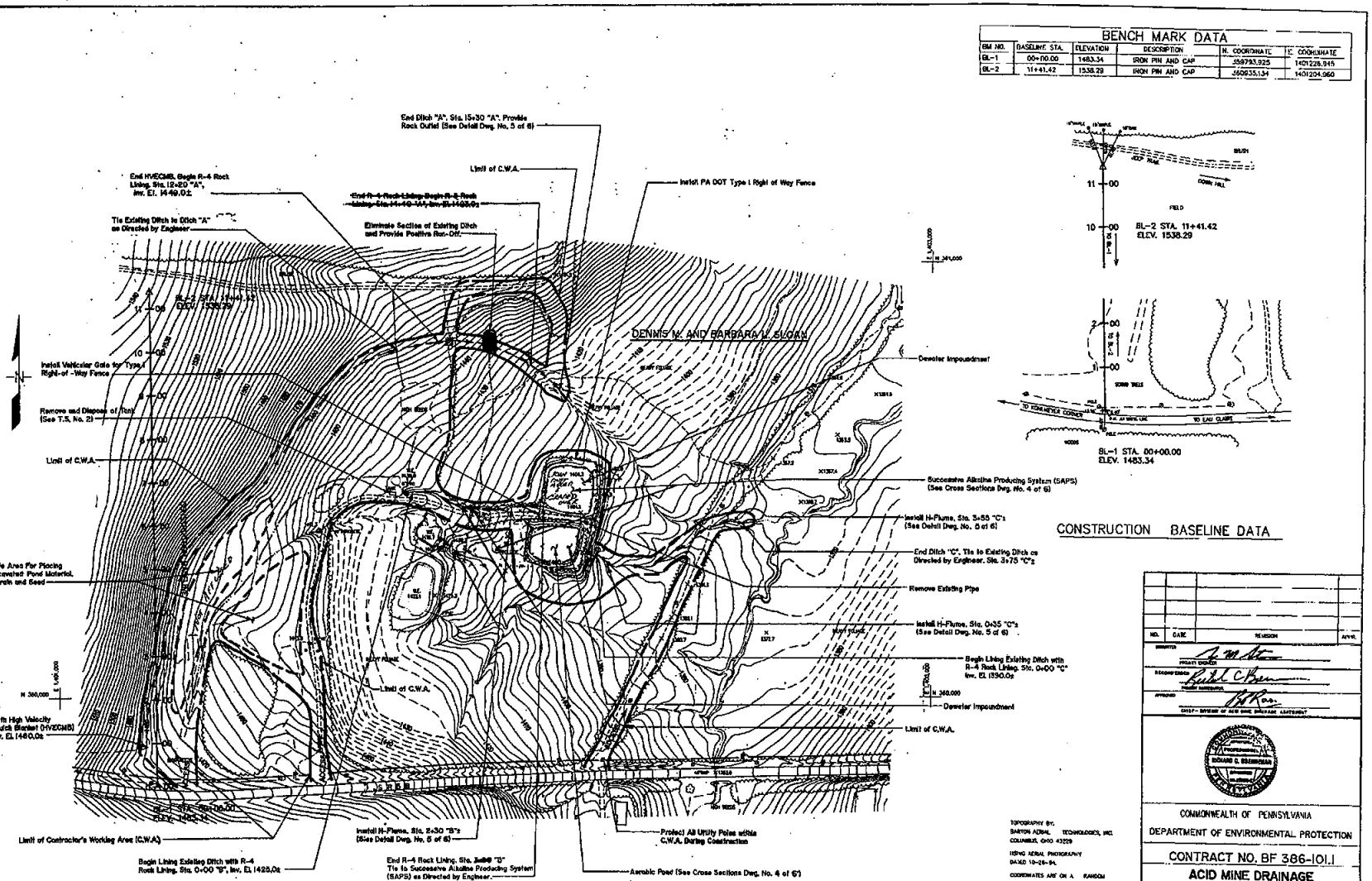
Rock lined ditch (looking up slope) directing flow to the SAPS pond.
Rock lining not visible due to overgrown brush.
Date of Photo: 10-2-08.

SAPS pond (looking in direction of inflow pipe directing flow to the SAPS pond).
Date of Photo: 12-19-05.

SAPS pond (looking in direction of inflow pipe directing flow to the SAPS pond).
Date of Photo: 10-2-08.

BENCH MARK DATA

BM NO.	BASELINE STA.	ELEVATION	DESCRIPTION	N. COORDINATE	E. COORDINATE
BL-1	00+00.00	1483.34	IRON PIN AND CAP	359793.925	1401226.945
BL-2	11+41.42	1538.29	IRON PIN AND CAP	360635.134	1401204.960



CONSTRUCTION BASELINE DATA

TOPOGRAPHY BY: BARTON AERIAL TECHNOLOGIES, INC. COLUMBUS, OHIO 43229
USING AERIAL PHOTOGRAPHY DATED 10-26-94.
COORDINATES ARE ON A RANDOM DATA BASE, RELATIVE TO THIS SITE ONLY.
ALL ELEVATIONS SHOWN ARE BASED ON U.S.G.S. DATUM
RELATIVE ERROR OF CLOSURE FOR TRAVERSE
TRAVERSE ADJUSTMENT BY COMPASS RULE METHOD.
ALL DIMENSIONS AND EXISTING CONDITIONS SHALL BE CHECKED AND VERIFIED BY CONTRACTOR AT THE SITE.

NO.	DATE	REVISION	APVD.

