August 2, 2014

Kyle Lawrence
CTEH
5120 Northshore Drive
N. Little Rock, AR 72118

Re: Lab Project Number: 60174738-005
Client Project ID: Wet Test

Dear:

Enclosed are the analytical results for sample(s) received by the laboratory. The results relate only to the samples included in this report. Results reported herein conform to the most current NELAC standards, where applicable, unless otherwise narrated in the body of the report.

If you have any question concerning this report, please feel free to contact me.

Sincerely,

Tim Harrell

Tim Harrell
Tim.Harrell@pacelabs.com
Technical Director

Pace Analytical Services, Inc.

808 West McKay, Frontenac, KS 66763

LABORATORY REPORT:

CLIENT: Kyle Lawrence **CTEH** **5120 Northshore Drive** **N. Little Rock, AR 72118** 1-314-773-3035	**Date Reported: 8-2-14** **Date Initiated: 7-31-14** **Time Arrived: 10:15** **Date Terminated: 8-2-14**

BIOMONITORING STUDY

ACUTE TOXICITY

Permit #

FINDING AND CONCLUSIONS:

Acute toxicity testing was performed on duplicate samples of effluent collected from the CTEH (0730WET09) effluent discharge. **Acute toxicity**, as defined by significant mortality for at least one of two aquatic test species during a 48 hour period of exposure, was not **detected in Ceriodaphnia exposed to the 100%** effluent **(AEC), and was not detected in fathead minnows exposed to the 100% effluent. The LC50 for the Ceriodaphnia was >100% and >100% for the Pimephales.** The test species utilized in this test were the water flea, Ceriodaphnia dubia and the fathead minnow, Pimephales promelas. Detailed results of the toxicity testing are provided in the Acute Toxicity Reports. In addition to the acute toxicity testing, water temperature, pH, dissolved oxygen, total hardness, total alkalinity, conductivity, and chlorine determinations were performed on the effluent and control samples.

SAMPLING PROCEDURES:

CTEH personnel collected a sample at the CTEH (0730WET09) effluent discharge. The sample was preserved with ice and transported to Pace Analytical by commercial carrier.

INTRODUCTION:

The purpose of this test was to determine the acute toxicity of the CTEH (0730WET09) effluent on the freshwater invertebrate, Ceriodaphnia dubia and the fathead minnow, Pimephalas promelas. These tests were conducted at Pace Analytical Services, Inc., Frontenac, KS.

TEST ORGANISMS:

Ceriodaphnia dubia - The genetic stock of Ceriodaphnia dubia used in this acute toxicity Test were originally obtained from a private breeder. Ceriodaphnia are cultured in house at Pace Analytical Services, Inc. Culture methods of Ceriodaphnia were obtained from EPA821-C-02-006 November 2002.

Pimephales promelas - The fathead minnows used in this acute toxicity test were cultured in-house at Pace Analytical Services, Inc., Frontenac, KS and/or were obtained from a private breeder. Fathead minnows are maintained at Pace Analytical Services until use for acute toxicity between the ages of 1 and 14 days. Information for culturing fathead minnows was taken from EPA821-C-02-006 November 2002.

MATERIALS AND METHODS:

Procedures used in the acute toxicity tests are described in Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms (USEPA, 2002).

CTEH personnel collected the effluent tested from the CTEH (0730WET09) discharge. Testing was performed using a 100% effluent, a series of dilutions, and a synthetic control. **The toxicity test was initiated within 36 hours of sample collection.**

Effluent and synthetic control test solutions were not aerated during the testing period.

Ceriodaphnia *ACUTE METHODS:*

This static test was ran using 40 ml glass vials containing 25 ml of test solution. Food was administered before the test. Five Ceriodaphnia neonates (<24 hr old) were randomly selected and placed in each of 4 replicates of test solution. A total of 20 organisms per concentration were tested. Observations of mortality were made at 24 and 48 hours of exposure.

