

October 7, 2008

Santino Provenzano
Environmental Superintendent
Mosaic Fertilizer LLC
PO Box 508
Bradley, Florida 33835-0508

RE: Horse Creek Stewardship Program
July Impact Assessment for High Ammonia
Request for Additional Information

Dear Mr. Provenzano:

The Peace River Manasota Regional Water Supply Authority (Authority) is in receipt of the above referenced impact assessment prepared by Biological Research Associates (BRA). BRA provided a thorough review and explanation of the data and possible causes of high ammonia levels. The Authority is however concerned that these high levels of ammonia have occurred during 2008 but not in previous years. What is different in 2008 that would cause this to occur? BRA's position that the cause of the high ammonia could not be caused by Mosaic's operations may be correct but it is suggested that additional data and analysis be included further supporting this conclusion. The Authority is therefore requesting the following additional information to be delivered within 15 working days from receipt of this request.

1. Please provide the daily discharge volumes (MG) in tabular form for all outfalls discharging to Horse Creek for calendar years 2003-2008 so that outfall discharges and Program water quality data can be readily compared with discharged events. A suggested plot showing discharges versus ammonia levels would be helpful also.
2. Please provide the current NPDES permits for all outfalls discharging to Horse Creek.
3. Please provide in tabular form the water quality data collected at each outfall on Horse Creek, the date the samples were collected and the sample location for the period 2003-2008.

Mr. Santino Provenzano

October 7, 2008

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4. Please provide a written description of the physical structure and method of operation for all outfalls discharging to Horse Creek along with descriptive pictures. Also include a description of where the actual water quality samples are taken at the outfall locations. Finally provide a description of how water re-circulated in the mining system for months without discharge can still retain high levels of DO when discharged to Horse Creek.

Should you require any clarification on the above request for additional information do not hesitate to contact me.

Yours truly,

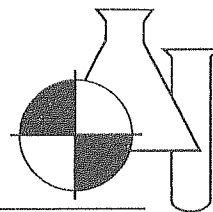
Samuel S. Stone

Environmental Affairs Coordinator

xc: Mike Coates
 Jeff Clark
 Ralph Montgomery
 Kris Robbins
 Doug Durbin
 Rob Brown
 John Ryan
 Bill Byle
 Victor Dotson

BENCHMARK

EnviroAnalytical, Inc.



To: Kristan Robbins, BRA
From: Dale Dixon, Benchmark EA
Date: 11/07/08

Re: Split Samples with Test America

The purpose of this memorandum is to address differences in Horse Creek ammonia and TKN analyses for split samples analyzed by Benchmark EA and Test America. Per your request, three sets of samples were analyzed by both laboratories and the results are summarized in Table 1 (Attachment 1).

Firstly, let's consider TKN results since these are not as complicated as results for ammonia. Both labs use EPA 350.1 for TKN analysis. The results from both labs are comparable with Benchmark's results biased slightly higher, but in an acceptable range. For reference see acceptance range for TKN proficiency tests (Attachment 2).

Moving on to ammonia results, Table 1 shows Benchmark's average result as 0.149 mg/L compared to Test America's average of 0.06 mg/L. Each lab's results are within their own range (different range for each lab) for all three sets of samples. Please note MDL's and PQL's for both labs.

Why is there this difference in ammonia results between the two labs? Benchmark uses SM4500NH₃C (18th Edition) with sample distillation prior to analysis. Test America uses EPA 350.1 but does not distill prior to analysis (see email exchange with Test America – Attachment 3). Distillation removes ammonia analyte from background interferences and allows greater sensitivity, with the biggest gain with low end values.

What is required? Table 1B (Attachment 4) is cut from the 2007 Method Update Rule published as Federal Register / Vol. 72, No. 47 / March 12, 2007 / Rules and Regulations. Table 1B shows manual distillation for both SM4500NH₃C and EPA 350.1 as a requirement unless a variance applies, as shown in footnote 6 shown under Table 1B. I leave interpretation of footnote 6 to you and others on the circulation list.

Please advise whether Benchmark should use distillation, analyze without distillation, or subcontract ammonia analyses to Test America with or without distillation.

CC: Earl Qualls
Santino Provenzano
Cheryl Creider
James Jacob Mink

Thank you,

A handwritten signature in cursive script, appearing to read 'Dale Dixon'.

Dale Dixon, Ph.D.
Laboratory Director

Attachment 1

TABLE 1
COMPARISON OF AMMONIA & TKN ANALYSES FOR HORSE CREEK
 (SEPTEMBER & OCTOBER 2008)

		BENCHMARK	TEST AMERICA	BENCHMARK	TEST AMERICA
SAMPLE SUBMISSION #	SAMPLE DESCRIPTION	AMMONIA as N	AMMONIA as N	TKN	TKN
		SM 4500NH3 C	EPA 350.1	EPA 351.2	EPA 351.2
		mdl=0.005/ pql=0.02	mdl=0.01 / pql=0.02	mdl=0.05 / pql=0.2	mdl=0.12 / pql=0.2
8100541 - 1	HCSW-1	0.086 mg/l	0.035 mg/l	1.21 mg/l	1.0 mg/l
8100541 - 2	HCSW-2	0.182 mg/l	0.072 mg/l	1.64 mg/l	1.6 mg/l
8100541 - 3	HCSW-3	0.142 mg/l	0.044 mg/l	1.40 mg/l	1.2 mg/l
8100541 - 4	HCSW-4	0.148 mg/l	0.078 mg/l	1.47 mg/l	1.2 mg/l
8100541 - 5	HCSW-5 EQ BL	0.005u	0.017 mg/l	0.05u	0.05u
8100541 - 6	HCSW-6 DUP	0.090 mg/l	0.033 mg/l	1.13 mg/l	1.1 mg/l
8100007-6	HCSW-1	0.136 mg/l Q	0.044 mg/l	1.43 mg/l	1.3 mg/l
8100007-14	HCSW-2	0.166 mg/l	0.058 mg/l	1.73 mg/l	1.5 mg/l
8100007-22	HCSW-3	0.192 mg/l	0.093 mg/l	0.055 mg/l J4	0.12 u J4
8100007-30	HCSW-4	0.142 mg/l	0.063 mg/l	1.59 mg/l	1.5 mg/l
8080866-9	19998 hcsw-2-horse creek-	0.219 mg/l	0.069 mg/l Q	1.81 mg/l	0.31 mg/l Q
8080866-17	20006 hcsw-3-hose creek-	0.230 mg/l	0.071 mg/l Q	1.80 mg/l	2.2 mg/l Q
8080866-25	20014 hcsw-4-horse creek-	0.202 mg/l	0.058 mg/l Q	1.70 mg/l	2.5 mg/l Q

Q = SAMPLE HELD BEYOND ACCEPTED HOLD TIME

J4 = SAMPLE MATRIX INTERFERENCE SUSPECTED

U = LESS THAN METHOD DETECTION LIMIT

NOTE: BENCHMARK AMMONIA ANALYSIS FOR 8100007-6 WAS INITIALLY RUN WITHIN HOLD TIME , BUT AFFORDED AN UNEXPECTED VALUE OF 0.444 MG/L.

NOTE: THE TABLE BELOW COMPARES BENCHMARK AMMONIA ANALYSES
 (SM 4500 NH3 C) WITHOUT DISTILLATION TO THOSE WITH DISTILLATION :

		BENCHMARK	BENCHMARK	BENCHMARK
SAMPLE SUBMISSION #	SAMPLE DESCRIPTION	AMMONIA as N	AMMONIA as N	AMMONIA as N
		WITH DISTIL. *	WITH DISTIL.**	WITHOUT DISTIL.
		mdl=0.005/ pql=0.02	mdl unknown	mdl unknown
8100541 - 1	HCSW-1	0.086 mg/l	0.104 mg/l	0.09 mg/l
8100541 - 2	HCSW-2	0.182 mg/l	0.114 mg/l	0.084 mg/l
8100541 - 3	HCSW-3	0.142 mg/l	0.188 mg/l	0.095 mg/l
8100541 - 4	HCSW-4	0.148 mg/l	0.128 mg/l	0.072 mg/l
8100541 - 5	HCSW-5 EQ BL	0.005u	0.0 mg	0.0 mg/l
8100541 - 6	HCSW-6 DUP	0.090 mg/l	0.096 mg/l	0.089 mg/l

* 8 fold concentraion in distillation process (400ml sample to 50 ml distillate) SM 4500 NH3 C

** no concentration change in distillation process (50ml sample to 50 ml distillate) SM 4500NH3 C

6390 Joyce Drive
100
Golden, CO 80403

Phone 303-940-0033
Fax 866-283-0269
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Final Report - Water Pollution Proficiency Testing