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

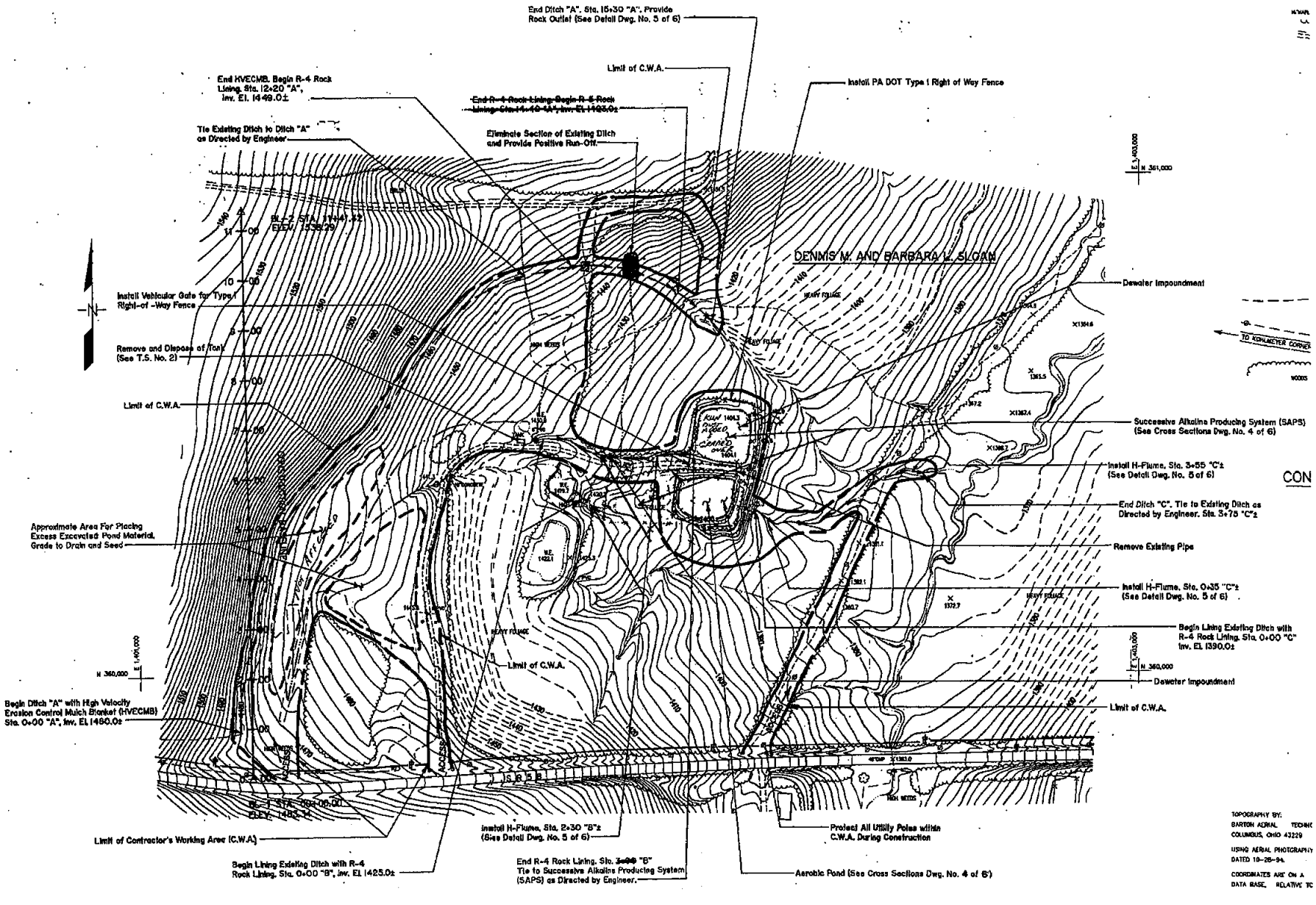
CONTRACT NO. BF 386-101.1

ACID MINE DRAINAGE TREATMENT PROJECT

PENGROVE COAL-HORTERT SITE
MINE DRAINAGE PERMIT NO. 3078BC10
EAU CLAIRE BOROUGH BUTLER COUNTY

PLAN

DRAWN BY	DATE	SHEET NO.
R.ROY	6-1-98	3 of 6
CHECKED BY	SCALE	
G.M.S.	As Shown	


End Ditch "A", Sta. 15+30 "A". Provide Rock Outlet (See Detail Dwg. No. 5 of 6)
Limit of C.W.A.
Install PA DOT Type 1 Right of Way Fence
End HVECMB. Begin R-4 Rock Lining. Sta. 12+20 "A", Inv. El. 1449.0±
End R-4 Rock Lining. Begin R-4 Rock Lining. Sta. 14+40 "A", Inv. El. 1425.0±
Tie Existing Ditch to Ditch "A" as Directed by Engineer
Eliminate Section of Existing Ditch and Provide Positive Run-Off.
DENNIS M. AND BARBARA L. SLOAN
Dewater Impoundment
Install Vehicular Gate for Type 1 Right-of -Way Fence
Remove and Dispose of Tank (See T.S. No. 2)
Limit of C.W.A.
Successive Alkaline Producing System (SAPS) (See Cross Sections Dwg. No. 4 of 6)
Install H-Flume, Sta. 3+55 "C"± (See Detail Dwg. No. 5 of 6)
End Ditch "C". Tie to Existing Ditch as Directed by Engineer. Sta. 3+75 "C"±
Approximate Area For Placing Excess Excavated Pond Material. Grade to Drain and Seed
Remove Existing Pipe
Install H-Flume, Sta. 0+35 "C"± (See Detail Dwg. No. 5 of 6)
Begin Lining Existing Ditch with R-4 Rock Lining. Sta. 0+00 "C" Inv. El. 1390.0±
Dewater Impoundment
Limit of C.W.A.
Begin Ditch "A" with High Velocity Erosion Control Mulch Blanket (HVECMB) Sta. 0+00 "A", Inv. El 1480.0±
Limit of Contractor's Working Area (C.W.A.)
Begin Lining Existing Ditch with R-4 Rock Lining. Sta. 0+00 "B", Inv. El 1425.0±
Install H-Flume, Sta. 2+30 "B"± (See Detail Dwg. No. 5 of 6)
End R-4 Rock Lining. Sta. 3+00 "B" Tie to Successive Alkaline Producing System (SAPS) as Directed by Engineer.
Protect All Utility Poles within C.W.A. During Construction
Aerobic Pond (See Cross Sections Dwg. No. 4 of 6)
TO KOHLMEYER CORNER
CON
TOPOGRAPHY BY:
BARTON AERIAL TECHNI
COLUMBUS, OHIO 43229
USING AERIAL PHOTOGRAPHY
DATED 10-26-94.
COORDINATES ARE ON A
DATA BASE, RELATIVE TO