Pimephales *ACUTE METHODS:*

This static toxicity test was conducted using 500 ml polypropylene container as test chambers containing 250 ml of test solution. Food was administered prior to test initiation, but not during the testing period. Ten Pimephales, 1 – 14 days old, from a single spawn, were randomly selected and placed in each of 4 test chambers. A total of 40 organisms were exposed to each test concentration. Observations of mortality were made at 24 and 48 hours of exposure.

WATER QUALITY METHODS:

Prior to test initiation, temperature, dissolved oxygen, pH, total alkalinity, total hardness, and total residual chlorine were measured in the effluent and in the controls. At 24 and 48 hours of exposure, temperature, dissolved oxygen, pH, and conductance were measured in the effluent sample and the controls.

DATA ANALYSIS:

Statistically significant ($p<0.05$) mortality is determined by Dunnet's procedure using average percent survival of each test concentration versus the average survival of the controls. If significant mortality occurs, median lethal concentrations (LC50) are calculated using effluent concentrations and their corresponding percent mortality data. The LC50's and the 95% confidence intervals are calculated where appropriate by the Spearman-Karber method. Statistical analysis is accomplished by following steps in EPA/600/4-90/027F, August 1993 and by use of Toxstat version 3.4.

RESULTS:

THE Ceriodaphnia MORTALITY RESULTS - There was no significant mortality observed of the freshwater invertebrate, Ceriodaphnia dubia, during the 48 hour exposure period to the 100% effluent concentrations. There was no significant mortality in the synthetic control. The LC50 value of the sample to Ceriodaphnia is approximately >100%.

Ceriodaphnia MORTALITY DATA

 # ALIVE

CONC.	REP #	O HOURS	24 HOURS	48 HOURS	% MORT.
SYNTHETIC	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
6.25%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
12.5%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
25%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
50%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0
100%	1	5	5	5	0
"	2	5	5	5	0
"	3	5	5	5	0
"	4	5	5	5	0

AVG. MORTALITY @ AEC (100% EFFLUENT) =0.0%

THE Pimephales RESULTS - Minnows exposed to effluent collected at the CTEH (0730WET09) effluent discharge exhibited no significant mortality in the 100% effluent concentration during the 48 hr exposure period. The synthetic control showed no significant mortality during the testing period. The LC50 value of the effluent to fathead minnows is estimated to be >100%.

CONC.	REP #	0 HOURS	24 HOURS	48 HOURS	% MORTALITY
SYNTHETIC	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
6.25%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
12.5%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
25%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
50%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0
100%	1	10	10	10	0
"	2	10	10	10	0
"	3	10	10	10	0
"	4	10	10	10	0

AVG. MORTALITY @ AEC (100% EFFLUENT) =0.0%

WATER CHEMISTRY RESULTS:

Total residual chlorine (Cl2) - The effluent sample from the The CTEH (0730WET09) discharge had <0.1 mg/l detectable level of total residual chlorine upon receipt in the laboratory.

Dissolved Oxygen (D.O.) - Dissolved oxygen reading of the 100% effluent sample was 9.50 mg/l after being raised to the test temperature of 25° C. At termination D.O. was 7.00 mg/l in the 100% effluent, which falls into acceptable limits. Aeration was not required in this test.

pH - The pH of the 100% effluent was 8.82 upon receipt in the laboratory and the synthetic control had a 7.72. At termination the pH measurement in the 100% effluent sample was 9.00.

Conductance - The conductance of the effluent sample was 1599 umhos and the synthetic control was 380 umhos.

