

Attachment 3**Ammonia Nitrogen Sampling Results from Illinois River at Diffuser
Ammonia Nitrogen (mg/l)**

Date	Result
03-28-07	0.23
09-28-07	0.20
12-07-07	<0.20
03-14-08	0.27
06-19-08	<0.10
09-28-08	<0.20
12-13-08	<0.20
03-20-09	<0.20
06-18-09	<0.20
09-28-09	<0.10
11-20-09	<0.20
03-31-10	<0.20
06-30-10	<0.20
09-23-10	<0.20
No Sample Frozen	
03-31-11	<0.10
06-30-11	<0.10
09-23-11	<0.10
12-15-11	<0.10
03-28-12	<0.10
06-22-12	<0.10
09-28-12	1.1
11-16-12	<0.10



RESULTS OF ACUTE AND CHRONIC TOXICITY TESTING
WITH *Ceriodaphnia dubia* AND *Pimephales promelas*
ON SEPTEMBER/OCTOBER 2006 EFFLUENT SAMPLES
FROM EMERALD PERFORMANCE MATERIALS

Prepared for:

Emerald Performance Materials, LLC
1550 County Road 1450N
Henry, Illinois 61537

Prepared by:

EA Engineering, Science, and Technology, Inc.
15 Loveton Circle
Sparks, Maryland 21152
For questions, please contact Wayne McCulloch
ph: 410-771-4950

Results relate only to the items tested or to the samples as received by the laboratory.

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EA Engineering, Science, and Technology, Inc.*

This report contains 16 pages plus 2 attachments.

A handwritten signature in black ink that reads 'Wayne L. McCulloch'.

Wayne L. McCulloch
Laboratory Director

A handwritten date in black ink that reads '20 November 2006'.

Date

INTRODUCTION

At the request of Emerald Performance Materials, EA Engineering, Science, and Technology performed acute and chronic toxicity tests on samples of Outfall 001 final effluent from Emerald Performance Material's Henry, Illinois facility. The acute and chronic toxicity tests were conducted with the water flea (*Ceriodaphnia dubia*) and the fathead minnow (*Pimephales promelas*). A suite of three 24-hour composite samples was collected on 26-27, 28-29 September and 1-2 October 2006. Additionally, grab samples of Upstream Illinois River (at Mile Marker 198.1) were collected on 27, 29 September and 2 October 2006. The acute and chronic toxicity test organisms were exposed to 100, 64, 32, 8, 2 and 0.5 percent Outfall 001 effluent. The *C. dubia* and *P. promelas* acute toxicity tests utilized only the 26-27 September Outfall 001 and the 27 September Upstream Illinois River samples for testing. The acute and chronic tests included a dilution water control of Upstream Illinois River water. The *C. dubia* and *P. promelas* acute and chronic toxicity tests also included a moderately hard laboratory control water. This testing was conducted under the biomonitoring requirements of the discharge permit number IL0001392.

The toxicity testing was conducted following EA's standard operating procedures (EA 2006), which are in accordance with Illinois EPA and US EPA guidance (US EPA 2002a, 2002b). The results of the chronic toxicity tests were statistically analyzed according to US EPA guidance (2002a) to determine if any effluent concentration was significantly different from the control with respect to survival, reproduction (*C. dubia*), or biomass (*P. promelas*). For the acute toxicity tests, the median lethal concentration (LC50) was calculated if there was at least 50 percent mortality in the 100 percent effluent concentration. The short-term chronic toxicity test endpoints are expressed as the No Observed Effect Concentration (NOEC), the Lowest Observed Effect Concentration (LOEC), and the Chronic Value (ChV). The median lethal concentration (LC50), and the 25 percent Inhibition Concentration (IC25) was also calculated for each test species. The Chronic Toxic Units (TU_c) were calculated for *C. dubia* and *P. promelas* based on the IC25 (TU_c=100/IC25). The Acute Toxic Units (TU_a) were calculated based on the 48-hour (*C. dubia*) and 96-hour (*P. promelas*) LC50s (TU_a=100/LC50). The test data were analyzed using the ToxCalc statistical software package (Version 5.0, Tidepool Scientific Software).

Summaries of sample and *C. dubia* and *P. promelas* acute toxicity test information are presented on pages 7-10, and the chronic toxicity test information is presented on pages 11-14. Table 1 summarizes the collection and receipt data for the effluent samples, and selected water quality parameters of the samples are reported in Table 2. Copies of raw data sheets with statistical analyses, and the Report Quality Assurance Record are included in Attachments I and II, respectively.

SUMMARY OF RESULTS

The results of the *Ceriodaphnia dubia* and *Pimephales promelas* acute and chronic toxicity testing conducted for Emerald Performance Materials comply with current NELAC standards, except as noted in the report.

The results of the *C. dubia* acute toxicity test on the 26-27 September 2006 Outfall 001 sample are presented on page 8. After 48 hours, there were no surviving organisms in the 100, 64 and 32 percent Outfall 001 concentrations. The remaining test concentrations had 100 percent survival. The upstream dilution water control and the lab control had 100 percent survival at test termination. The 48-hour LC50 for *C. dubia* was 16.0 percent effluent (6.25 TU_a).

The *P. promelas* acute toxicity test results are summarized on page 10. There were no surviving organisms in the 100, 64 and 32 percent Outfall 001 concentrations, and there was 100 percent survival in the remaining Outfall 001 concentrations, the upstream dilution water control, and the laboratory control. The 96-hour *P. promelas* LC50 was also 16.0 percent effluent (6.25 TU_a).

The results of the *C. dubia* chronic toxicity test on the 26 September – 2 October 2006 Outfall 001 samples are presented on page 12. After 48 hours of exposure, there were no surviving organisms in the 100, 64 and 32 percent effluent concentrations. The remaining effluent concentrations had 100 percent survival. The upstream control and laboratory control also had 100 percent survival at 48 hours. The resulting 48-hour LC50 value was 16.0 percent effluent (6.25 TU_a).

After six days, percent survival was the same as the 48-hour results. Mean young production in the 8 percent effluent concentration (23.9 neonates/organism) was statistically different ($p=0.05$) from the upstream control (29.0 young per female). The 2 and 0.5 percent effluent treatments were not statistically different from the upstream control. Based on reproduction as the most sensitive chronic endpoint, the NOEC for this test is 2 percent effluent. The LOEC is 8 percent effluent, and the ChV is 4 percent effluent. The IC25 for this test is 10.2 percent effluent. The TU_c, based on the IC25, is 9.8. The laboratory control had 100 percent survival at test termination and mean young production of 22.6 young per female, respectively.