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Sample Number: PC4-1 (Raw Water)
Location: Rock Lined Channel directing flow into SAPS
SIS Data tabulated by G. Steiner

Raw Water													
Date	pH	Hot Acidity	Calc Acidity	Alk	Fe (+2)	Fe (total)	Fe (+3)	Tot Susp Solids	Mn	Al	Sulfate	Ca	Mg
10/2/2008	3.9	149	57.9	0.0	0.670	4.015	3.345	80	55.4	7.46	1085.6	164	134

Sample Number: PC4-3 (Treated Water)
Location: Outlet Pipe from Aerobic Pond
SIS Data tabulated by G. Steiner

Treated Water *(Outlet Pipe from Aerobic Pond)*													
Date	pH	Hot Acidity	Calc Acidity	Alk	Fe (+2)	Fe (total)	Fe (+3)	Tot Susp Solids	Mn	Al	Sulfate	Ca	Mg
10/2/2008	7.2	- 7.20	- 41.1	41.4	0.050	0.115	0.065	24	16.6	<0.2	892	189	117

Note: Flow rates could not be measured due to site conditions on this date

Sample Number: PC4-1 (Raw Water)

Location: H-Flume in Rock Lined channel directing flow into SAPS

SIS Data tabulated by Brent Means

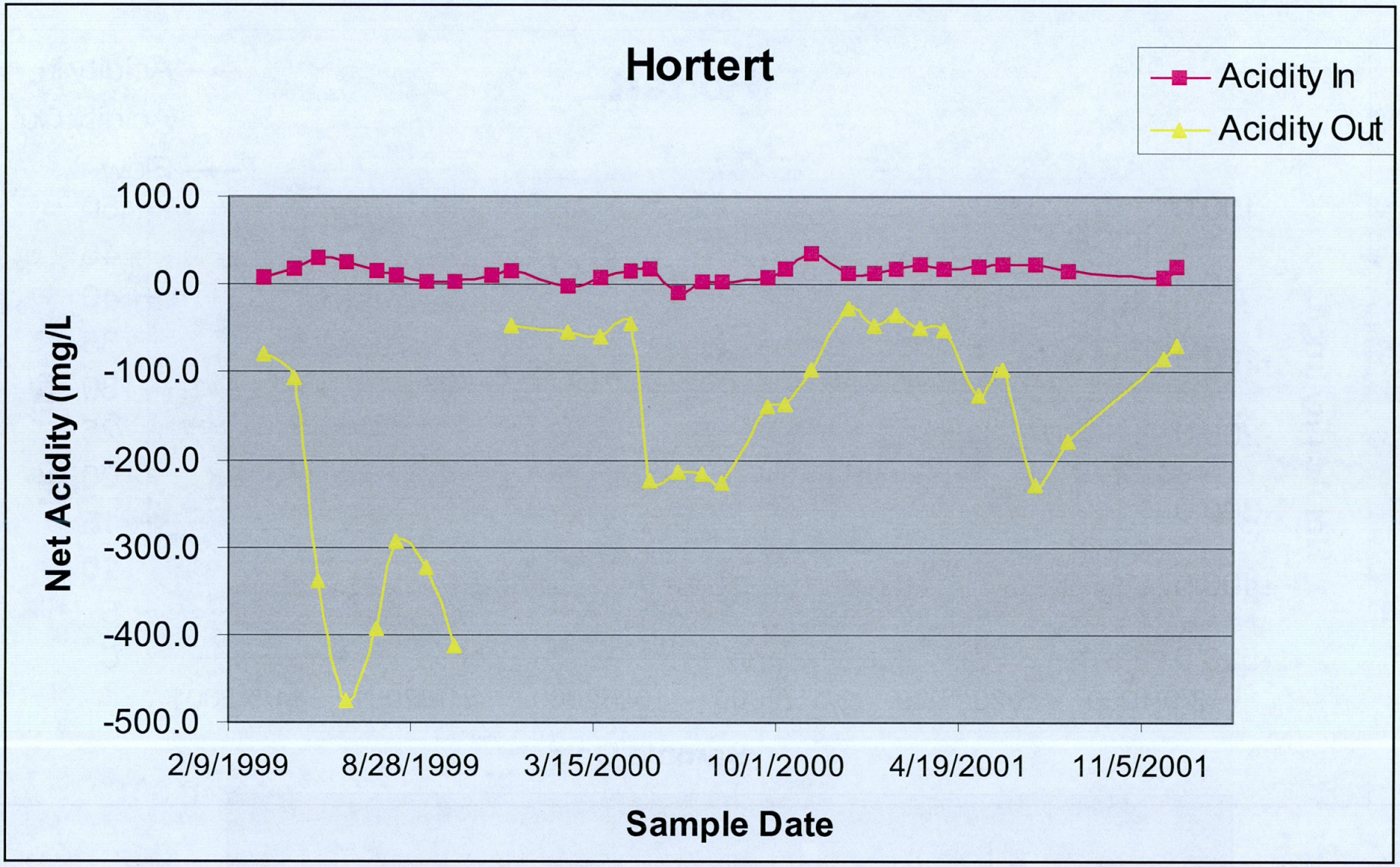
Raw Water																	
Date	Flow	Method	pH	Hot Acidity	Cal Net Acidity	Alk	Fe	Mn	Al	Sulfate	Fe & Al	Acid Load (g/Hr)	Acid load (ton/day)	Na	Ca	Mg	Cl
3/18/1999	30		4.8	56	8.0	2.4	0.111	24.1	1.67	445	1.8	54.3	2.96E-04	7.46			
4/22/1999	18		4.7	86	18.4	2.2	0.102	35.2	3.47	624	3.6	75.0	4.09E-04	8.02			
5/18/1999	3	M	4.7	174	29.5	2.2	0.079	69.1	5.49	1020	5.6	20.1	1.10E-04	10.9			
6/17/1999	5		4.6	172	25.9	1.2	0.155	79.5	4.58	968	4.7	29.4	1.61E-04	9.98			
7/20/1999	5		4.7	156	16.2	2	0.172	86.1	3.01	1421.7	3.2	18.4	1.00E-04	13.4			
8/11/1999	3	M	5	166	9.3	3.6	0.117	80.6	2.17	1150	2.3	6.3	3.45E-05	13.2			
9/14/1999	1		5.5	134	2.3	4.8	0.098	83.9	1.21	1080	1.3	0.5	2.91E-06	13.4			
10/14/1999	2	M	5.3	90	3.4	4.2	0.22	56.5	1.22	880.1	1.4	1.6	8.49E-06	11.4			
11/23/1999	2		4.9	124	9.9	3.2	0.061	70.1	2.21	1130	2.3	4.5	2.45E-05	14.7			
12/16/1999	11.5		5	64	15.4	2.8	1.1	39.7	2.65	571	3.8	40.3	2.20E-04	8.02			
2/15/2000	12		5.5	48	-1.1	4.8	0.056	26.7	0.616	479	0.7	-2.9	-1.59E-05	6.68			
3/21/2000	3	M	5	62	7.6	3	0.044	37	1.8	493	1.8	5.2	2.83E-05	8.88			
4/25/2000	10		4.9	80	15.3	2.8	0.061	47.4	3.11	682	3.2	34.7	1.89E-04	9.08			
5/16/2000	10		4.9	110	19.0	3	0.101	56.2	3.8	886	3.9	43.2	2.36E-04	12.5			
6/15/2000	12		6	94	-10.4	16	1.3	46.6	0.363	587	1.7	-28.3	-1.54E-04	10.2			
7/11/2000	5		5.4	118	3.4	4.4	0.336	71.7	1.2	1030	1.5	3.8	2.09E-05	15.7			
8/2/2000	5	M	5.3	126	2.9	3.8	0.123	67.9	1.1	858	1.2	3.3	1.79E-05	12.4			
9/21/2000	5		5.1	132	8.7	3.8	0.15	67.1	2.1	1030	2.3	9.8	5.37E-05	12.5			
10/11/2000	6		4.9	112	18.5	3	0.147	71.5	3.68	864	3.8	25.2	1.37E-04	18.4			
11/8/2000	1		4.7	180	36.4	2.2	0.067	84.5	6.74	909	6.8	8.3	4.51E-05	15.2			
12/19/2000	12.5		4.9	58	12.1	2.6	0.115	38.1	2.48	584	2.6	34.4	1.88E-04	10.5			
1/17/2001			4.9	94	13.8	2.8	0.08	39.9	2.84	828	2.9	0.0	0.00E+00	10.5			
2/8/2001	7.5	M	4.8	90	18.6	2.4	0.045	45.6	3.61	781	3.7	31.6	1.73E-04	10.9			
3/7/2001			4.8	110	21.8	2.8	0.096	45.9	4.24	279	4.3	0.0	0.00E+00	11.8			
4/3/2001	7.5	M	4.8	136	18.1	2.4	0.07	45.7	3.52	841	3.6	30.9	1.69E-04	10.5			
5/10/2001	7		4.8	58	21.0	2.6	0.055	58.5	4.08	1111.2	4.1	33.4	1.82E-04	11.6			
6/5/2001	6		4.8	114	23.1	2.4	0.13	60.2	4.39	69.4	4.5	31.5	1.72E-04	11.8			
7/11/2001	1		4.8	178.8	22.0	2.4	0.329	79.1	4.09	1250	4.4	5.0	2.73E-05	14.1			
8/15/2001	0.75		4.8	248.4	15.4	2.6	0.135	84.9	3.03	281.5	3.2	2.6	1.43E-05	16.4			
11/28/2001	2.5		5.1	124.2	7.0	3.6	0.304	42.7	1.68	797	2.0	4.0	2.16E-05	13.4			
12/13/2001	10		4.8	129.8	19.2	2.4	0.13	41.2	3.68	787	3.8	43.6	2.38E-04	11			
1/19/2006			4.8	89	9.4	8.8	0.179	37.4	3.04	1058.6	3.2	10.9	5.92E-05	14.3	133	94	21.4