Study: WP0708

Opening Date: July 7, 2008 - Closing Date: September 11, 2008

Laboratory: Benchmark EnviroAnalytical
1711 12th Street East
Palmetto, FL 34221
UNITED STATES

Contact: Radica Koutselas, QC Officer
941-723-9986

EPA Lab ID: FL00289

Nutrients - #1 (PT-NUT-WP(1))								Lot #: 8076-10	
NELAC Code	Analyte	Method Code	Method Description	Units	Assigned Value	Result	Warning Limits	Acceptance Limits	Evaluation
1515	Ammonia as N	20023603	SM4500-NH3C	mg/L	14.1	13.6	11.7 - 16.3	10.5 - 17.5	Acceptable
1810	Nitrate as N	10067604	EPA 353.2	mg/L	17.7	17.4	15.1 - 20.1	13.8 - 21.3	Acceptable
1810	Nitrate as N	10053006	EPA 300.0	mg/L	17.7	16.8	15.1 - 20.1	13.8 - 21.3	Acceptable
1820	Nitrate and Nitrite as N	10067604	EPA 353.2	mg/L	17.7	17.4	15.4 - 19.5	14.4 - 20.6	Acceptable
1820	Nitrate and Nitrite as N	10053006	EPA 300.0	mg/L	17.7	16.8	15.4 - 19.5	14.4 - 20.6	Acceptable
1870	Orthophosphate as P	10070801	EPA 365.3	mg/L	0.770	0.773	0.641 - 0.914	0.573 - 0.982	Acceptable
1870	Orthophosphate as P	10053006	EPA 300.0	mg/L	0.770	0.772	0.641 - 0.914	0.573 - 0.982	Acceptable
Additional State Specific Analytes									
-	Total Dissolved Phosphorus			mg/L	0.00				NR
-	Dissolved Nitrogen			mg/L	0.00				NR
-	Total Nitrogen			mg/L	0.00				NR
Nutrients - #2 (PT-NUT-WP(2))								Lot #: 8076-11	
NELAC Code	Analyte	Method Code	Method Description	Units	Assigned Value	Result	Warning Limits	Acceptance Limits	Evaluation
1795	Total Kjeldahl Nitrogen (TKN)	10065404	EPA 351.2	mg/L	6.51	6.36	5.07 - 7.86	4.38 - 8.56	Acceptable
1910	Total Phosphorus	10070801	EPA 365.3	mg/L	1.94	1.92	1.69 - 2.24	1.55 - 2.38	Acceptable
Nutrients - #3 (PT-NUT-WP(3))								Lot #: 8076-69	
NELAC Code	Analyte	Method Code	Method Description	Units	Assigned Value	Result	Warning Limits	Acceptance Limits	Evaluation
1840	Nitrite as N	20017203	SM4500NO2B	mg/L	3.34	3.44	3.01 - 3.67	2.84 - 3.84	Acceptable
1840	Nitrite as N	10053006	EPA 300.0	mg/L	3.34	3.44	3.01 - 3.67	2.84 - 3.84	Acceptable
Oil & Grease (PT-OGR-WP)								Lot #: 8076-12	
NELAC Code	Analyte	Method Code	Method Description	Units	Assigned Value	Result	Warning Limits	Acceptance Limits	Evaluation
1860	Oil & Grease	10127409	EPA 1664	mg/L	50.3	48.9	37.2 - 56.5	32.4 - 61.3	Acceptable

Attachment 3

Dr. Dale Dixon

From: "Fritz, Tina" <Tina.Fritz@testamericainc.com>
To: "Dr. Dale Dixon" <dale.dixon@benchmarkea.net>
Cc: <rada@benchmarkea.net>; <jennifer.jordan@benchmarkea.net>
Sent: Friday, November 07, 2008 9:09 AM
Subject: RE: ammonia distillation?

Samples were not distilled, as we were unaware they were NPDES samples. Please advise when sending samples that require distillation and we will make sure to do so.

From: Dr. Dale Dixon [mailto:dale.dixon@benchmarkea.net]
Sent: Thursday, November 06, 2008 11:55 AM
To: Fritz, Tina
Cc: rada@benchmarkea.net; jennifer.jordan@benchmarkea.net
Subject: ammonia distillation?

Tina,

I received results for ammonia in reports for job numbers 660-25431-1 ; 660-25620-1 ; 660-25845-1. Were these samples distilled prior to analysis or is TA operating from a variance as described in footnote 6 of Table IB-List of Approved Inorganic Test Procedures of the Federal Register update rule ?

Thanks,
Dale Dixon

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Please consider the environment before printing this e-mail.

11/7/2008

Attachment 4

CWA

TABLE IB.—LIST OF APPROVED INORGANIC TEST PROCEDURES

Parameter	Methodology ⁵⁰	Reference (method number or page)					
		EPA 35, 52	Standard methods (18th, 19th)	Standard methods (20th)	Standard methods online	ASTM	USGS/AOAC/other
4. Ammonia (as N), mg/L	Manual, distillation (at pH 9.5) ⁶ followed by:	350.1, Rev. 2.0 (1993).	4500-NH ₃ B ₃	4500-NH ₃ B	4500-NH ₃ B-97		973.49 ³
	Nesslerization		4500-NH ₃ C (18th only).			D1426-98, 03 (A)	973.49 ³ , I-3520-85 ²
	Titration		4500-NH ₃ C (19th) and 4500-NH ₃ E (18th).	4500-NH ₃ C	4500-NH ₃ C-97.		
	Electrode		4500-NH ₃ D or E (19th) and 4500-NH ₃ F or G (18th).	4500-NH ₃ D or E	4500-NH ₃ D or E-97.	D1426-98, 03 (B).	
	Automated phenate, or	350.1 ⁶⁰ , Rev. 2.0 (1993).	4500-NH ₃ G (19th) and 4500-NH ₃ H (18th).	4500-NH ₃ G	4500-NH ₃ G-97		I-4523-85 ²
	Automated electrode Ion Chromatography					D6919-03.	See footnote 7

⁶ Manual distillation is not required if comparability data on representative effluent samples are on file to show that this preliminary distillation step is not necessary; however, manual distillation will be required to resolve any controversies.

⁶⁰ The use of EDTA may decrease method sensitivity in some samples. Analysts may omit EDTA provided that all method specified quality control acceptance criteria are met.

11216 No. 47/Monday, March 12, 2007



Biological Research Associates

Environmental and Natural Resource Management Consultants

A Division of ENTRIX, Inc.

3 October 2008

Samuel S. Stone
Environmental Affairs Coordinator
Peace River Facility
8998 S.W. County Road 769
Arcadia, FL 31269

RE: Horse Creek Stewardship Program
Ammonia Impact Assessment for July 2008
Developed on behalf of Mosaic in October 2008

Dear Mr. Stone,

The impact assessment you requested for the Horse Creek Stewardship Program July 2008 sampling event is attached. Please contact us if you have any questions or comments.

Sincerely,

BIOLOGICAL RESEARCH ASSOCIATES

Kristan Robbins
Senior Ecologist/Data Analyst

Daniel Hammond
Water Resource Analyst

Enclosure: Ammonia Impact Assessment July 2008 Exceedance at HCSW-2, HCSW-3, and HCSW-4



Biological Research Associates

Environmental and Natural Resource Management Consultants

A Division of ENTRIX, Inc.

AMMONIA IMPACT ASSESSMENT JULY 2008 EXCEEDANCE AT HCSW-2, HCSW-3, AND HCSW-4

Prepared on behalf of:



Prepared by:



October 2008

Kristan M. N. Robbins
Senior Ecologist/Data Analyst

Daniel G. Hammond
Water Resource Analyst

G:\02476\065\HCSP Monthly reports\Impact Assessments\July08_amm_impactassessment_100208.doc

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1-800-497-9294 • www.biologicalresearch.com • Established 1973

BACKGROUND

This report was prepared as a component of the Horse Creek Stewardship Program (HCSP). The HCSP plan document requires that an “impact assessment” be conducted for any trigger level exceedances or water quality trends found while preparing the annual HCSP report. However, this assessment is being proactively provided at the request of Sam Stone of the Peace River Manasota Regional Water Supply Authority (PRMRWSA) based on monthly monitoring data not yet incorporated into an annual report.

As part of the HCSP, Mosaic monitors four locations monthly on Horse Creek for a number of water quality parameters. Most of the monitored parameters have trigger levels that are set to track conditions in the stream. The trigger level for ammonia is exceeded if concentrations are observed above 0.3 mg/L. In July 2008, ammonia at three stations, HCSW-2 at Goose Pond Road (0.408 mg/L), HCSW-3 at State Road 70 (0.319 mg/L), and HCSW-4 at State Road 72 (0.308 mg/L) exceeded the trigger level. In addition, ammonia at HCSW-1 at State Road 64 (0.237) was also elevated. All of the HCSP ammonia sampling data is presented below. Additional ammonia measurements that were recorded during HCSP monthly sampling event in August 2008 are also included.