The *P. promelas* chronic toxicity test results are summarized on page 14. After 96 hours, there were no surviving organisms in the 100, 64 and 32 percent effluent concentrations, and there was 48 percent survival in the 8 percent effluent concentration. There was a minimum of 98 percent survival in the remaining effluent concentrations, upstream river control and laboratory control. The resulting 96-hour *P. promelas* LC50 value was 7.4 percent effluent (13.5 TU_a). After seven days, there was 38 percent survival in the 8 percent effluent concentration, which was significantly different (p=0.05) from the upstream river control survival of 83 percent. Survival in the 2 and 0.5 percent effluent concentrations was 85 and 98 percent, both of which were greater than the dilution water control. There was 100 percent survival in the laboratory water control. Biomass in the 2 and 0.5 percent effluent concentrations was 0.547 and 0.649 mg/organism, and were not significantly different than the river water control biomass of 0.582 mg/organism. Biomass in the laboratory control was 0.756 mg/organism. The 7-day NOEC for this test was 2 percent effluent, the LOEC was 8 percent and the ChV was 4 percent effluent. The 7-day IC25 was 3.3 percent effluent, and chronic toxic units based on the IC25 was 30.3 TU_c.

In conformance with EA's quality assurance/quality control program, monthly acute and chronic reference toxicant tests were conducted on the test species. The results of reference toxicant test were within acceptable control chart limits, and are summarized on pages 7 and 9 for the *C. dubia* and *P. promelas* acute toxicity tests, and on pages 11 and 13 for the *C. dubia* and *P. promelas* chronic toxicity tests.

REFERENCES

- EA. 2006. EA Ecotoxicology Laboratory Quality Assurance and Standard Operating Procedures Manual. EA Manual ATS-102. Internal document prepared by EA's Ecotoxicology Laboratory, EA Engineering, Science, and Technology, Inc., Sparks, Maryland.
- US EPA. 2002a. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013. U.S. Environmental Protection Agency, Office of Water, Washington, D.C.
- US EPA 2002b. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition. EPA-821-R-02-012. U.S. Environmental Protection Agency, Office of Water, Washington, DC.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: ***Ceriodaphnia dubia* 48-hour static non-renewal acute LC50 assay**

Test Procedure: **EA Protocol ATS-SAI-CD-08**
Acute assay with *Ceriodaphnia dubia*

Client Name: **Emerald Performance Materials**

Sample Description: **Outfall 001 Effluent**

EA Accession Number: **AT6-537**

Collection time and date: 0030, 26 September to 0030, 27 September 2006
Receipt time and date: 1050, 28 September 2006

EA Test Number: **TN-06-432**

Test initiation time and date: 1420, 28 September 2006^(a)
Test completion time and date: 1348, 30 September 2006

Dilution Water Description: **Illinois River Water**

EA Accession Number: **AT6-538**

Collection time and date: 0816, 27 September 2006
Receipt time and date: 1050, 28 September 2006

Test Chamber: **30-ml cup**
Volume per Test Chamber: **15 ml**
Number of Replicates: **4**
Number of Organisms per Replicate: **5**

Organism Lot Information

Lot Number: Not applicable
Source: EA's Culture Facility (Sparks, Maryland)
Age: <24 hours

Reference Toxicant Test Information

Reference Toxicant: Sodium chloride (NaCl)
EA Test Number: RT-06-114
48-hour LC50: 2,018 mg/L NaCl
Laboratory control chart acceptability range for LC50: 1,289-2,465 mg/L NaCl

(a) Sample was 34.3 hours old at receipt, and was 37.8 hours old at test initiation.

SUMMARY OF SAMPLE/TEST INFORMATION (continued)

Test Species: *Ceriodaphnia dubia*
 Sample Description: **Outfall 001 effluent – Emerald Performance Materials**
 Sample Dates: **26-27 September 2006**
 EA Test Number: **TN-06-432**

Test Concentration (percent effluent)	48-Hour Survival (percent)
Upstream Control	100
0.5	100
2	100
8	100
32	0
64	0
100	0
Lab Control	100

Test Results

48-Hour LC50 (as percent effluent): 16.0 (Not calculable)^(a)
 TU_a: 6.25

<u>Selected Test Water Quality Parameters</u>	<u>Range</u>
Temperature (°C):	19.8 – 21.0
pH:	7.9 – 8.5
Dissolved Oxygen (mg/L):	8.5 – 9.0
Conductivity (µS/cm):	317 – 8,850

^(a) 95 percent confidence limits were not calculable.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: ***Pimephales promelas* 96-hour static non-renewal acute LC50 assay**

Test Procedure: **EA Protocol ATS-SAF-FM-08**

Acute assay with fathead minnows (*Pimephales promelas*)

Client Name: **Emerald Performance Materials**

Sample Description: **Outfall 001 Effluent**

EA Accession Number: **AT6-537**

Collection time and date: 0030, 26 September to 0030, 27 September 2006

Receipt time and date: 1050, 28 September 2006

EA Test Number: **TN-06-433**

Test initiation time and date: 1500, 28 September 2006^(a)

Test completion time and date: 1450, 2 October 2006

Dilution Water Description: **Illinois River Water**

EA Accession Number: **AT6-538**

Collection time and date: 0816, 27 September 2006

Receipt time and date: 1050, 28 September 2006

Test Chamber: **1L-beaker**

Volume per Test Chamber: **250 ml**

Number of Replicates: **2**

Number of Organisms per Replicate: **10**

Organism Lot Information

Lot Number: FH6-9/19-20

Source: EA's Culture Facility (Sparks, Maryland)

Age: 8-9 days (hatched within a 24-hour window)

Reference Toxicant Test Information

Reference Toxicant: Potassium Chloride (KCl)

EA Test Number: RT-06-112

48-hour LC50: 903 mg/L KCl

Laboratory control chart acceptability range for LC50: 502-1,034 mg/L KCl

(a) Sample was 34.3 hours old at receipt, and was 38.5 hours old at test initiation.

SUMMARY OF SAMPLE/TEST INFORMATION (continued)

Test Species: *Pimephales promelas*
 Sample Description: **Outfall 001 effluent – Emerald Performance Materials**
 Sample Dates: **26-27 September 2006**
 EA Test Number: **TN-06-433**

Test Concentration (percent effluent)	96-Hour Survival (percent)
Upstream Control (801)	100
0.5	100
2	100
8	100
32	0
100	0
64	0
Lab Control	100

Test Results

96-Hour LC50 (as percent effluent): 16.0 (not calculable)^(a)
 TU_a: 6.25

<u>Selected Test Water Quality Parameters</u>	<u>Range</u>
Temperature (°C):	19.8 – 20.8
pH:	7.9 – 8.7
Dissolved Oxygen (mg/L):	7.3 – 13.2 ^(b)
Conductivity (µS/cm):	317 – 8,850

(a) 95 percent confidence limits were not calculable.
 (b) Elevated dissolved oxygen in river water could be due to algae.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: ***Ceriodaphnia dubia* daily renewal chronic toxicity test**

Test Procedure: **EA Protocol ATS-STC-CD-09**

Survival and reproduction test with cladoceran (*Ceriodaphnia dubia*)

Client Name: **Emerald Performance Materials**

<u>Sample Description</u>	<u>EA Accession Numbers^(a)</u>
Outfall 001 Effluent	AT6-537, AT6-539, AT6-544
Upstream Control	AT6-538, AT6-540, AT6-543

Dilution Water Description: **Upstream Illinois River**

EA Test Number: **TN-06-434**

Test initiation time and date: 1210, 28 September 2006

Test completion time and date: 1215, 4 October 2006

Test Vessel: **30-ml cup**

Test Volume: **15 ml**

Number of Organisms per Replicate: **1**

Number of Replicates per Concentration: **10**

Photoperiod: **16-hour light/8-hour dark**

Organism Lot Information

Lot Number: Not applicable

Source: EA's Culture Facility (Sparks, Maryland)

Age: 24 hours old (released within an 8-hour period)

Reference Toxicant Test Information

Reference Toxicant: Sodium chloride (NaCl)

EA Test Number: RT-06-113

6-Day IC25: 1,025 mg/L NaCl

Laboratory control chart acceptability range for chronic IC25: 175-1,468 mg/L NaCl

(a) Due to time of sample collection (0030 hours) sample age was slightly >36 hours at first use.