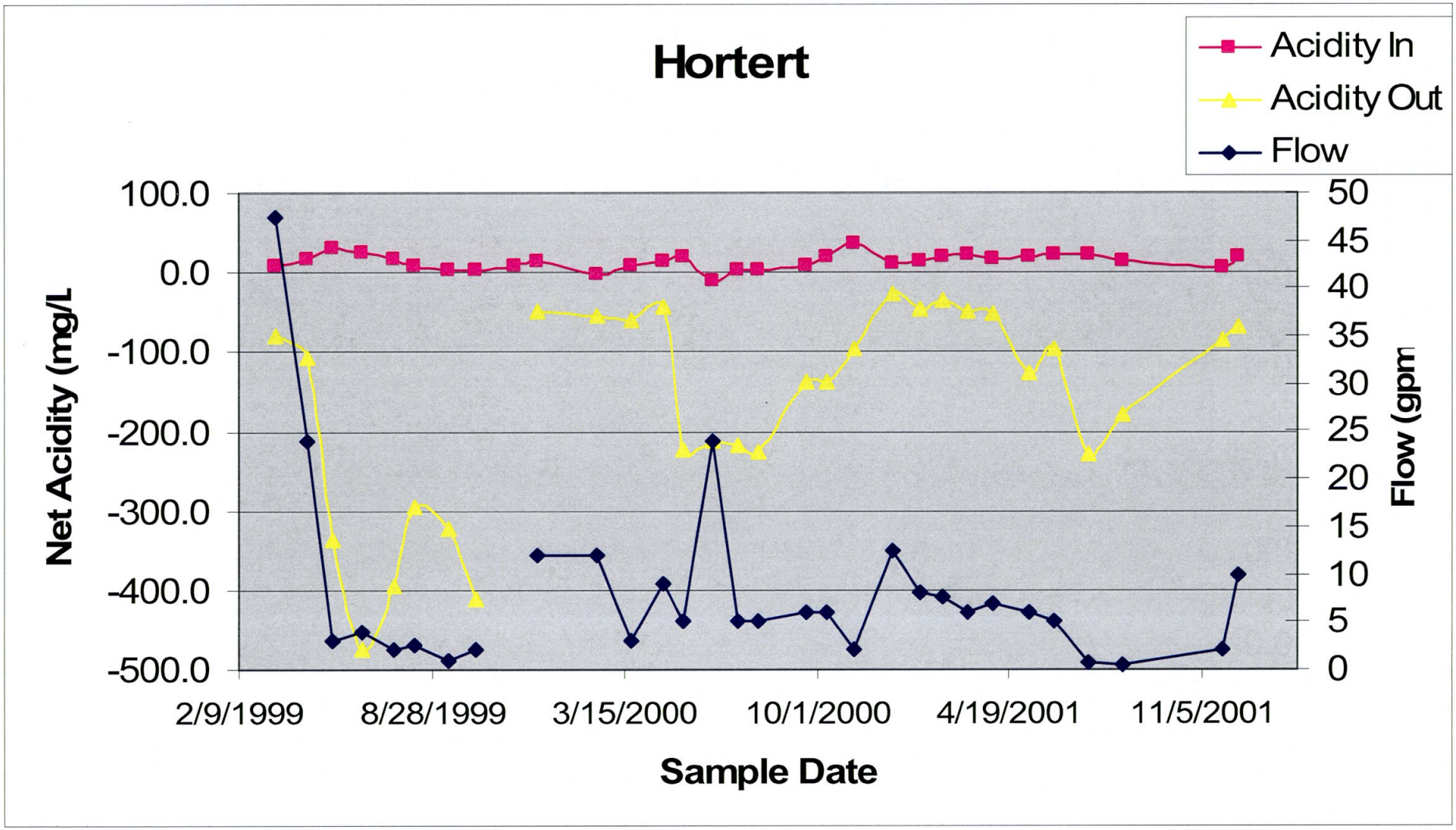
Sample Number: PC4-2 (Outlet of SAPS/VPF)