RESULTS AND DISCUSSION

The July 2008 ammonia values recorded by Mosaic represent the highest ammonia concentrations observed at each HCSP station since the inception of the Stewardship Program, initiated in April 2003 (Table 1). Previously, the maximum ammonia concentration at each station ranged from 0.100 mg/L at HCSW-1 to 0.200 mg/L at HCSW-4 (Table 2). The ammonia concentrations measured at each HCSP station during the June 2008 event were two to six times less than the July 2008 samples (Table 2, Figure 1), but concentrations in August 2008 were also elevated, although not above the HCSP trigger level.

Table 1. Summary statistics of Ammonia levels at Horse Creek Stewardship Program monthly sampling stations from April 2003 to August 2008.

	HCSW-1	HCSW-2	HCSW-3	HCSW-4
	State Road 64	Goose Pond Rd	State Road 70	State Road 72
Minimum	0.023	0.023	0.019	0.023
Median	0.040	0.050	0.040	0.044
Mean	0.052	0.065	0.061	0.062
Maximum	0.237	0.408	0.319	0.308

Table 2. All recorded Ammonia concentrations at Horse Creek Stewardship Program monthly sampling stations from April 2003 to August 2008.

Date	HCSW-1	HCSW-2	HCSW-3	HCSW-4
	State Road 64	Goose Pond Rd	State Road 70	State Road 72
4/30/2003	0.060	0.030	0.070	0.060
5/27/2003	0.080	0.070	0.060	0.040
6/19/2003	0.080	0.050	0.080	0.090

Mosaic Phosphates Company
Ammonia Impact Assessment
July 2008 Exceedance at HCSW-2, HCSW-3, and HCSW-4



Date	HCSW-1	HCSW-2	HCSW-3	HCSW-4
	State Road 64	Goose Pond Rd	State Road 70	State Road 72
7/14/2003	0.080	0.040	0.110	0.110
8/28/2003	0.060	0.070	0.070	0.070
9/25/2003	0.100	0.090	0.130	0.130
10/29/2003	0.060	0.130	0.130	0.100
11/20/2003	0.050	0.090	0.070	0.070
12/16/2003	0.050	0.050	0.060	0.200
1/29/2004	0.050	0.040	0.040	0.050
2/24/2004	0.050	0.060	0.060	0.060
3/16/2004	0.060	0.080	0.090	0.080
4/14/2004	0.040	0.070	0.060	0.050
5/26/2004	0.090	0.100	0.080	0.080
6/29/2004	0.070	0.050	0.120	0.070
7/27/2004	0.080	0.070	0.190	0.100
8/30/2004	0.080	0.090	0.030	0.030
9/29/2004	0.030	0.080	0.050	0.070
10/27/2004	0.090	0.100	0.070	0.070
11/18/2004	0.070	0.140	0.080	0.090
12/15/2004	0.023	0.023	0.023	0.023
1/26/2005	Lab error	Lab error	Lab error	Lab error
2/24/2005	0.040	0.040	0.040	0.040
3/30/2005	0.040	0.040	0.040	0.040
4/27/2005	0.094	0.048	0.065	0.040
5/25/2005	0.040	0.040	0.040	0.040
6/22/2005	0.040	0.040	0.040	0.054
7/27/2005	0.040	0.040	0.040	0.040
8/23/2005	0.040	0.055	0.040	0.040
9/29/2005	0.040	0.040	0.040	0.040
10/27/2005	0.040	0.040	0.040	0.040
11/17/2005	0.040	0.040	0.040	0.040
12/20/2005	0.051	0.061	0.048	0.053
1/30/2006	0.040	0.040	0.040	0.040
2/23/2006	0.040	0.040	0.040	0.040
3/28/2006	0.040	0.078	0.054	0.059
4/27/2006	0.040	0.040	0.040	0.040
5/25/2006	dry	0.048	dry	0.041
6/29/2006	0.031	0.025	0.025	0.039
7/27/2006	0.034	0.038	0.025	0.071
8/21/2006	0.076	0.100	0.082	0.091
9/27/2006	0.025	0.058	0.025	0.037
10/19/2006	0.029	0.066	0.054	0.096
11/9/2006	0.025	0.085	0.025	0.025
12/13/2006	0.025	0.065	0.025	0.029
1/23/2007	0.025	0.034	0.025	0.025
2/14/2007	0.025	0.025	0.025	0.025
3/14/2007	0.025	0.048	0.034	0.041
4/25/2007	0.025	0.025	0.025	0.025
5/16/2007	0.025	0.025	0.025	0.034
6/20/2007	0.025	0.029	0.025	0.025
7/18/2007	0.055	0.051	0.027	0.050
8/27/2007	0.025	0.025	0.025	0.025

Date	HCSW-1	HCSW-2	HCSW-3	HCSW-4
	State Road 64	Goose Pond Rd	State Road 70	State Road 72
9/26/2007	0.025	0.025	0.025	0.025
10/29/2007	0.068	0.100	0.084	0.071
11/29/2007	0.031	0.062	0.038	0.074
12/17/2007	0.031	0.063	0.033	0.031
1/30/2008	0.043	0.053	0.040	0.040
2/26/2008	0.023	0.034	0.019	0.036
3/27/2008	0.023	0.031	0.019	0.023
4/23/2008	0.056	0.039	0.030	0.046
5/29/2008	dry	0.130	0.046	0.066
6/26/2008	0.080	0.070	0.150	0.050
7/31/2008	0.237	0.408	0.319	0.308
8/26/2008	0.144	0.219	0.230	0.202

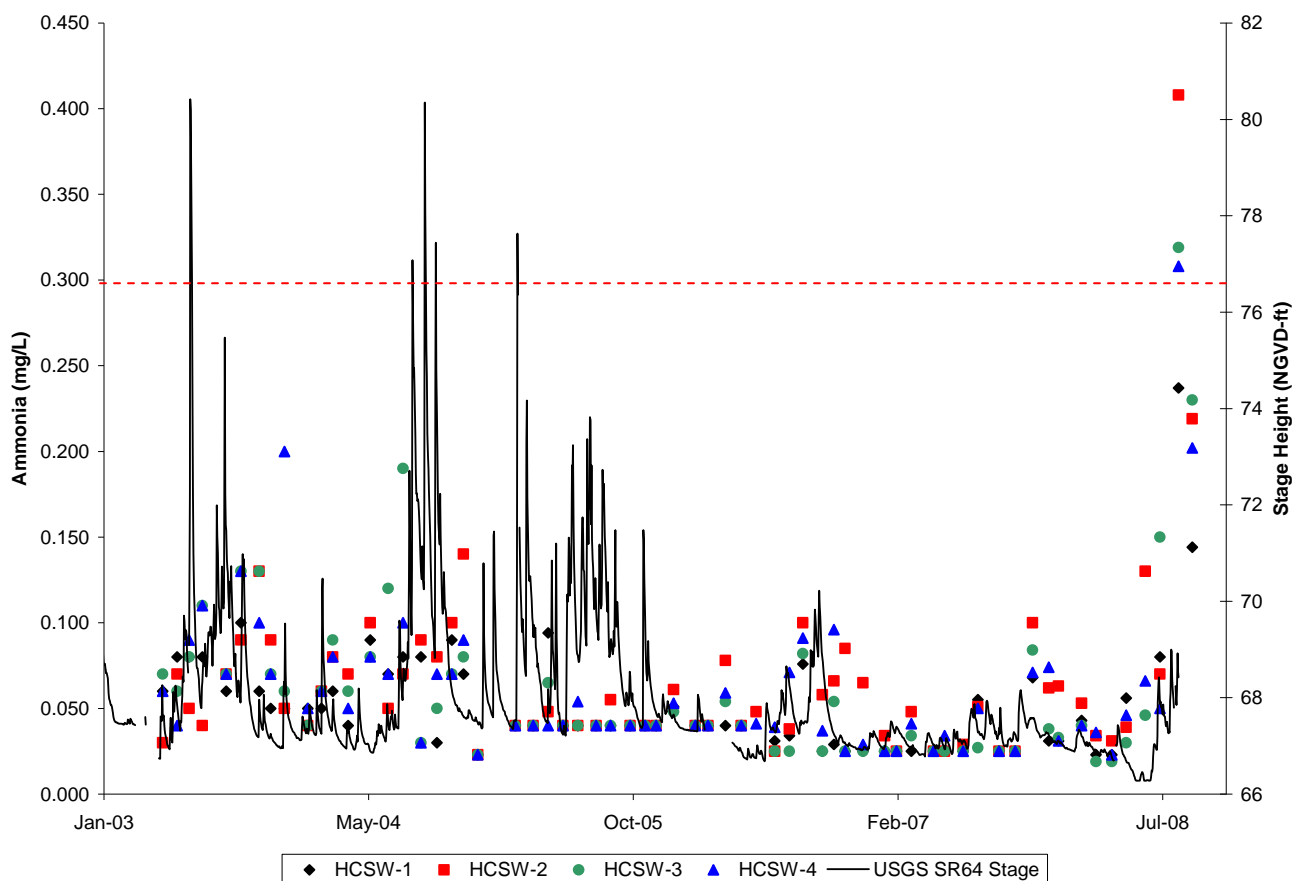


Figure 1. Measured Ammonia at Horse Creek Stewardship Program monthly sampling stations from April 2003 to August 2008, with USGS provisional stage height at HCSW-1.