SUMMARY OF SAMPLE/TEST INFORMATION (continued)

Test Species: *Ceriodaphnia dubia* (water flea)
 Test: Survival and reproduction test
 Client Name: Emerald Performance Materials
 Sample Description: Outfall 001 effluent
 Sample Dates: 26-27, 28-29 September, 1-2 October 2006
 EA Test Number: TN-06-434

Test Concentration (percent effluent)	48-Hour % Survival	6-Day % Survival	Mean Young Production as Neonates/Organism (\pm SD)
Upstream Control	100	100	29.0 (\pm 4.9)
0.5	100	100	28.8 (\pm 6.0)
2	100	100	29.2 (\pm 2.7)
8	100	100	23.9 (\pm 4.6) ^(a)
32	0	0 ^(a)	0 ^(b)
64	0	0 ^(a)	0 ^(b)
100	0	0 ^(a)	0 ^(b)
Lab Control	100	100	22.6 (\pm 3.1)

Endpoints as percent Outfall 001 effluent

48-Hour LC50: 16.0 (not calculable)^(c)
 TU_a: 6.25

	<u>Survival</u>	<u>Reproduction</u>
NOEC:	8	2
LOEC:	32	8
ChV:	16	4

IC25: 10.2 (7.0-12.4)
 TU_c (100/IC25): 9.8

<u>Selected Test Water Quality Parameters</u>	<u>Range</u>
Temperature ($^{\circ}$ C):	23.7 – 25.9
pH:	7.7 – 8.4
Dissolved Oxygen (mg/L):	8.0 – 8.7
Conductivity (μ S/cm):	317 – 8,880

(a) Significantly different ($p=0.05$) from Upstream Control.

(b) Concentrations with no surviving test organisms are omitted from hypothesis testing for reproduction, per EPA guidance.

(c) 95 percent confidence limits were not calculable.

SUMMARY OF SAMPLE/TEST INFORMATION

Test: *Pimephales promelas* daily renewal chronic toxicity test-----

Test Procedure: **EA Protocol ATS-STC-FH-09**

Larval survival and growth test with fathead minnows (*Pimephales promelas*)

Client Name: **Emerald Performance Materials**

Sample Description

EA Accession Numbers^(a)

Outfall 001 Effluent

AT6-537, AT6-539, AT6-544

Upstream Control

AT6-538, AT6-540, AT6-543

Dilution Water Description: **Upstream Illinois River**

EA Test Number: **TN-06-435**

Test initiation time and date: 1345, 28 September 2006

Test completion time and date: 1330, 5 October 2006

Test Vessel: **1-L beaker**

Test Volume: **250 ml**

Number of Organisms per Replicate: **10**

Number of Replicates per Concentration: **4**

Photoperiod: **16-hour light/8-hour dark**

Organism Lot Information

Lot Number: FH6-9/27-28

Source: EA's Culture Facility (Sparks, Maryland)

Age: <24 hours old

Reference Toxicant Test Information

Reference Toxicant: Potassium chloride (KCl)

EA Test Number: RT-06-111

7-Day IC25: 594 mg/L KCl

Laboratory control chart acceptability range for chronic IC25: 511-721 mg/L KCl

(a) Due to time of sample collection (0030 hours) sample age was slightly >36 hours at first use.

SUMMARY OF SAMPLE/TEST INFORMATION (continued)

Test Species: *Pimephales promelas* (fathead minnow)
 Test: Survival and growth test
 Client Name: Emerald Performance Materials
 Sample Description: Outfall 001 effluent
 Sample Dates: 26-27, 28-29 September, 1-2 October 2006
 EA Test Number: TN-06-435

Test Concentration (percent effluent)	96-Hour % Survival	7-Day % Survival	Mean Biomass as mg/Organism (±SD)
Upstream Control	100	83	0.582 (±0.122)
0.5	100	98	0.649 (±0.077)
2	98	85	0.547 (±0.066)
8	48	38 ^(a)	0.147 (±0.037) ^(b)
32	0	0 ^(a)	0 ^(b)
64	0	0 ^(a)	0 ^(b)
100	0	0 ^(a)	0 ^(b)
Laboratory Control	100	100	0.756 (±0.050)

Endpoints as percent Outfall 001 effluent

96-Hour LC50: 7.4 (5.9 – 9.2)^(c)
 TU_a: 13.5

	<u>Survival</u>	<u>Biomass</u>
NOEC:	2	2
LOEC:	8	8
ChV:	4	4

IC25: 3.3 (1.6 – 4.5)^(c)
 TU_c (100/IC25): 30.3

Selected Test Water Quality Parameters

	<u>Range</u>
Temperature (°C):	23.3 – 25.9
pH:	7.5 – 8.2
Dissolved Oxygen (mg/L):	4.4 – 8.6
Conductivity (µS/cm):	318 – 8,910

- (a) Significantly different (p=0.05) from the Upstream Control.
 (b) Concentrations with significant mortality are omitted from hypothesis testing for biomass.
 (c) Value in parentheses represents 95 percent confidence limits.

TABLE 1 SUMMARY OF COLLECTION AND RECEIPT DATA FOR SEPTEMBER/OCTOBER 2006 SAMPLES FROM EMERALD PERFORMANCE MATERIALS

EA Accession Number	Collection Time and Date	Receipt Time and Date	Sample Usage
Outfall 001:			
AT6-537	0030, 26 September 2006 to 0030, 27 September 2006	1050, 28 September 2006	Test Initiation & Day 1 Renewal
AT6-539	0030, 28 September 2006 to 0030, 29 September 2006	1100, 30 September 2006	Days 2, 3 & 4 Renewals
AT6-544	0030, 01 October 2006 to 0030, 02 October 2006	1100, 03 October 2006	Days 5 & 6 Renewals
Upstream Illinois River:			
AT6-538	0816, 27 September 2006	1050, 28 September 2006	Test Initiation & Day 1 Renewal
AT6-540	0815, 29 September 2006	1100, 30 September 2006	Days 2, 3 & 4 Renewals
AT6-543	0802, 02 October 2006	1100, 03 October 2006	Days 5 & 6 Renewals



PDC Laboratories, Inc.