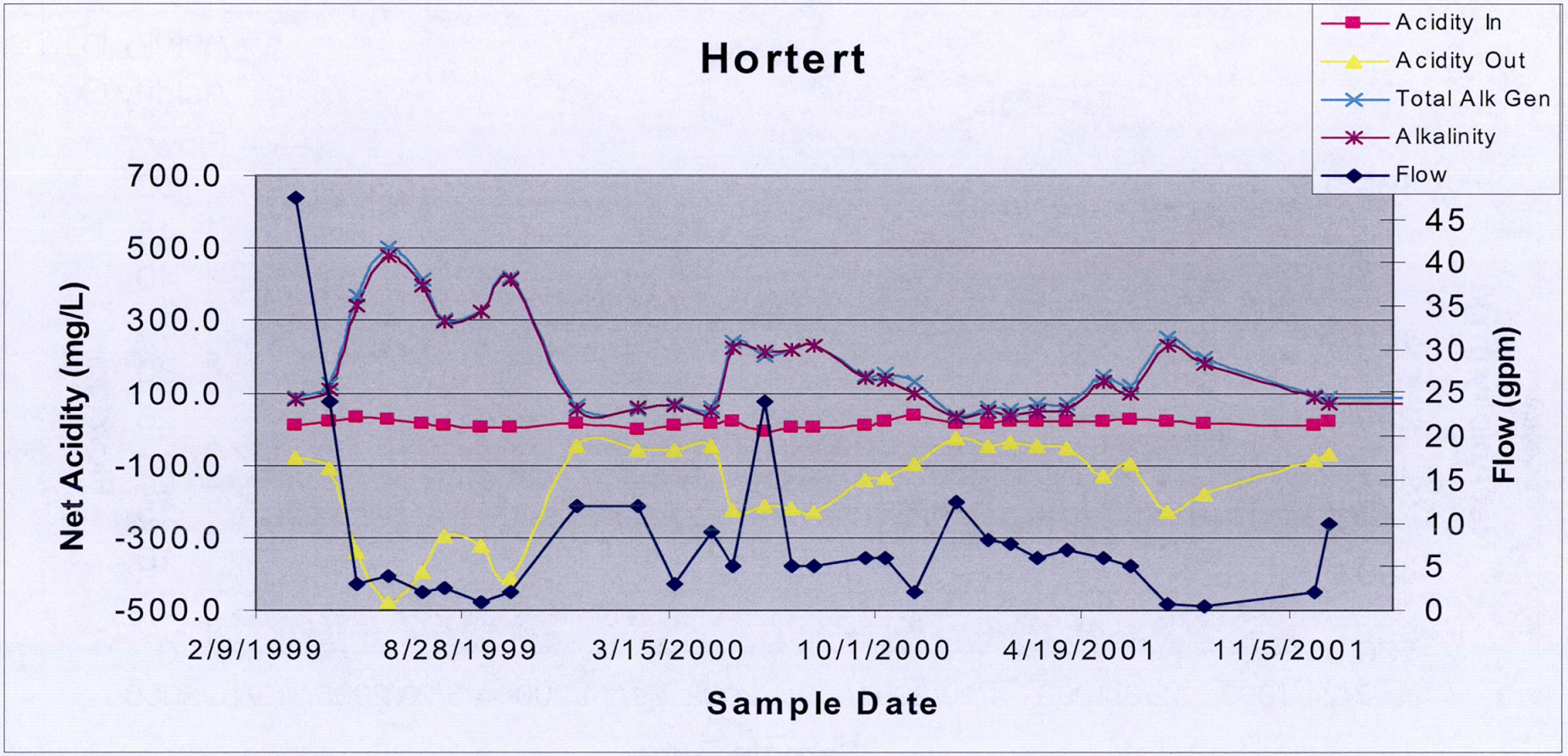
Location: Outlet pipe (from SAPS) into Aerobic Pond