Ammonia appears to be unusually elevated (2x – 6x) at all HCSP stations during July and August 2008 compared to data collected since April 2003. We suggest the elevated ammonia is caused by either a change in laboratory and analysis methods that may have caused a step-change in the results or low dissolved oxygen and other natural stream conditions that have limited the nitrification cycle. We will examine both of these possibilities in turn.

In June 2008, the lab analysis for the HCSP program was moved from the lab previously used during the majority of the HCSP, TestAmerica. In June, Mosaic's internal laboratory analyzed the ammonia grab sample; in July and August 2008, Benchmark EA, Inc, performed the ammonia analysis. Both TestAmerica and Mosaic used laboratory method 350.1, a colorimetric method, to analyze ammonia, and Benchmark uses method SM4500-NH3C, a distillation method. It is possible these two methods may yield slightly different ammonia concentrations, although we would not expect the difference to be of as large a magnitude as seen between the June and July 2008 samples. To determine if the method change is contributing to the reporting of elevated ammonia concentrations, Benchmark will run both methods for the August, September, and possibly other future samples.

Although the laboratory method change may contribute to reporting of elevated ammonia, it is likely that low streamflow and dissolved oxygen are also factors. Dissolved oxygen is a limiting factor in the nitrification cycle, which is the biological oxidation of ammonia to nitrite and then to nitrate. The conversion of ammonia to nitrite is usually the rate-limiting step of the nitrification cycle. Nitrification of ammonia to nitrite can slightly lower the dissolved oxygen in a stream, but if dissolved oxygen is initially very low, nitrification will be inhibited and the ratio of ammonia to nitrate+nitrite will increase. If nitrification of ammonia is taking place, one expects ammonia and nitrite concentrations to be low and nitrate concentrations to be higher. If nitrification is not occurring, then ammonia will increase while nitrate decreases. During nitrification, the overall total nitrogen concentration of the stream stays relatively constant as nitrogen in the atmosphere is fixed and nitrates are assimilated or denitrified. If nitrification is limited, total nitrogen may increase slightly, as fixation is still taking place although nitrates are not produced.

During 2008 in Horse Creek, HCSW-1 had less than 1.0 cfs of streamflow from 15 April to 13 June, which likely resulted in very little flow to downstream stations; streamflow at HCSW-4 during that most of that time was less than 5 cfs (Figure 2). When flows began again in late June 2008, organic debris and sand were washed into the stream with storm runoff, resulting in increased decomposition of organic material which produces ammonia via ammonification and consumes oxygen through nitrification.

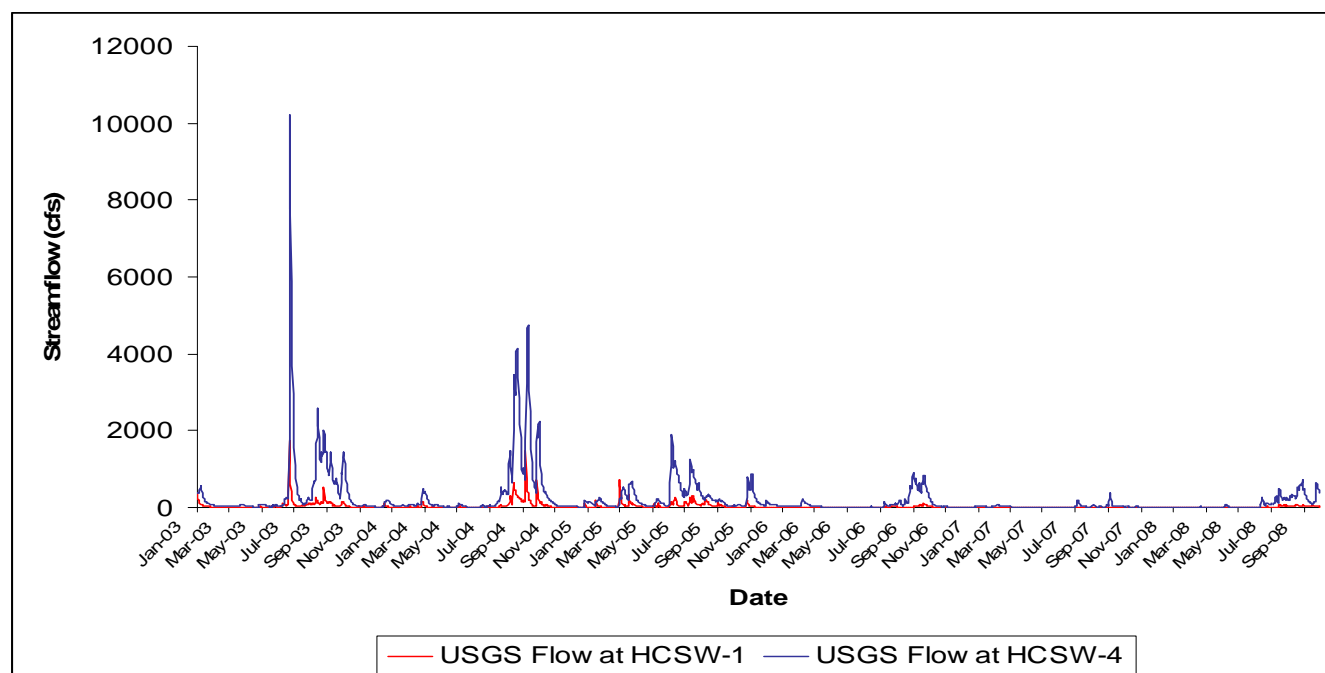


Figure 2. USGS Streamflow from January 2003 to September 2008, based on USGS provisional data.

Dissolved oxygen follows a seasonal cycle in Horse Creek, with the lowest concentrations during high flow/ high temperature periods, unrelated to mining (Figure 3). While dissolved oxygen at HCSW-1, the station closest to mining, is usually above the HCSP trigger value and state water quality standard (5.0 mg/L), at HCSW-2 and HCSW-3 concentrations often fall below it. HCSW-2 is downstream of a large freshwater marsh that has lower pH and dissolved oxygen than upstream in Horse Creek. In addition, the control structure leading out of the marsh and downstream to HCSW-2 is set fairly high, so relatively low flows from upstream may be impounded within the marsh until higher flows begin, leaving HCSW-2 as isolated pools disconnected from HCSW-1 during low flow periods. When higher flows begin, this pooled hypoxic water from HCSW-2, along with decomposing organic material from the marsh, is washed downstream to HCSW-3 and HCSW-4, thus lowering the dissolved oxygen there.