P.O. Box 9071 • Peoria, IL 61612-9071

(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689



Emerald Performance Materials
1550 County Rd 1450 N
Henry, IL 61537
Attn: Jim Hastings

Date Received: 06/14/11 8:15
Report Date: 07/15/11
Customer #: 202011
PO#: HE-40014063-UB

Sample No: **1061342-01**
Sample Description: **PLANT**

Collect Date: **06/13/11 17:30**
Matrix: **Waste Water Grab**

Parameters	Result	Qual	Analysis Date	Analyst	Method
Miscellaneous - Environmental Analysis South					
WET Testing Single Dilution - subcontracted	See Attached		06/15/11 00:00	Subco	Subcontracted



PDC Laboratories, Inc.

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(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689



Emerald Performance Materials
1550 County Rd 1450 N
Henry, IL 61537
Attn: Jim Hastings

Date Received: 06/14/11 8:15
Report Date: 07/15/11
Customer #: 202011
PO#: HE-40014063-UB

Notes

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PIA PDC Laboratories - Peoria, IL

NELAC Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230

Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553

Drinking Water Certifications: Kansas (E-10338); Missouri (870); Wisconsin (998284430); Indiana (C-IL-040); Iowa (240)

Wastewater Certifications: Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)

Hazardous/Solid Waste Certifications: Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)

UST Certification; Iowa (240)

SPM PDC Laboratories - Springfield, MO

EPA DMR-QA Program

STL PDC Laboratories - St. Louis, MO

NELAC Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS EPA Lab No. E-10389

A handwritten signature in black ink, appearing to read 'Kurt Stepping'.

Certified by: Kurt C. Stepping, Senior Project Manager

CHAIN OF CUSTODY RECORD

PDC LABORATORIES, INC.
 2231 WEST ALTORFER DRIVE
 PEORIA, IL 61615

PHONE # 800-752-6651
 FAX # 309-692-9689

State where samples collected

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT) • (SAMPLE ACCEPTANCE POLICY ON REVERSE)

1 CLIENT EMERALD PERFORMANCE ADDRESS 1550 CR 1450N CITY HENRY IL STATE ZIP CONTACT PERSON MIKE STRABLEY		PROJECT NUMBER P. O. NUMBER PHONE NUMBER FAX NUMBER		MEANS SHIPPED DATE SHIPPED MATRIX TYPES WW-WASTEWATER DW-DRINKING WATER SW-SOLID WASTE MS-SOLID WASTE LS-SOLID LEACHATE OTHER:		ANALYSIS REQUESTED LOGGED BY: <i>AA</i> LAB PROJ # <i>1001312-2</i> TEMPLATE: PROJ. MGR.:		REMARKS
2 SAMPLE DESCRIPTION AS YOU WANT ON REPORT WET TESTING * plant * level 100		DATE COLLECTED TIME COLLECTED SAMPLE TYPE GRAB COMP BOTTLE COUNT		DATE SHIPPED DATE SHIPPED MATRIX TYPES WW-WASTEWATER DW-DRINKING WATER SW-SOLID WASTE MS-SOLID WASTE LS-SOLID LEACHATE OTHER:		ANALYSIS REQUESTED WET TESTING X		
5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) (RUSH FEE IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE) RUSH RESULTS VIA (PLEASE CIRCLE) FAX		NORMAL RUSH PHONE E-MAIL		DATE RESULTS NEEDED E-MAIL		COMMENTS: (FOR LAB USE ONLY) * taken from bottles of		SAMPLE TEMPERATURE UPON RECEIPT °C CHILL PROCESS STARTED PRIOR TO RECEIPT SAMPLE(S) RECEIVED ON ICE PROPER BOTTLES RECEIVED IN GOOD CONDITION BOTTLES FILLED WITH ADEQUATE VOLUME SAMPLES RECEIVED WITHIN HOLD TIME(S) (EXCLUDES TYPICAL FIELD PARAMETERS) DATE AND TIME TAKEN FROM SAMPLE BOTTLE
7 RECEIVED BY (SIGNATURE) RECEIVED BY (SIGNATURE) RECEIVED AT LAB BY (SIGNATURE)		RECEIVED BY (SIGNATURE) RECEIVED BY (SIGNATURE) RECEIVED AT LAB BY (SIGNATURE)		DATE TIME DATE TIME DATE TIME		COMMENTS: (FOR LAB USE ONLY) * taken from bottles of		

Copies: white should accompany samples to PDC Labs. Yellow copy to be retained by the client.

CHAIN OF CUSTODY RECORD

PDC LABORATORIES, INC.
 2231 WEST ALTORFER DRIVE
 PEORIA, IL 61615

PHONE # 309-692-9688
 FAX # 309-692-9589

State where samples collected IL

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT)

1 CLIENT EMERALD MATERIALS ADDRESS RR 1 BOX 15 HENRY, IL CONTACT PERSON JIM HASTINGS		PROJECT NUMBER P.O. NUMBER PHONE NUMBER 309/664-9411 FAX NUMBER 309/664-9414	ANALYSIS REQUESTED DATE SHIPPED 6-16-11	(FOR LAB USE ONLY) LOGIN # 106342-04 LAB PROJ. # TEMPLATE: EMRLD_DAY PROJ. MGR.: EAK
2 SAMPLE DESCRIPTION AS YOU WANT ON REPORT PRIMARY EFFLUENT PLANT EFFLUENT Plant Effluent UPStream River H2O		SAMPLER (PLEASE PRINT) RANDY SIMPSON SAMPLER'S SIGNATURE [Signature]	MATRIX TYPES: WWS - WASTEWATER DW - DRINKING WATER GW - GROUND WATER WWSL - SLUDGE WAF - FORD LCHT - LEACHATE OTHER: MATRIX TYPE WW WW WW	BOTTLE COUNT 1 2 1 1
DATE COLLECTED 6-16-11 0030 6-16-11 0030 6-16-11 0030 6-15 1900	TIME COLLECTED 0030 0030 0030 1900	SAMPLE TYPE COMP X X X	CHN SS CO CB X X X X	REMARKS
5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) NORMAL RUSH (RUSH TAX IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE) BEST RESULTS VIA (PLEASE CIRCLE) FAX PHONE FAX # IF DIFFERENT FROM ABOVE: PHONE # IF DIFFERENT FROM ABOVE:		DATE RECEIVED BY: (SIGNATURE) [Signature] DATE 6-16-11 TIME 0030	DATE RECEIVED BY: (SIGNATURE) [Signature] DATE 6/16/11 TIME 7:00	COMMENTS: (FOR LAB USE ONLY) SAMPLE TEMPERATURE UPON RECEIPT CHILL PROCESS STARTED PRIOR TO RECEIPT SAMPLE(S) RECEIVED ON ICE PROPER BOTTLES RECEIVED IN GOOD CONDITION BOTTLES FILLED WITH ADEQUATE VOLUME SAMPLES RECEIVED WITHIN HOLD TIMES (EXCLUDES TYPICAL FIELD PARAMETERS) DATE AND TIME TAKEN FROM SAMPLE BOTTLE SAMPLE TEMPERATURE UPON RECEIPT 2 °C FOR N FOR N FOR N

Environmental Analysis South, Inc.