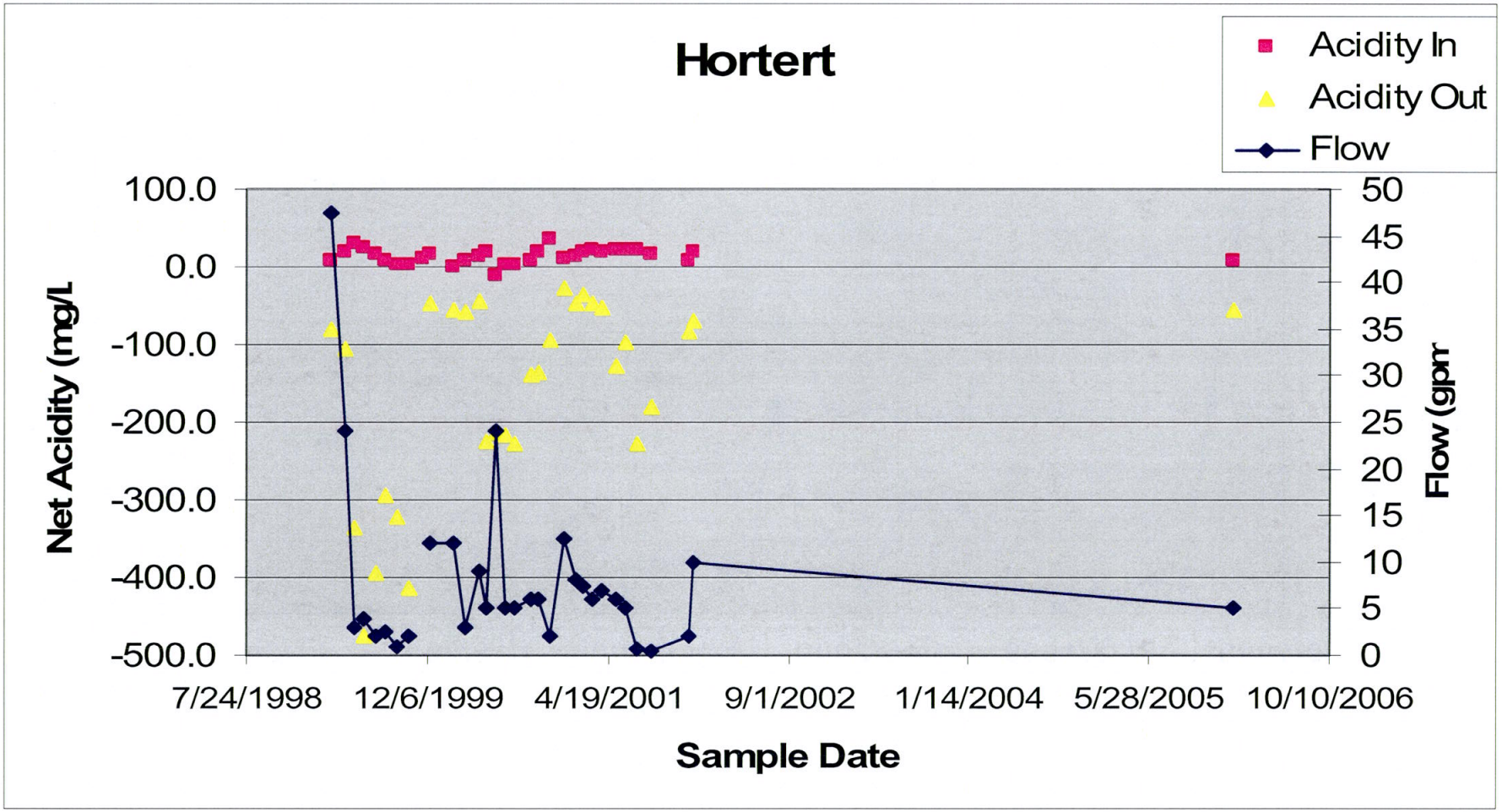
SIS Data tabulated by Brent Means

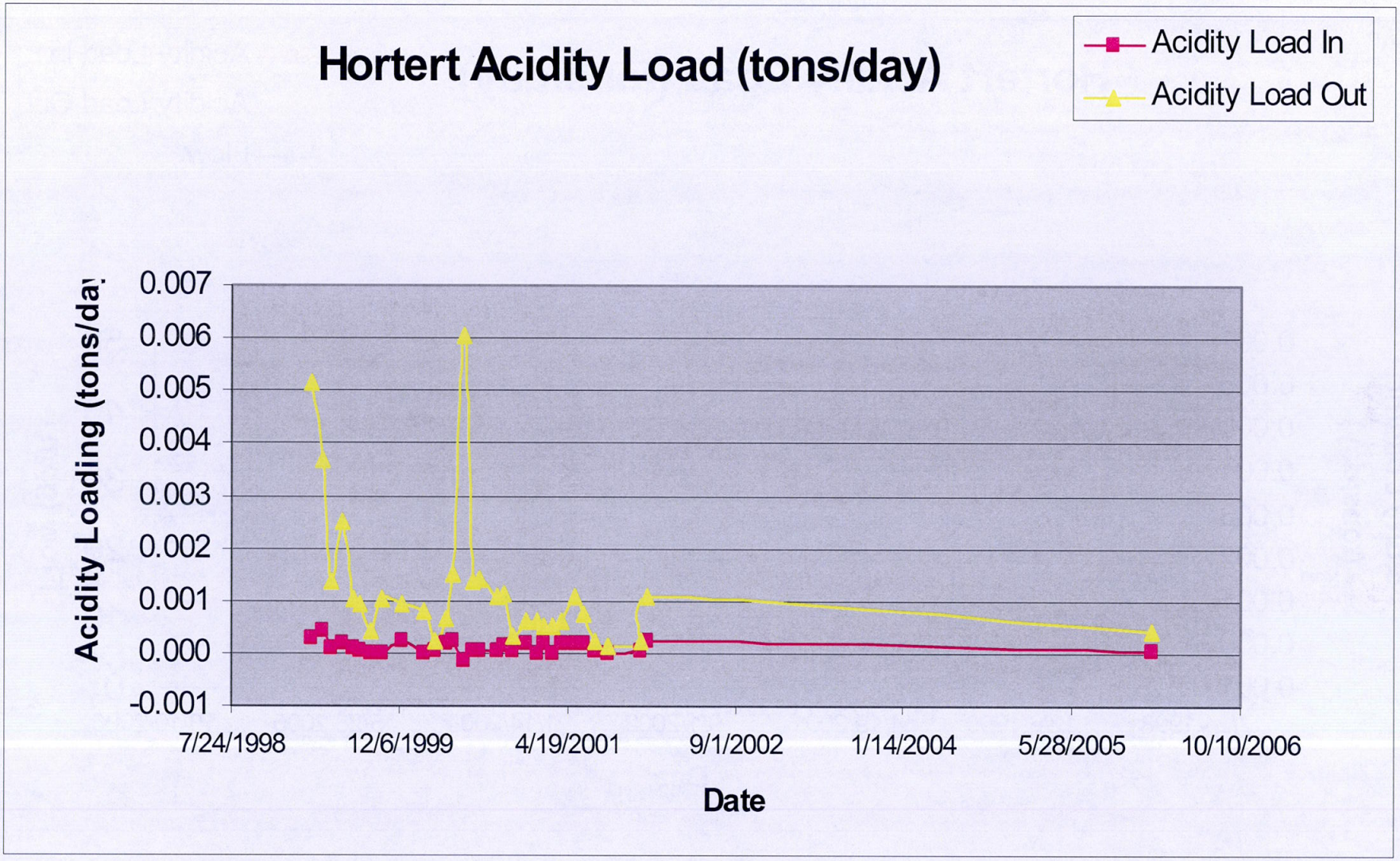
OUT VFP																	
Date	Flow	Method	pH	Hot Acidity	Cal Net Acidity	Acid Removed	Alk	Fe	Mn	Al	Sulfate	Fe & Al	Acid Load (g/Hr)	Acid load (ton/day)	Na	Ca	Mg	Cl
3/18/1999	47.5		7.2	0	-79.5	87.4	82	0.526	4.88	0.2	730	0.7	943.1	5.14E-03	7.72			
4/22/1999	24		7.3	0	-106.0	124.4	108	0.319	11	0.2	553	0.5	677.9	3.70E-03	7.95			
5/18/1999	3	M	7.7	0	-337.2	366.7	340	0.535	15	0.243	565	0.8	249.8	1.36E-03	9.47			
6/17/1999	4		7.4	0	-476.2	502.1	478	0.202	18.6	0.23	561	0.4	456.1	2.49E-03	8.87			
7/20/1999	2		7.6	0	-394.1	410.3	396	0.292	30	0.2	953.2	0.5	186.3	1.02E-03	10.6			
8/11/1999	2.5	M	8	0	-294.1	303.4	296	0.274	31.5	0.2	734	0.5	172.3	9.40E-04	11.7			
9/14/1999	1		7.9	0	-323.3	325.6	326	0.591	27.7	0.2	816	0.8	73.9	4.03E-04	11.4			
10/14/1999	2	M	7.9	0	-412.5	416.0	414	0.125	37.1	0.2	845.5	0.3	188.9	1.03E-03	12.6			
11/23/1999														0.00E+00				
12/16/1999	12		6.9	0	-48.0	63.4	52	0.54	23.5	0.456	430	1.0	172.8	9.43E-04	7.56			
2/15/2000	12		7	0	-55.0	54.0	58	0.582	23.8	0.245	522	0.8	147.1	8.02E-04	8.31			
3/21/2000	3	M	6.9	0	-59.4	67.0	62	0.456	30.8	0.242	456	0.7	45.7	2.49E-04	8.72			
4/25/2000	9		7	0	-44.1	59.4	48	0.738	25.4	0.34	602	1.1	121.3	6.62E-04	6.87			
5/16/2000	5		7.5	0	-224.3	243.3	226	0.213	35.8	0.2	379	0.4	276.3	1.51E-03	9.23			