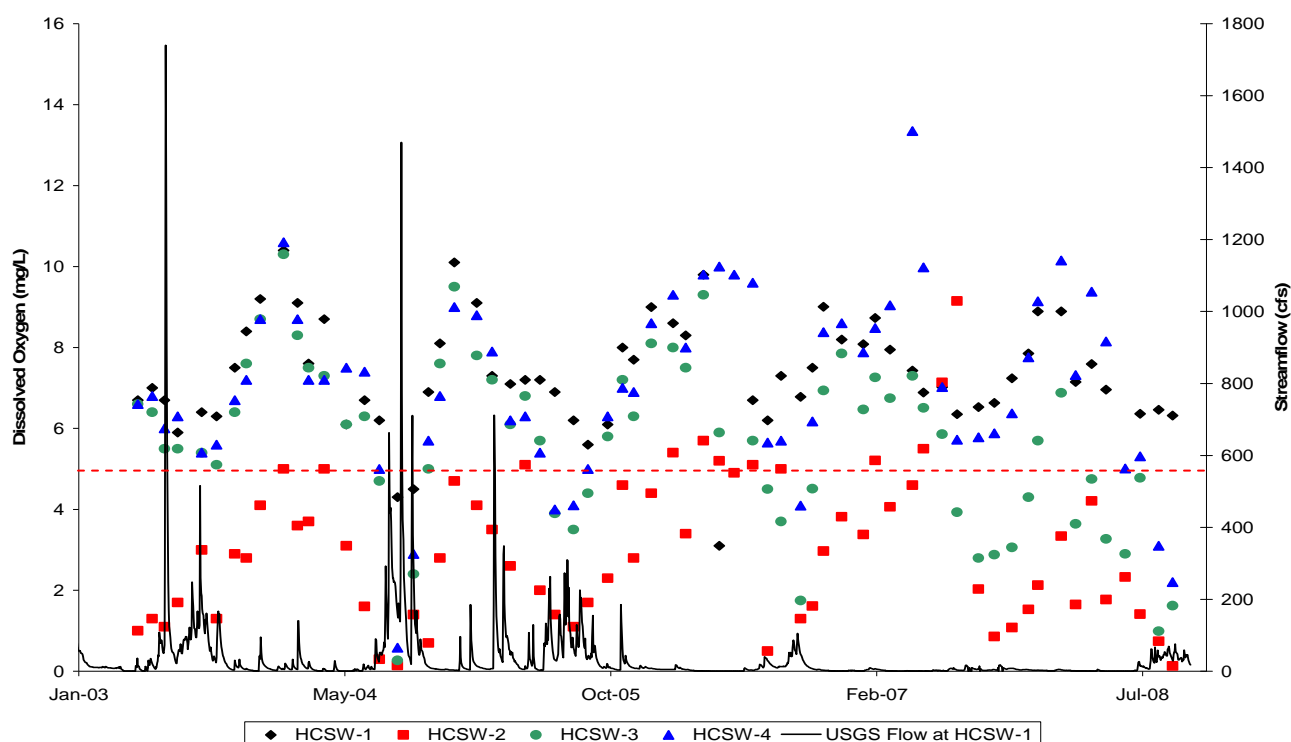


Figure 3. Measured Dissolved Oxygen at Horse Creek Stewardship Program monthly sampling stations from April 2003 to August 2008, with USGS provisional streamflow at HCSW-1.

In July and August 2008, when ammonia was unusually elevated, total nitrogen was only slightly elevated above average 2008 concentrations (Figure 4). The relative composition of total nitrogen in those months, however, became skewed toward ammonia rather than nitrate+nitrite, as we would expect from depressed nitrification. It is likely that organic decomposition from storm runoff during June to August storm events may have increased the in-stream concentration of organic nitrogen and ammonia, which slightly increased the overall total nitrogen concentration (Figure 4). At the same time, dissolved oxygen at several stations was very low, probably from additional oxygen demand from the large marsh above HCSW-2 (Figure 5). The combination of increased ammonia production and depressed dissolved oxygen resulted in a lower rate of nitrification of ammonia to nitrite and nitrate. As dissolved oxygen levels recover during the cooler months, the ratio of ammonia to nitrate+nitrite should decrease, thus decreasing the overall concentration of ammonia well below the trigger value.

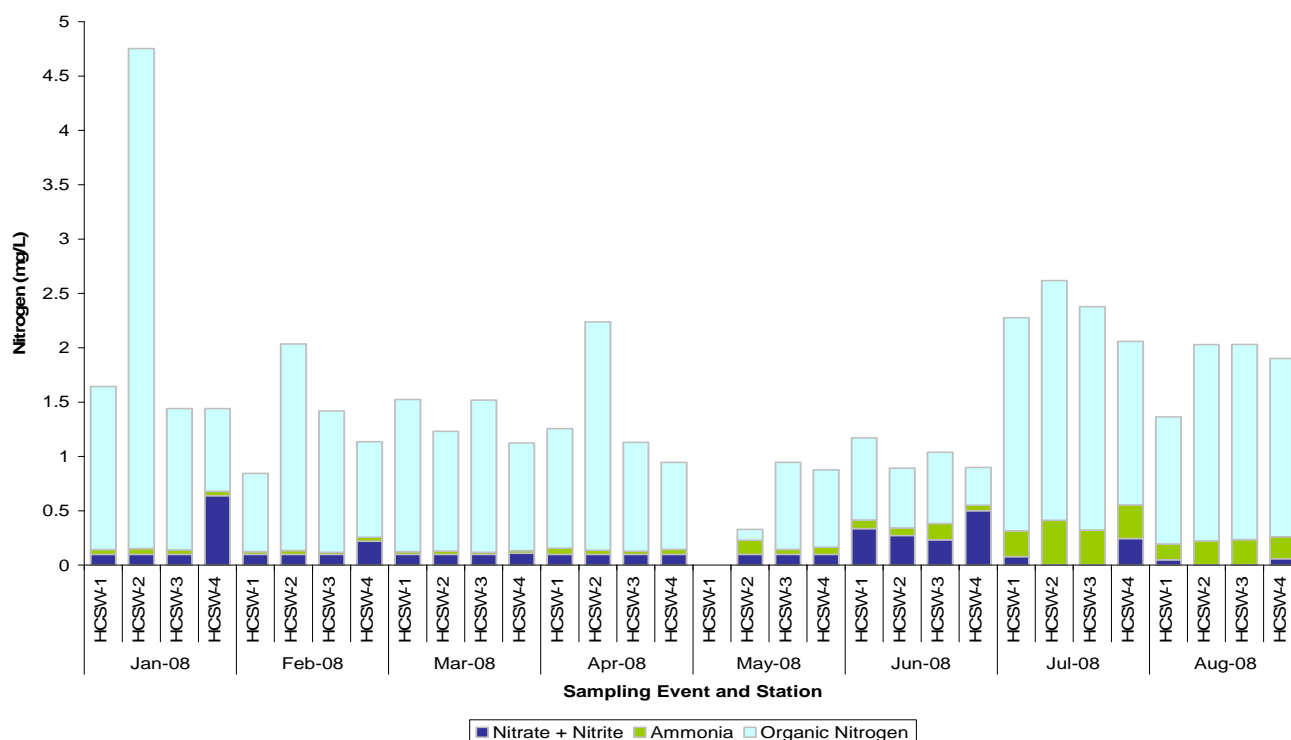


Figure 4. Total Nitrogen Components (Nitrate + Nitrite, Ammonia, and Organic Nitrogen) at Horse Creek Stewardship Program monthly sampling stations from January 2008 to August 2008.

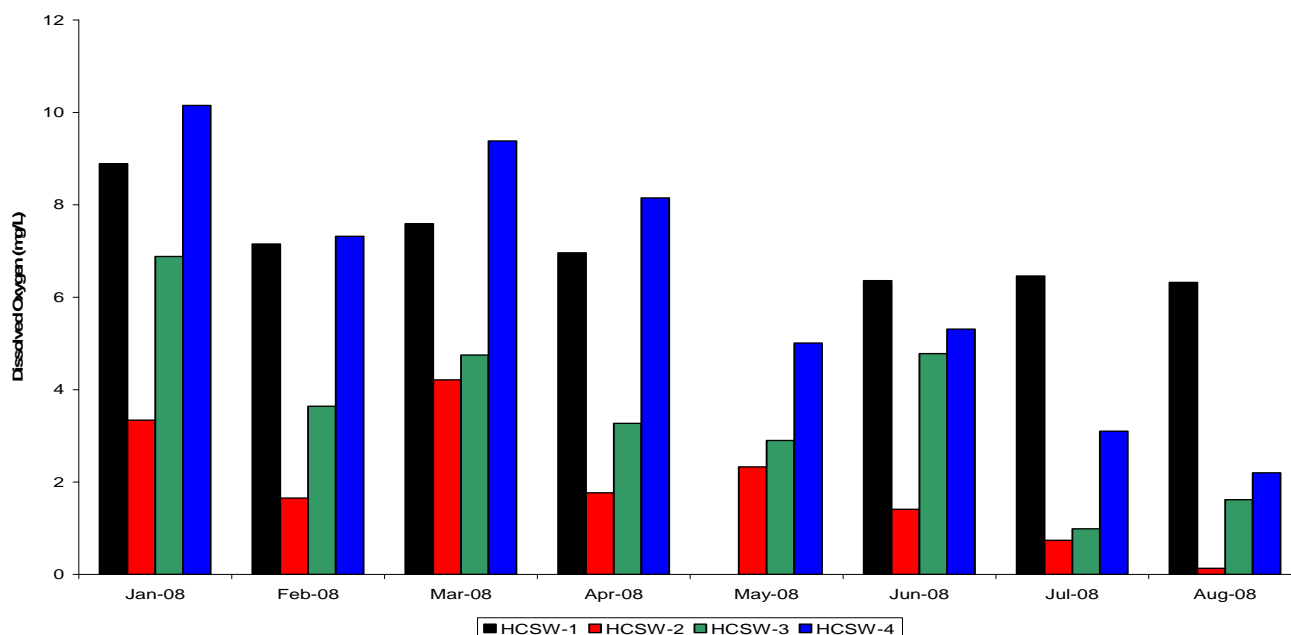


Figure 5. Dissolved Oxygen at Horse Creek Stewardship Program monthly sampling stations from January 2008 to August 2008.