4000 East Jackson Blvd. • Jackson, MO 63755 • 573-204-8817 • Fax 573-204-8818



REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1311712
June 15, 2011 through June 19, 2011

Tests performed by:

John P. Clippard / Chemical Analyst at Environmental Analysis South (EAS)
Kelly J. Ray / Biologist at Environmental Analysis South (EAS)
Sara C. Shields / Lab Supervisor - Chemist at Environmental Analysis South (EAS)
David F. Warren / Lab Director - Chemist at Environmental Analysis South (EAS)

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Environmental Analysis South, Inc.

4000 East Jackson Blvd. • Jackson, MO 63755 • 573-204-8817 • Fax 573-204-8818



REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1311712
June 15, 2011 through June 19, 2011

1. REPORT SUMMATION:

1.1. Multiple Dilution Data Summation

Test Solution	<i>Pimephales promelas</i> Acute Toxicity Test 96 Hour Survival	<i>Ceriodaphnia dubia</i> Acute Toxicity Test 48 Hour Survival
Reconstituted Control (RC)	100%	100%
Upstream Control (UC)	100%	100%
6.25% Effluent	90%	100%
12.5% Effluent	0%*	35%*
25% Effluent	0%*	0%*
50% Effluent	0%*	0%*
100% Effluent	0%*	0%*
Estimated LC ₅₀ Value	8.50% Effluent	11.27% Effluent

* Indicates a significant difference at alpha = 0.5 between effluent and control survival data.

Conclusion:

Pimephales promelas 96 hour WET results:

LC 50 = 8.50% using Trimmed Spearman-Kärber

NOAEC = 6.25% using Steel's Many-One Rank Test

Ceriodaphnia dubia 48 hour WET results:

LC 50 = 11.27% using Trimmed Spearman-Kärber

NOAEC = 6.25% using Steel's Many-One Rank Test

Approved by _____


Sara C. Shields, Chemist

Environmental Analysis South, Inc.

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REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1311712
June 15, 2011 through June 19, 2011

2. TEST METHOD SUMMARY

2.1. TEST CONDITIONS AND METHODS:

	<i>Ceriodaphnia dubia</i> :	<i>Pimephales promelas</i> :
Test duration:	48 hours	96 hours
Temperature:	24 - 26 degree Celsius	24 - 26 degree Celsius
Light quality:	Ambient laboratory illumination	Ambient laboratory illumination
Photoperiod:	16 hour light, 8 hours dark	16 hour light, 8 hours dark
Control Water:	Moderately Hard Reconstituted Water	Moderately Hard Reconstituted Water
Dilution Water:	Upstream Water - If unavailable or toxic, then control water will be used.	Upstream Water - If unavailable or toxic, then control water will be used.
Size of test vessel:	30 milliliters	250 milliliters
Volume of test solution:	15 milliliters	200 milliliters
Age of test organisms:	<24 hours	1 -14 days (all same age)
Number of organisms/test vessel:	5	10
Number of replicates/concentration:	4	2
Number of organisms/concentration:	20	40 for a single dilution test and 20 for a multiple dilution test
Feeding regime:	None (fed prior to test)	None (fed prior to test)
Aeration:	None	None
Test acceptability criterion:	90% or greater survival in controls	90% or greater survival in controls

The methodology used for the chemistry data was taken from the *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992). The exception was hardness, which was determined using a Hach EDTA titration test kit. The toxicity tests follow guidelines laid out in the permittee's NPDES permit and were conducted according to EPA approved methods (USEPA 2002).

All test organisms were cultured according to EPA approved methods (USEPA 2002). The *Ceriodaphnia dubia* and the *Pimephales promelas* were obtained from C-K Associates Inc. located in Baton Rouge, Louisiana and shipped overnight for use in the whole effluent toxicity test.

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REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1311712
June 15, 2011 through June 19, 2011

2.2. REFERENCE TOXICITY TEST:

Environmental Analysis South performs monthly reference toxicity tests. The most recent reference test was initiated on June 8, 2011 using KCL Lot #41713. Following are the results:

2.2.1. *P. promelas* - 48 hr. Acute Test – $LC_{50} = 1.071$ g/l 95%CI (0.736-1.405 g/l)

EAS %CV = 15.6%

National Warning Limits (75th percentile) = 19%CV

National Control Limits (90th percentile) = 33%CV

2.2.2. *C. dubia* - 48 hr. Acute Test – $LC_{50} = 0.467$ g/l 95%CI (0.303-0.631g/l)

EAS %CV = 17.5%

National Warning Limits (75th percentile) = 29%CV

National Control Limits (90th percentile) = 34%CV

2.3. LITERATURE CITED:

1. APHA. 1992. *Standard methods for the examination of water and wastewater*, 18th Ed. American Public Health Association, Washington, D.C
2. USEPA. 2002. *Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms*, 5th Ed. EPA-821-R-02-012
3. USEPA 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications under the National Pollutant Discharge Elimination System, (Table B-2). June 2000. EPA 833-R-00-003.

CLIENT NAME: City of Emerald, IL (Plant)

NPDES NUMBER:

TYPE OF METHOD: multiple dilution, 96 hrs PP & 48 CD, AEC=100%

DATE & TIME OF COLLECTION: 06/13/11 1730 hrs

DATE & TIME OF SUBMISSION: 06/15/11 1030 hrs by UPS

Upstream: River

Collected: 06/13/11 1730 hrs

INITIAL OBSERVATIONS	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	INT EFFL	INT UC	INT RC
LOG NUMBER / ID NUMBER						1311712	1311712A	4014
pH - SU	06/15/11	1045 hrs	SCS	SB114 (8.8-9.2)	9.08	7.68	7.60	7.93
TEMPERATURE °C RECEIVED	06/15/11	1045 hrs	SCS	EAS 106		2	3	24
SPECIFIC CONDUCTANCE umhos	06/15/11	1045 hrs	SCS	ERA P185-506(359-407)	388	12730	546	239
HARDNESS - ppm	06/15/11	1045 hrs	SCS	ERA P170-507(107-134)	120	280	200	80
CHLORINE - ppm	06/15/11	1045 hrs	SCS	tap water	+	<0.04	<0.04	<0.04
DISSOLVED OXYGEN - ppm	06/15/11	1045 hrs	SCS	cal@840		6	7.6	8.3
TOTAL ALKALINITY - ppm	06/15/11	1230 hrs	SCS	ERA P185-506(70.8-83.7)	74.4	406	141	61.7
INITIAL AMMONIA - ppm	06/21/11	1245 hrs	JPC	EAS #1981 (8-12)	10.4	85	0.087	<0.050
TOTAL DISSOLVED SOLIDS - ppm								

0 HOUR OBSERVATIONS	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	X %AEC
pH - SU	06/15/11	1100 hrs	SCS	SB114 (8.8-9.2)	9.08	7.96	7.95	7.76	7.83	7.90	7.94	7.96	
TEMPERATURE °C	06/15/11	1100 hrs	SCS	EAS 106		24.4	23.6	23.7	23.6	24.5	24.5	23.6	
SPECIFIC CONDUCTANCE umhos	06/15/11	1100 hrs	SCS	ERA P185-506(359-407)	388	240	546	12340	6260	3690	2090	1326	
DISSOLVED OXYGEN - ppm	06/15/11	1100 hrs	SCS	cal@840		7.7	9.0	7.8	8.7	8.9	9.1	9.0	