6/15/2000	24		7.5	0	-213.8	203.4	216	0.392	38.9	0.2	423	0.6	1108.8	6.05E-03	9.69			
7/11/2000	5		7.5	0	-216.8	220.2	218	0.022	36.2	0.2	757	0.2	250.0	1.36E-03	10.6			
8/2/2000	5	M	7.7	0	-226.8	229.7	228	0.047	37.6	0.2	475	0.2	260.8	1.42E-03	10.3			
9/21/2000	6		7.1	0	-138.4	147.0	140	0.191	48.6	0.2	782	0.4	200.4	1.09E-03	11.8			
10/11/2000	6		7.2	0	-136.7	155.2	138	0.053	48	0.2	758	0.3	211.5	1.15E-03	12.6			
11/8/2000	2		6.9	0	-95.8	132.2	98	0.41	57.1	0.2	1030	0.6	60.0	3.27E-04	13.1			
12/19/2000	12.5		7.1	0	-26.8	38.9	30	0.59	20.2	0.286	328	0.9	110.5	6.03E-04	7.5			
1/17/2001	8		7	0	-46.2	60.0	48	0.249	45.1	0.2	854	0.4	109.1	5.95E-04	11			
2/8/2001	7.5		7	0	-35.1	53.7	38	0.658	31.8	0.2	550	0.9	91.4	4.99E-04	7.74			
3/7/2001	6		7	0	-48.4	70.2	50	0.187	41.7	0.2	83.8	0.4	95.6	5.22E-04	11.3			
4/3/2001	7	M	7.3	0	-51.5	69.7	54	0.501	28.2	0.2	581	0.7	110.7	6.04E-04	9.42			
5/10/2001	6		7.4	0	-127.4	148.5	130	0.529	38.1	0.2	872.4	0.7	202.3	1.10E-03	11.3			
6/5/2001	5		7.2	0	-95.9	119.0	98	0.379	41	0.2	53.4	0.6	135.1	7.37E-04	10.7			
7/11/2001	0.75		7.8	0	-228.2	250.2	230	0.248	53.1	0.2	801	0.4	42.6	2.32E-04	14.2			
8/15/2001	0.5		7.1	0	-179.5	194.9	182	0.27	61.1	0.316	231	0.6	22.1	1.21E-04	13.7			
11/28/2001	2		7.3	0	-84.5	91.5	86	0.137	46.1	0.2	809	0.3	41.5	2.27E-04	12.1			
12/13/2001	10		7.1	0	-68.6	87.8	70	0.1	40.6	0.2	734	0.3	199.4	1.09E-03	11.7			
1/19/2006	5.1	M	7	-36.4	-54.2	63.6	56	0.251	9.29	0.2	928.5	0.5	73.6	4.02E-04	8.871	120	52	17.2