CONCLUSIONS

In conclusion, it is likely that the reported elevated ammonia concentrations observed in Horse Creek in July 2008 are either the result of a laboratory method change or a seasonal fluctuation in the nitrogen cycle of Horse Creek. Several months of analysis with both laboratory methods will help to determine if the method change is responsible for the elevated concentrations. If that is the case, Mosaic may choose to use the 350.1 method to keep consistency throughout the HCSP.

If the elevated ammonia is not caused by the analysis method, it is likely a result of a natural increase in ammonification from decomposition and a limitation of nitrification because of low dissolved oxygen. Although we have not previously seen such an example of increased ammonification and decreased nitrification during the HCSP, 2007 and 2008 have been very dry years for Horse Creek, and the July – August 2008 high flows are the highest since 2006 (Figure 2). The storm events in July and August 2008 washed considerable organic matter into the stream and also inundated terrestrial plants growing on the dry stream channel.

It is very unlikely that Mosaic NPDES outfalls, which were discharging during July 2008, are the source of elevated ammonia. Mosaic's NPDES permits require that the dissolved oxygen concentration of the discharge must be above 5 mg/L, so nitrification is not limited and ammonia will have been converted to other forms of nitrogen. In addition, the Horse Creek outfalls, which are part of the Ft. Green system, are not connected to any chemical plants that may use ammonia in their processes.

PEACE RIVER MANASOTA REGIONAL WATER SUPPLY AUTHORITY

Serving the Citizens of Charlotte, DeSoto, Manatee & Sarasota Counties since 1982

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SARASOTA COUNTY

PATRICK J. LEHMAN, P.E., EXECUTIVE DIRECTOR

October 7, 2008

Santino Provenzano
Environmental Superintendent
Mosaic Fertilizer LLC
PO Box 508
Bradley, Florida 33835-0508

RE: Horse Creek Stewardship Program
July Impact Assessment for High Ammonia
Request for Additional Information

Dear Mr. Provenzano:

The Peace River Manasota Regional Water Supply Authority (Authority) is in receipt of the above referenced impact assessment prepared by Biological Research Associates (BRA). BRA provided a thorough review and explanation of the data and possible causes of high ammonia levels. The Authority is however concerned that these high levels of ammonia have occurred during 2008 but not in previous years. What is different in 2008 that would cause this to occur? BRA's position that the cause of the high ammonia could not be caused by Mosaic's operations may be correct but it is suggested that additional data and analysis be included further supporting this conclusion. The Authority is therefore requesting the following additional information to be delivered within 15 working days from receipt of this request.

1. Please provide the daily discharge volumes (MG) in tabular form for all outfalls discharging to Horse Creek for calendar years 2003-2008 so that outfall discharges and Program water quality data can be readily compared with discharged events. A suggested plot showing discharges versus ammonia levels would be helpful also.
2. Please provide the current NPDES permits for all outfalls discharging to Horse Creek.
3. Please provide in tabular form the water quality data collected at each outfall on Horse Creek, the date the samples were collected and the sample location for the period 2003-2008.

Mr. Santino Provenzano
October 7, 2008
Page two

4. Please provide a written description of the physical structure and method of operation for all outfalls discharging to Horse Creek along with descriptive pictures. Also include a description of where the actual water quality samples are taken at the outfall locations. Finally provide a description of how water re-circulated in the mining system for months without discharge can still retain high levels of DO when discharged to Horse Creek.

Should you require any clarification on the above request for additional information do not hesitate to contact me.

Yours truly,



Samuel S. Stone
Environmental Affairs Coordinator

xc: Mike Coates
Jeff Clark
Ralph Montgomery
Kris Robbins
Doug Durbin
Rob Brown
John Ryan
Bill Byle
Victor Dotson



October 28, 2008

CERTIFIED MAIL 7005 3110 0002 1685 7888

Samuel S. Stone
Environmental Affairs Coordinator
Peace River Manasota Regional Water Supply Authority
8998 S. W. County Rd. 769
Arcadia, FL 34269

RE: Horse Creek Stewardship Program
July Impact Assessment for High Ammonia
Request for Additional Information Response

Dear Mr. Stone,

Mosaic has received your 7 October 2008 request for additional information regarding the July Ammonia Impact Assessment prepared by Biological Research Associates (BRA). We have fulfilled your four requests, as follows:

- 1. Please provide the daily discharge volumes (MG) in tabular form for all outfalls discharging to Horse Creek for calendar years 2003-2008 so that outfall discharges and Program water quality data can be readily compared with discharged events. A suggested plot showing discharges versus ammonia levels would be helpful also.**

A excel sheet named "NPDES_DischargeWQ_102108.xls" has been posted to the Horse Creek ftp site, which contains daily discharge and water quality for the Horse Creek 003 and 004 outfalls. A graph showing ammonia concentrations at HCSW-1 from the Program, USGS streamflow at HCSW-1, and NPDES combined discharge at 003 and 004 is attached at the end of this letter.

- 2. Please provide the current NPDES permits for all outfalls discharging to Horse Creek.**

The current NPDES permit for all Ft. Green outfalls has been posted to the Horse Creek ftp site as "FTG-fl0027600-mod 2008.pdf".

- 3. Please provide in tabular form the water quality data collected at each outfall on Horse Creek, the date the samples were collected, and the sample location for the period 2003-2008.**

A excel sheet named "NPDES_DischargeWQ_102108.xls" has been posted to the Horse Creek ftp site, which contains daily discharge and water quality for the Horse Creek 003 and 004 outfalls. Note that ammonia concentrations are not regulated by the Ft. Green NPDES permit, and are, therefore, not sampled at the NPDES outfalls. Total Kjeldahl Nitrogen (TKN), ammonia plus organic nitrogen, is collected at each outfall.

4. **Please provide a written description of the physical structure and method of operation for all outfalls discharging to Horse Creek along with descriptive pictures. Also include a description of how water re-circulated in the mining system for months without discharge can still retain high levels of DO when discharged to Horse Creek.**

A excel sheet named "Horse_Creek_Outfall_Description.xls" has been posted to the Horse Creek ftp site, which contains a map and general description of the Horse Creek 003 and 004 outfalls and their operation.

Mosaic and BRA have reviewed the data that you have requested, as well as the referenced impact assessment already provided, and we believe that the observed elevated concentrations of ammonia were not a direct result of mining or NPDES discharge. Mining discharge in July 2003 reached similar volumes to that of July 2008, and TKN and total nitrogen concentrations at the outfalls and HCSW-1 were also similar during both periods. Ammonia concentrations at HCSW-1, however, were much lower in July 2003 than in July 2008. The major difference between the two periods is not the volume of NPDES discharge, but rather the long period of low streamflow and rainfall that proceeded the July 2008 event. We think that these natural stream conditions, as well as differences in laboratory method, resulted in higher than usual ammonia concentrations in Horse Creek.