24 HOUR OBSERVATIONS - PP	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	X %AEC
pH - SU	06/16/11	1100 hrs	SCS	SB114 (8.8-9.2)	9.06	7.66	8.40	8.30	8.37	8.40	8.41	8.42	
TEMPERATURE °C	06/16/11	1100 hrs	SCS	EAS 106		24.4	24.4	24.4	24.4	24.4	24.4	24.4	
SPECIFIC CONDUCTANCE umhos	06/16/11	1100 hrs	SCS	ERA P185-506(359-407)	393	267	549	12070	6590	3670	2100	1312	
DISSOLVED OXYGEN - ppm	06/16/11	1100 hrs	SCS	cal@840		7.6	7.7	7	7.4	7.8	7.8	7.9	

48 HOUR OBSERVATIONS - PP	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	X %AEC
pH - SU	06/17/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.95	7.61	8.34	8.52	8.51	8.39	8.41	8.38	
TEMPERATURE °C	06/17/11	1100 hrs	SCS	EAS 106		24.4	24.4	24.4	24.4	24.4	24.4	24.4	
SPECIFIC CONDUCTANCE umhos	06/17/11	1100 hrs	SCS	ERA P185-506(359-407)	371	265	552	12130	6580	3680	2120	1315	
DISSOLVED OXYGEN - ppm	06/17/11	1100 hrs	SCS	cal@840		7.5	7.1	7.1	6.9	6.9	7.1	6.9	
FINAL AMMONIA - ppm													

24 HOUR OBSERVATIONS - CD	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	X %AEC
pH - SU	06/16/11	1100 hrs	SCS	SB114 (8.8-9.2)	9.06	8.00	8.53	8.56	8.57	8.57	8.57	8.55	
TEMPERATURE °C	06/16/11	1100 hrs	SCS	EAS 106		24.4	24.4	24.4	24.4	24.4	24.4	24.4	
SPECIFIC CONDUCTANCE umhos	06/16/11	1100 hrs	SCS	ERA P185-506(359-407)	394	253	534	12100	6440	3640	2080	1289	
DISSOLVED OXYGEN - ppm	06/16/11	1100 hrs	SCS	cal@840		7.9	8.1	8.3	8.3	8.3	8.2	8.2	

48 HOUR OBSERVATIONS - CD	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	X %AEC
pH - SU	06/17/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.95	8.60	8.52	8.72	8.70	8.64	8.59	8.57	
TEMPERATURE °C	06/17/11	1100 hrs	SCS	EAS 106		24.4	24.4	24.4	24.4	24.4	24.4	24.4	
SPECIFIC CONDUCTANCE umhos	06/17/11	1100 hrs	SCS	ERA P185-506(359-407)	371	268	540	11900	6420	3610	2070	1282	
DISSOLVED OXYGEN - ppm	06/17/11	1100 hrs	SCS	cal@840		7.5	8.1	7.6	7.9	7.8	7.8	8.1	
FINAL AMMONIA - ppm													

Page 9 of 15

Approved by: *[Signature]*

Date: 06/30/2011

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

City of Emerald, IL (Plant) EAS LOG# 1311712

Date Test Began: June 15, 2011

Time Test Began: 1100 hrs

Analyst 1: DFW

Date Test Finished: 06/19/11PP&06/17/11CD

Time Test Finished: 1200 hrs

Analyst 2: KJR

Analyst 3: SCS

P. promelas (PP)

AGE: 5 days

HATCH NUMBER: 8636 c-k

	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
PERIOD	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE
0 HR-PP	10,10	10,10	10,10	10,10	10,10	10,10	10,10	
24 HR-PP	10,10	10,10	0,0	0,0	0,0	10,10	10,10	
48 HR-PP	10,10	10,10	0,0	0,0	0,0	1,0	10,10	

Ceriodaphnia dubia (CD)

AGE: <24 hours

HATCH NUMBER: 2338 c-k

	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
PERIOD	ALIVE	ALIVE						
0 HR-CD	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	
24 HR-CD	5,5,5,5	5,5,5,5	0,0,0,0	0,0,0,0	5,2,5,2	5,5,5,5	5,5,5,5	
48 HR-CD	5,5,5,5	5,5,5,5	0,0,0,0	0,0,0,0	0,0,0,0	3,1,0,3	5,5,5,5	

Approved by: *[Signature]*

Date: 06/30/2011

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

City of Emerald, IL (Plant) EAS LOG# 1311712

Date Test Began: June 15, 2011

Time Test Began: 1100 hrs

Analyst 1: DFW

Date Test Finished: 06/19/11PP&06/17/11CD

Time Test Finished: 1200 hrs

Analyst 2: KJR

Analyst 3: SCS

P. promelas (PP)

AGE: 5 days

HATCH NUMBER: 8636 c-k

	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
PERIOD	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE
48 HR-PP	10,10	10,10	0,0	0,0	0,0	1,0	10,10	
72 HR-PP	10,10	10,10	0,0	0,0	0,0	1,0	10,10	
96 HR-PP	10,10	10,10	0,0	0,0	0,0	0,0	9,9	

Approved by: *[Signature]*

Date: 06/20/2011

*Multiple
9/6/11, IL*

11366

SUBCONTRACT ORDER

**PDC Laboratories, Inc.
1061342**

SENDING LABORATORY:

PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, IL 61615
Project Manager: Kurt C. Stepping
kstepping@pdclab.com Phone: 309-683-1719

RECEIVING LABORATORY:

Environmental Analysis South
4000 East Jackson Blvd
Jackson, MO 63755
Phone :573-204-8817

Sample Origin (State) IL
PO# L 70631

Analysis	Due	Expires	Comments
Sample ID: 1061342-01 01-Wet Single	Water 06/24/11 16:00	Sampled:06/13/11 17:30 06/15/11 17:30	<i>Plant #1311712 temp rec'd = 30c</i>
Sample ID: 1061342-02 01-Wet Single	Water 06/24/11 16:00	Sampled:06/13/11 17:30 06/15/11 17:30	<i>River #1311712-A temp rec'd = 30c</i>

Relinquished By <i>[Signature]</i>	Date/Time <i>6-14-11 10:00</i>	Received By <i>[Signature]</i>	Date/Time <i>6/15/11</i>	Sample Temperature Upon Receipt	<u> </u> C
Relinquished By <i>[Signature]</i>	Date/Time <i>1030 UPS</i>	Received By <i>[Signature]</i>	Date/Time <i>1030 UPS</i>	Sample(s) Received on Ice	Y or N
				Proper Bottles Received in Good Condition	Y or N
				Bottles Filled with Adequate Volume	Y or N
				Samples Received Within Hold Time	Y or N
				Date/Time Taken From Sample Bottle	Y or N

renewal
for 1311712

SUBCONTRACT ORDER

**PDC Laboratories, Inc.
1061342**

SENDING LABORATORY:

PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, IL 61615

Project Manager: Kurt C. Stepping
kstepping@pdclab.com Phone: 309-683-1719

RECEIVING LABORATORY:

Environmental Analysis South
4000 East Jackson Blvd
Jackson, MO 63755
Phone :573-204-8817

Sample Origin (State) IL
PO# L40601

Analysis	Due	Expires	Comments
----------	-----	---------	----------

Sample ID: 1061342-01	Water	Sampled:06/13/11 17:30	Sent 6-14-11
01-Wet Single	06/24/11 16:00	06/15/11 17:30	

Sample ID: 1061342-02	Water	Sampled:06/13/11 17:30	Sent 6-14-11
01-Wet Single	06/24/11 16:00	06/15/11 17:30	

Sample ID: 1061342-03	Water	Sampled:06/16/11 00:30	Plant # 1311920 temperature = 1°C SCS
01-Wet Single	06/24/11 16:00	06/18/11 00:30	

Sample ID: 1061342-04	Water	Sampled:06/15/11 19:00	Upstream # 1311920-A temperature = 1°C SCS
01-Wet Single	06/24/11 16:00	06/17/11 19:00	

Relinquished By	Date/Time	Received By	Date/Time	Sample Temperature Upon Receipt	<u>1.3</u> C
<i>William J. Hoag</i>	<u>6-16-11 13:52</u>	<i>Amelia</i>	<u>6/17/11</u>	Sample(s) Received on Ice	<input checked="" type="checkbox"/> or N
				Proper Bottles Received in Good Condition	<input checked="" type="checkbox"/> or N
				Bottles Filled with Adequate Volume	<input checked="" type="checkbox"/> or N
				Samples Received Within Hold Time	<input checked="" type="checkbox"/> or N
				Date/Time Taken From Sample Bottle	<input checked="" type="checkbox"/> or N

1030 UPS



PDC Laboratories, Inc.

P.O. Box 9071 • Peoria, IL 61612-9071

(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689



Emerald Performance Materials
 1550 County Rd 1450 N
 Henry, IL 61537
 Attn: Jim Hastings

Date Received: 07/26/11 11:49
 Report Date: 08/31/11
 Customer #: 202011
 PO#: HE-40014063-UB

Sample No: **1072876-01**
 Sample Description: **UPSTREAM**

Collect Date: **07/25/11 16:00**
 Matrix: **Waste Water Regular Sample**

Parameters	Result	Qual	Analysis Date	Analyst	Method
Miscellaneous - Environmental Analysis South					
WET Testing Single Dilution - subcontracted	1		07/25/11 00:00	Subco	Subcontracted

Sample No: **1072876-02**
 Sample Description: **EFFLUENT**

Collect Date: **07/25/11 16:00**
 Matrix: **Waste Water Regular Sample**

Parameters	Result	Qual	Analysis Date	Analyst	Method
Miscellaneous - Environmental Analysis South					
WET Testing Single Dilution - subcontracted	1		07/25/11 00:00	Subco	Subcontracted



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Emerald Performance Materials
1550 County Rd 1450 N
Henry, IL 61537
Attn: Jim Hastings

Date Received: 07/26/11 11:49
Report Date: 08/31/11
Customer #: 202011
PO#: HE-40014063-UB

Notes

This report shall not be reproduced, except in full, without the written approval of the laboratory.

PDC Laboratories participates in the following accreditation/certification and proficiency programs at the following locations. Endorsement by Federal or State Governments or their agencies is not implied.

- PIA PDC Laboratories - Peoria, IL
NELAC Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications: Kansas (E-10338); Missouri (870); Wisconsin (998284430); Indiana (C-IL-040); Iowa (240)
Wastewater Certifications: Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)
Hazardous/Solid Waste Certifications; Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)
UST Certification; Iowa (240)
- SPM PDC Laboratories - Springfield, MO
EPA DMR-QA Program
- STL PDC Laboratories - St. Louis, MO
NELAC Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS EPA Lab No. E-10389

WET analysis subcontracted, report attached.

Certified by: Kurt C. Stepping, Senior Project Manager

CHAIN OF CUSTODY RECORD

PDC LABORATORIES, INC.
 2231 WEST ALTORFER DRIVE
 PEORIA, IL 61615
 PHONE # 800-752-6651
 FAX # 309-692-9689

State where samples collected

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT) - (SAMPLE ACCEPTANCE POLICY ON REVERSE)

<p>1 CLIENT NAME: EMERALD</p> <p>ADDRESS: 550 CR 1450 N</p> <p>CITY: HENRY IL</p> <p>STATE: IL</p> <p>ZIP: 62529</p> <p>CONTACT PERSON: MIKE STRABLEY</p>		<p>2 SAMPLE DESCRIPTION AS YOU WANT ON REPORT</p> <p>WET TESTING</p> <p>MONTHLY FECAL TESTING &</p> <p>stream</p> <p>effluent</p>		<p>3 ANALYSIS REQUESTED</p> <p>WET TESTING</p> <p>X</p> <p>FECAL</p> <p>X</p>		<p>4 (FOR LAB USE ONLY)</p> <p>LOGGED BY: [Signature]</p> <p>LAB PROJ. # 10728742</p> <p>TEMPLATE:</p> <p>PROJ. MGR:</p> <p>REMARKS:</p>	
<p>5 PROJECT NUMBER</p> <p>PHONE NUMBER</p> <p>FAX NUMBER</p> <p>SAMPLER (PLEASE PRINT): MIKE STRABLEY</p> <p>SAMPLER'S SIGNATURE: [Signature]</p>		<p>6 MEANS SHIPPED: courier</p> <p>DATE SHIPPED:</p> <p>MATRIX TYPES: WW-WASTEWATER DW-DRINKING WATER SW-SOLID WASTE MS-SOLID LCH-LEACHATE OTHER:</p> <p>MATRIX TYPE: WW</p> <p>BOTTLE COUNT: 2</p>		<p>7 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) (RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE)</p> <p>RUSH RESULTS VIA (PLEASE CIRCLE) FAX</p> <p>PHONE #</p> <p>EMAIL ADDRESS</p>		<p>8 COMMENTS: (FOR LAB USE ONLY)</p> <p>SAMPLE TEMPERATURE UPON RECEIPT: 4 °C</p> <p>CHILL PROCESS STARTED PRIOR TO RECEIPT: [Signature]</p> <p>SAMPLE(S) RECEIVED ON ICE: [Signature]</p> <p>PROPER BOTTLES RECEIVED IN GOOD CONDITION: [Signature]</p> <p>BOTTLES FILLED WITH ADEQUATE VOLUME: [Signature]</p> <p>SAMPLES RECEIVED WITHIN HOLD TIME(S): [Signature]</p> <p>(EXCLUDES TYPICAL FIELD PARAMETERS)</p> <p>DATE AND TIME TAKEN FROM SAMPLE BOTTLE: 7/25/10 1600</p>	

Copies: white should accompany samples to PDC Labs. Yellow copy to be retained by the client.

ENVIRONMENTAL ANALYSIS SOUTH, INC.