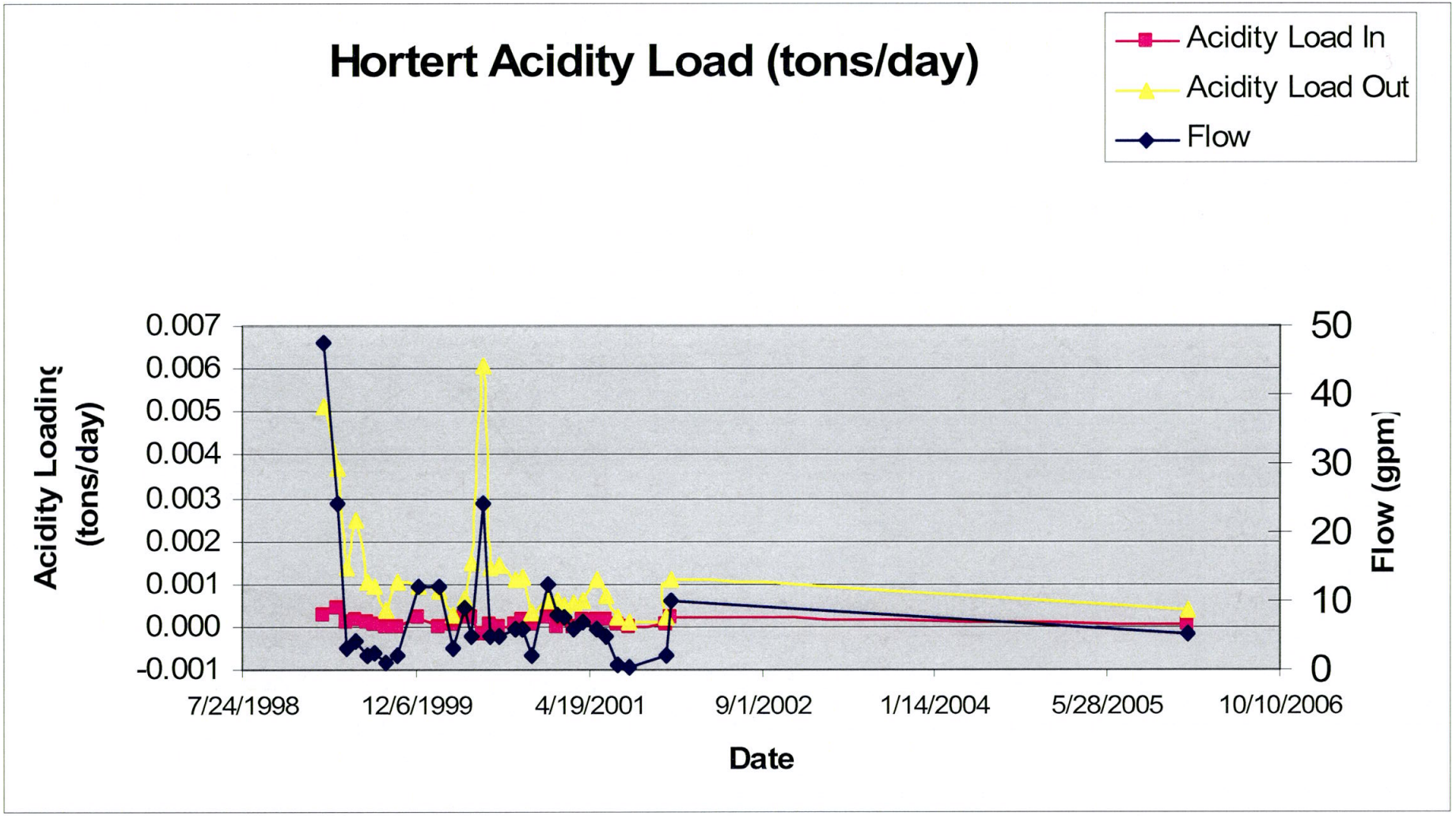

Hortert
Acidity In
Acidity Out
100.0
0.0
-100.0
-200.0
-300.0
-400.0
-500.0
Net Acidity (mg/L
2/9/1999
8/28/1999
3/15/2000
10/1/2000
4/19/2001
11/5/2001
Sample Date


Hortert
Acidity In
Acidity Out
Flow
100.0
0.0
-100.0
-200.0
-300.0
-400.0
-500.0
Net Acidity (mg/L
50
45
40
35
30
25
20
15
10
5
0
Flow (gpm
2/9/1999
8/28/1999
3/15/2000
10/1/2000
4/19/2001
11/5/2001
Sample Date


Hortert
Acidity In
Acidity Out
Total Alk Gen
Alkalinity
Flow
700.0
500.0
300.0
100.0
-100.0
-300.0
-500.0
Net Acidity (mg/L)
45
40
35
30
25
20
15
10
5
0
Flow (gpm)
2/9/1999
8/28/1999
3/15/2000
10/1/2000
4/19/2001
11/5/2001
Sample Date


Hortert
Acidity In
Acidity Out
Flow
100.0
0.0
-100.0
-200.0
-300.0
-400.0
-500.0
Net Acidity (mg/L
50
45
40
35
30
25
20
15
10
5
0
Flow (gpm
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
Sample Date


Hortert Acidity Load (tons/day)
Acidity Load In
Acidity Load Out
Acidity Loading (tons/da
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
Date


Hortert Acidity Load (tons/day)
Acidity Load In
Acidity Load Out
Flow
Acidity Loading (tons/day)
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
-0.001
50
40
30
20
10
0
Flow (gpm)
7/24/1998
12/6/1999
4/19/2001
9/1/2002
1/14/2004
5/28/2005
10/10/2006
Date