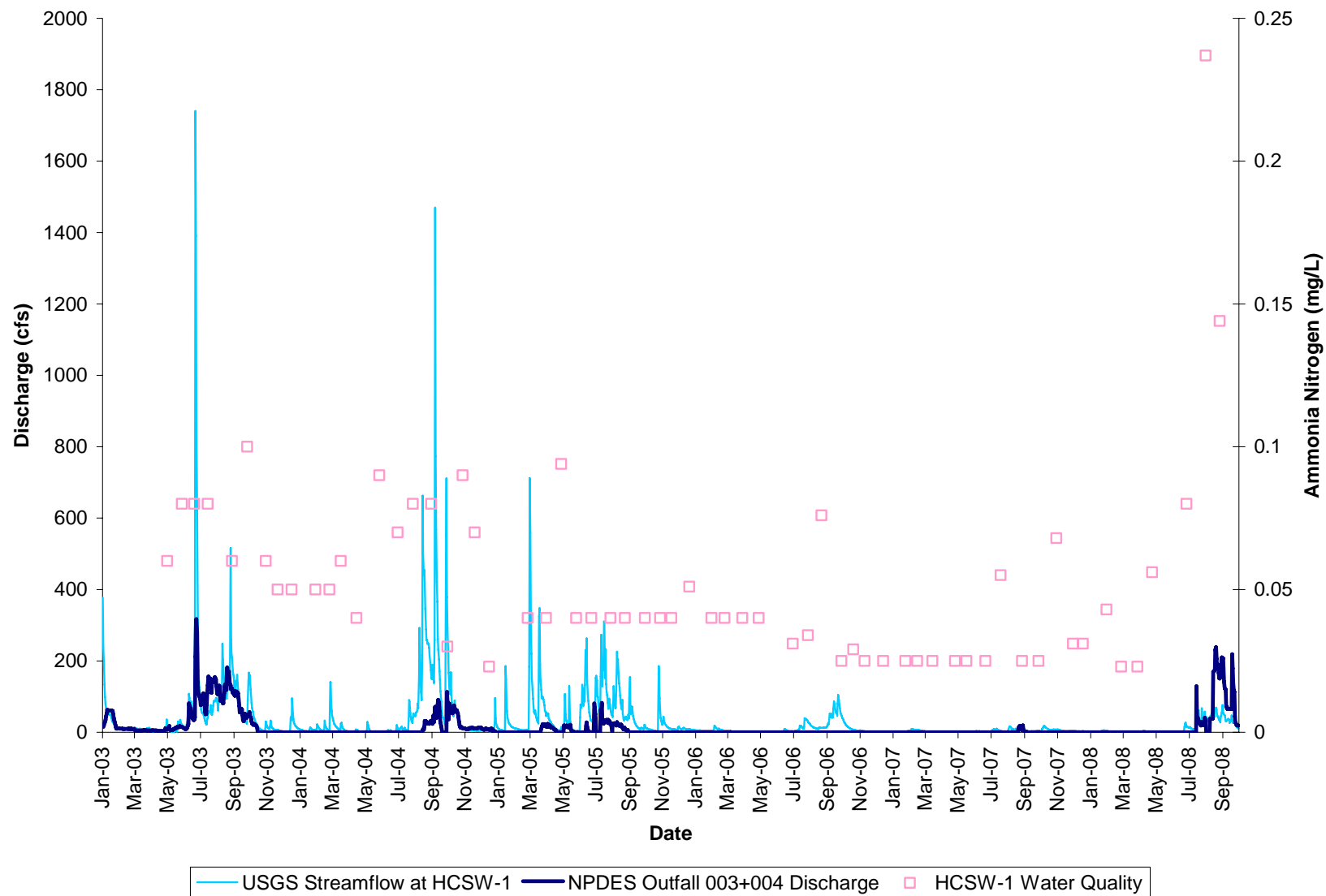
If you have any other questions regarding this Ammonia Impact Assessment please contact me at 813-781-1185 or by email at santino.provenzano@mosaicco.com.

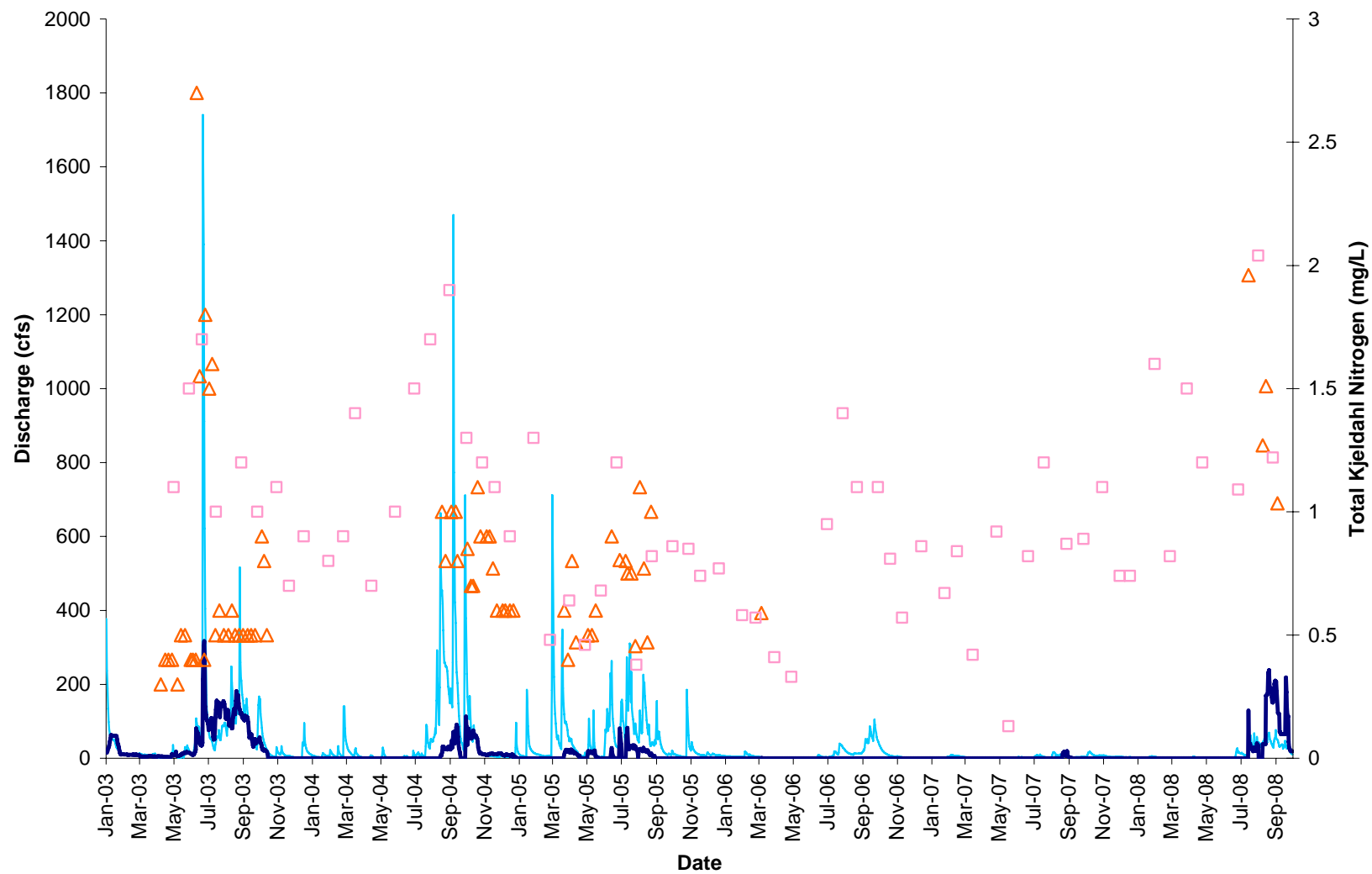
Sincerely,

A handwritten signature in blue ink, appearing to read "Santino A. Provenzano", is written over a faint, light blue circular stamp or watermark.

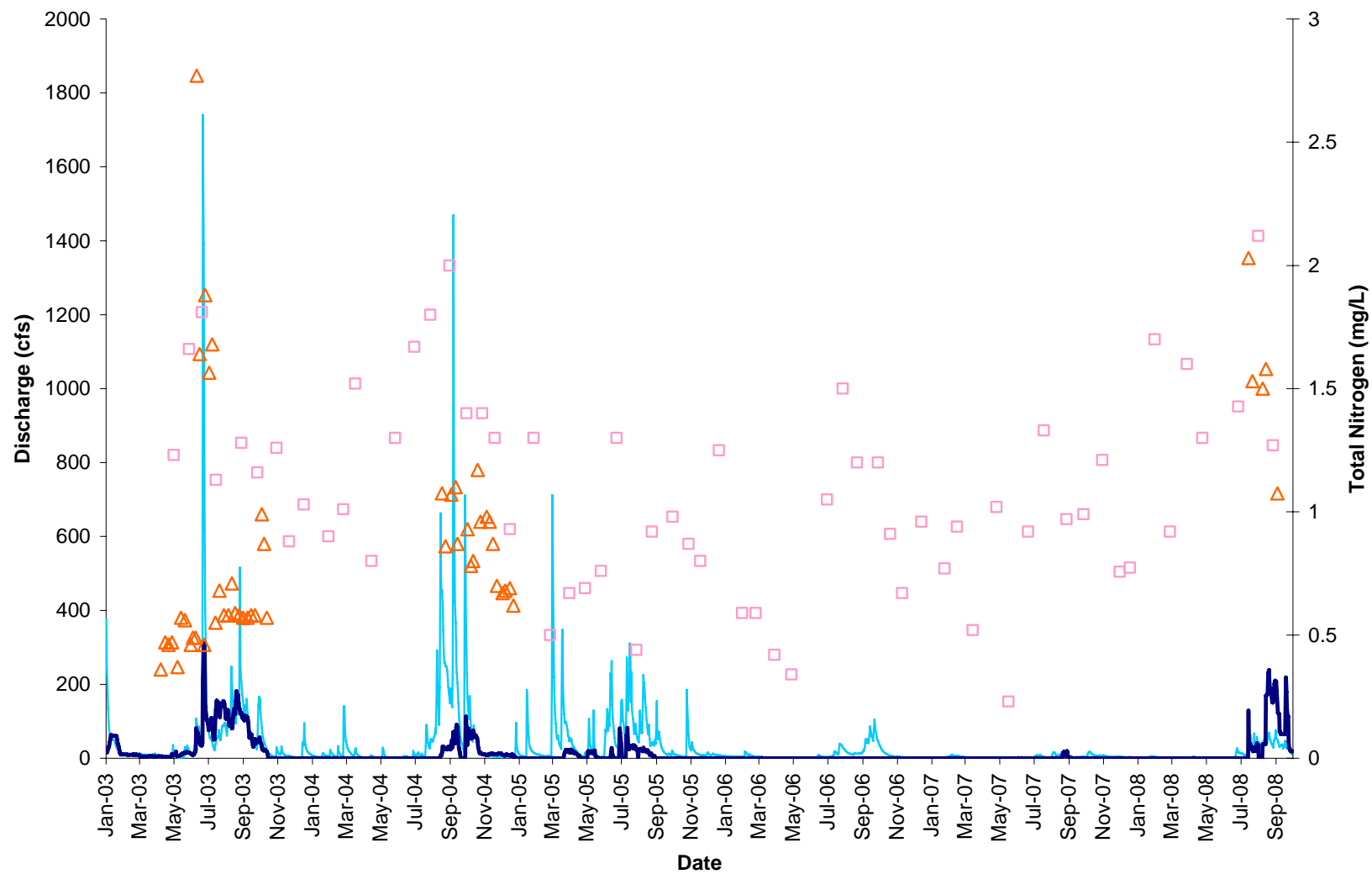
Santino A. Provenzano
Environmental Superintendent
Mosaic Fertilizer, LLC – East Mines