INITIAL WATER QUALITY:

Initial Measurements Synthetic Water

pH	D.O. (mg/l)	Cond. (umhos)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
7.72	8.10	380	<0.1	25.0	98	56

Initial Measurements of 100% Effluent

PH	D.O. (mg/l)	Cond. (umhos)	Cl2 (mg/l)	Temp (C)	Hard (mg/l)	Alk (mg/l)
8.82	9.50	25.0	<0.1	25.0	546	380

TEST WATER QUALITY:

24-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	7.83	7.80	25.1	377
6.25%	8.02	7.70	25.0	509
12.5%	8.28	7.50	25.0	606
25%	8.53	7.50	25.0	770
50%	8.77	7.40	25.0	1175
100%	8.92	7.10	25.0	1803

48-hour Water Quality Measurements

EFFLUENT CONC (%)	PH	D.O. (mg/l)	TEMP (C)	COND. (umhos)
Synthetic	7.93	7.50	25.0	408
6.25%	8.17	7.40	24.8	575
12.5%	8.42	7.40	24.8	624
25%	8.60	7.40	24.8	795
50%	8.82	7.30	24.8	1198
100%	9.00	7.00	24.8	2012

QUALITY ASSURANCE:

The absence of control mortality during this test indicated the health of the organisms and indicated that any significant mortality in the test concentrations is not due to contaminants or variations in test conditions. Reference toxicity tests are routinely performed by staff members of our Toxicology Department.

REFERENCE TOXICANT (NaCl)
Ceriodaphnia
 # OF LIVE ORGANISMS

CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
3.0 g/l	20	6	0
2.5 g/l	20	15	7
2.0 g/l	20	20	19
1.5 g/l	20	20	20
1.0 g/l	20	20	20

LC50 = 2.38 g/l NaCl

REFERENCE TOXICANT (NaCl)
Pimephales
 # OF LIVE ORGANISMS

CONC OF TOXICANT	TEST INITIATION	24 HOUR EXPOSURE	48 HOUR EXPOSURE
10.0 g/l	40	7	0
8.0 g/l	40	35	24
6.0 g/l	40	39	38
4.0 g/l	40	40	40
2.0 g/l	40	40	39

LC50 = 8.22 g/l NaCl

Submitted By: Tim Harrell

Timothy Harrell
Technical Director

Pace Analytical
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 1

1736235

Section A Required Client Information:
- Company: CTEH
- Address: 5120 Northshore Drive, N. Little Rock, AR 72118
- Email To: klawrence@cteh.com
- Phone: 501-801-8500 Fax:
- Requested Due Date/TAT: Rush/ASAP

Section B Required Project Information:
- Report To: klawrence@cteh.com
- Copy To: labresults@cteh.com
- Purchase Order No.:
- Project Name: Red River Supply
- Project Number: 106460

Section C Invoice Information:
- Attention: Accounts Receivable
- Company Name: CTEH
- Address: 5120 Northshore Drive
- Pace Quote Reference: LRaccounting@cteh.com
- Pace Project Manager:
- Pace Profile #:

REGULATORY AGENCY
- ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
- ☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: ND

Section D Required Client Information

Matrix Codes MATRIX / CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Tissue TS; Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	WET Method	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	0730WET07	WT	9			07/30/14	1535		1	1									X		1GAUB 001
2	0730WET01	WT	9			07/30/14	1520		1	1									X		1GAUB 002
3	0730WET05	WT	9			07/30/14	1450		1	1									X		1GAUB 003
4	0730WET08	WT	9			07/30/14	1500		1	1									X		1GAUB 004
5	0730WET09	WT	9			07/30/14	1605		1	1									X		1GAUB 005
6																					
7																					
8																					
9																					
10																					
11																					
12																					

60174738

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
COC: ENV0730_North_WET	[signature]	7-30-14	1700	[signature] Pace	7/31/14	1015	1.6 +2.4	Y	Y	Y
2 coolers										

SAMPLER NAME AND SIGNATURE
- PRINT Name of SAMPLER: Gabe Macormic
- SIGNATURE of SAMPLER: [signature]
- DATE Signed (MM/DD/YY): 7-30-14

ORIGINAL

F-ALL-Q-020rev.07, 15-May-2007

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.