cc: Mink, SFM
Nadaskay, SFM
Robbins, BRA
Horse Creek File





USGS Streamflow NPDES Discharge NPDES WQ HCSW-1 WQ



USGS Streamflow NPDES Discharge NPDES WQ HCSW-1 WQ



December 1, 2008

Mr. Samuel S. Stone, Environmental Affairs Coordinator
Peace River Manasota Regional Water Supply Authority
8998 SW County Road 769
Arcadia, FL 34266

**Subject: Horse Creek Stewardship Program
July 2008 Ammonia Impact Assessment**

Dear Mr. Stone:

In July and August 2008, elevated ammonia concentrations were detected in Horse Creek during monthly water quality sampling events conducted by Mosaic as part of the Horse Creek Stewardship Program (HCSP). The ammonia concentrations observed at the HCSP stations were 2 to 6 times higher than the typical values observed since the initiation of the Program in April 2003. In addition, the trigger level for ammonia (0.3 mg/L) was exceeded at three of the four HCSP stations during the event conducted on July 31, 2008.

On behalf of Mosaic, Biological Research Associates (BRA) prepared an ammonia impact assessment in October 2008 to address the possible causes of the elevated ammonia concentrations as required by the HCSP agreement. The impact assessment focused on two key factors that may have contributed to the elevated ammonia concentrations. The first is a change in the analytical laboratory processing the samples and the analytical procedure. Prior to July 2008, the ammonia samples were analyzed either by TestAmerica or Mosaic's own in-house laboratory using U.S. Environmental Protection Agency Method 350.1, a colorimetric method with no distillation. In July 2008, Mosaic began sending samples to Benchmark EA, Inc. (Benchmark), which uses a different method (SM4500-NH3C) that includes a distillation step for determining ammonia concentrations. BRA proposed that the laboratory and procedural change could be responsible for the elevated ammonia concentrations observed. The second potential contributing factor cited in the impact assessment was that the low streamflow and dissolved oxygen in the Creek around the time of sampling may have disrupted the nitrification process in the stream. Nitrification is the oxidation (or conversion) of ammonia to nitrites and then to nitrates by nitrifying bacteria. Oxygen is a limiting factor in this process; therefore, low dissolved oxygen concentration in the stream could inhibit nitrification, thereby leading to a build up of ammonia and/or nitrites.

On October 28, 2008, the Peace River Manasota Regional Water Supply Authority (the Authority) requested additional information from Mosaic to help determine if Mosaic's discharges into Horse Creek may have contributed to the elevated ammonia concentrations. Mosaic promptly responded by providing the requested information, including a spreadsheet containing daily discharge and National Pollutant Discharge Elimination System (NPDES) mandated water quality results for their two Horse Creek

outfalls, the current NPDES permit for these outfalls at the Fort Green Mine, and general descriptions and photos of the outfalls.

Mosaic supplemented this information with a letter dated November 11, 2008, which documents the results of two tests comparing the two different methods of analyzing ammonia (distillation and non-distillation) for split samples taken during the September and October HCSP sampling events. The first test examined the results of split samples taken in September and October that were sent to Benchmark, which performed the ammonia analyses using the distillation method, and TestAmerica, which utilized the non-distillation method. Results indicate that the distillation method values determined by Benchmark were on average 2.5 times higher than the non-distillation method values reported by TestAmerica. The second test examined ammonia concentrations from split samples taken in October 2008 that were analyzed by only Benchmark using both the distillation and non-distillation methods. This test yielded ammonia concentrations that were 1.5 to 2 times higher for the distillation method than the non-distillation method for 3 of the 4 HCSP stations.

EarthBalance[®] has reviewed all the information provided by Mosaic as a part of the July 2008 impact assessment for ammonia. We have concluded that laboratory changes and consequent changes in analytical procedures are likely accountable for the significant increase in ammonia concentrations beginning in July 2008. We also agree with the premise that naturally occurring low flows, in conjunction with low dissolved oxygen concentrations, could have also played a role in the elevated ammonia concentrations due to inhibition of the in-stream nitrification process. Based on the information provided, we do not believe there is sufficient evidence to attribute the elevated ammonia concentrations in Horse Creek to Mosaic's discharges although we cannot conclusively rule it out as a contributing factor. We do, however, recommend that the HCSP move forward using the distillation procedure for all ammonia analyses. According to Dr. Dale Dixon (Benchmark), distillation is required by the U.S. Environmental Protection Agency for all NPDES ammonia analyses and it yields more sensitive results due to limited background interference.

Please feel free to contact me at (941) 426-7878 or via email at jclark@earthbalance.com if you have any questions regarding this matter.

Sincerely,
EarthBalance[®]



Jeff Clark, M.S., PMP
Senior Biologist

cc: File (03345.30)

MEMORANDUM

May 20, 2009

TO: Rob Brown
John Ryan
Bill Byle
Vic Dotson

FROM: Sam Stone

RE: Horse Creek Stewardship Program
Ammonia Sample Distillation

As a result of the ammonia impact assessment we have learned that an ammonia lab procedure change resulted in the high ammonia results. Now we are left with the dilemma of do we continue forward with distilled samples or do we ask the lab to not distill the samples. Below is a brief summary of our findings and you the members of the TAG need to provide input as to how the program should proceed forward.

1. From April 2003 – mid 2008 the Horse Creek Stewardship Program (HCSP) labs that analyzed Mosaic's samples did not distill their samples. Mosaic changed labs to Benchmark (mid 2008) which does distill its samples. Since mid 2008 the program has ran samples both distilled and non-distilled.
2. The split samples run for the Authority from April 2003 – mid 2008 (6 per year) was run by Benchmark and was distilled.
3. DEP requires that all labs distill samples for ammonia but then labs can exempt out by running a performance test between distilled and non distilled samples. Most labs therefore run one test to demonstrate that there is no difference, then they do not distill any more samples. DEP is comfortable with this rule and does not have plans to change the rule. (See notes from Dale Dixon)
4. Entrix pointed out to the group that if we changed future samples to distillation there will be a step increase when comparing past and future program results making trend analysis difficult with incorrect conclusions possible. Entrix also followed up with the WMD and learned that the WMD does not distill samples and does not plan to distill in the future. We currently compare the program results with the WMD results as part of the annual report. How important is it to compare results between the WMD and the HCSP?

Horse Creek TAG

May 20, 2009

Page two

5. Our consultant PBS&J suggested that we delete the early non-distilled Mosaic data and substitute the Authority's split data (all distilled) then continue with distillation forward. Entrix pointed out however that a comparison between the old split data (distilled) vs the old Mosaic data (non-distilled) was not consistent. At times the distilled results were higher but then at other times the reverse would be true.

In conclusion this issue is difficult to decide. I prefer accuracy which means distillation, but then we can not compare program data with WMD data, and can not compare future program data with early Mosaic program data. Since most labs do not distill, if our program has distilled data then we could not compared our data with other data from other tributaries. For all these reasons I am recommending that the program not distill the ammonia samples.

Please give me your thoughts ASAP.

xc: Mike Coates
 Jeff Clark
 Santino Provenzano
 Kris Robbins
 Ralph Montgomery