4000 East Jackson Blvd
 Jackson, MO 63755
 Phone: (573) 204-8817 Fax: (573) 204-8818



**WHOLE EFFLUENT TOXICITY TESTING
 CHAIN OF CUSTODY**

CLIENT: PDC - Emerald

NPDES PERMIT NUMBER: IL 0001392

EFFLUENT NAME: _____ (LEGAL NAME) GRAB ~~24~~ 24 HR COMPOSITE ~~X~~

COLLECTION DATA: START DATE: 7/25 START TIME: 1000 0000

FINISH DATE: 7/25 FINISH TIME: 1600

UPSTREAM NAME: ILLINOIS RIVER (LEGAL NAME) (GRAB SAMPLE)

COLLECTION DATA: DATE: 7/25/11 TIME: 1600

SAMPLER NAME: MIKE STRABLEY (PRINT NAME) CARRIER: _____

Disclaimer: Environmental Analysis South, Inc. shall not be held financially liable for invalid whole effluent toxicity test (WET) or shipping charges resulting from the following reasons:

- Sampling & holding time errors (Will results in a setup charge of \$100 to the client)
- Commercial carrier delivery problems or errors (Will results in a setup charge of \$100 to the client)
- Problems with health or delivery of test organisms by vendor (No setup charge to client)

SAMPLER CHECK LIST

NO HEADSPACE IN BOTTLES

~~SHIP SAMPLES BY NEXT DAY CARRIER OR DELIVER TO LAB ON~~ 7, 27, 11

SAMPLES TO BE HAND DELIVERED TO LABORATORY SAME DAY AS TEST SETUP

SUFFICIENT ICE TO COOL SAMPLES TO A RANGE OF 0 - 6°C WHEN SHIPPING OVERNIGHT

RELINQUISHED BY: [Signature] DATE: 7-26-11 TIME: [Signature]

LABORATORY USE ONLY

EFFLUENT LOG NUMBER: _____

RECEIVED TEMPERATURE: _____ °C THERMOMETER ASSIGNED NUMBER: _____

HEADSPACE: YES or NO SAMPLES ICED or DELIVERED SAME DAY AS TEST

UPSTREAM LOG NUMBER: _____

RECEIVED TEMPERATURE: _____ °C THERMOMETER ASSIGNED NUMBER: _____

HEADSPACE: YES or NO SAMPLES ICED or DELIVERED SAME DAY AS TEST

RECEIVED BY: _____ DATE: _____ TIME: _____

SHIPPING ORDER

Emerald Performance Materials
 1550 County Road 1450 N.
 Henry, IL. 61537

OUR PURCHASE ORDER NO. HE-40007840

YOUR INVOICE NO.

SHIPPED FROM Henry, IL 61537

YOUR INVOICE DATE

SOLD TO PDC Lab

SHIP TO PDC Lab

SHIPPING ORDER NUMBER
P19-110282

PLEASE USE THE ABOVE NUMBER WHEN CORRESPONDING

BILL OF LADING NUMBER

O.S.D.R. REPORT NUMBER

CHECKED BY

This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.

[Signature]

AUTHORIZED BY Mike Strabley
 PURCHASING DEPT. APPROVAL
 DATE ENTERED 7-26-11
 PLANT LOCATION HENRY

DEPT. NO. 2478
 ACCOUNT 6100.1014

CHECK REASON FOR SHIPMENT
 REJECT ED - RETURNED FOR CREDIT
 REJECT ED - RETURNED FOR REPLACEMENT
 TO BE PREPARED AND RETURNED TO:

CONTAINERS - RETURNED FOR CREDIT
 SALES OF PROPERTY
 LOAN OF PROPERTY
 SAMPLE FOR EVALUATION

DATE SHIPPED 7-26-11
 HAZARDOUS YES NO
 (IF YES, GIVE ADDITIONAL INFORMATION BELOW)

SHIP VIA PREPAID COLLECT
 Box No: _____
 Lab Results: _____

Primary Effluent
 Plant Effluent

DESCRIPTIONS
WET TESTING SAMPLES

QUANTITY
2 GALLONS

SHIPPED UNIT
GALLONS

PRICE TOTAL
 NCX

INSTRUCTION TO VENDOR
 MATERIAL RECEIVED BY: Name:

Date Received:

Environmental Analysis South, Inc.

4000 East Jackson Blvd. • Jackson, MO 63755 • 573-204-8817 • Fax 573-204-8818



REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1314124
July 27, 2011 through July 29, 2011

Tests performed by:

John P. Clippard / Chemical Analyst at Environmental Analysis South (EAS)
Kelly J. Ray / Biologist at Environmental Analysis South (EAS)
Sara C. Shields / Lab Supervisor - Chemist at Environmental Analysis South (EAS)
David F. Warren / Lab Director - Chemist at Environmental Analysis South (EAS)

1. **Report Summation**
 - 1.1. **Data Summation**
 - 1.2. **Conclusion**
2. **Method Summation**
 - 2.1. **Test Conditions and Methods**
 - 2.2. **Potassium chloride Reference Salt Test**
 - 2.2.1. *Pimephales promelas* data
 - 2.2.2. *Ceriodaphnia dubia* data
 - 2.3. **Literature Cited**
3. **Raw Data Bench Sheets**
 - 3.1. **Initial observations (page 1)**
 - 3.2. **Zero hour Observations (page 1)**
 - 3.3. **Twenty-four (24) - Forty-eight (48) hour Observations (page 1)**
 - 3.4. **Seventy-two (72) – Ninety-six (96) hour Observations (page 2)**
 - 3.5. **Survival Data Table (page 3-4)**
 - 3.6. **Test Comments (page 5)**
4. **Chain of Custody**

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REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1314124
July 27, 2011 through July 29, 2011

1. REPORT SUMMATION:

1.1. Multiple Dilution Data Summation

Test Solution	<i>Pimephales promelas</i> Acute Toxicity Test 48 Hour Survival	<i>Ceriodaphnia dubia</i> Acute Toxicity Test 48 Hour Survival
Reconstituted Control (RC)	100%	100%
Reconstituted Control + Sodium Thiosulfate (RCT)	100%	100%
Upstream Control (UC)	100%	100%
6.25% Effluent	95%	100%
12.5% Effluent	0%*	50%*
25% Effluent	0%*	0%*
50% Effluent	0%*	0%*
100% Effluent	0%*	0%*
Estimated LC ₅₀ Value	8.68% Effluent	12.50% Effluent (10.71% - 14.60%)

* Indicates a significant difference at alpha = 0.5 between effluent and control survival data.

Conclusion:

Pimephales promelas 48 hour WET results:

LC 50 = 8.68% using Trimmed Spearman-Kärber
NOAEC = 6.25% using Steel's Many-One Rank Test

Ceriodaphnia dubia 48 hour WET results:

LC 50 = 12.50% using Trimmed Spearman-Kärber
NOAEC = 6.25% using Steel's Many-One Rank Test

Note: Per the method, test duration for the *Pimephales promelas* should have been 96 hrs. However, due to UPS failure to deliver the renewal effluent, the test was terminated at 48 hours. These results were calculated using the 48 hour data.

Approved by _____


Sara C. Shields, Chemist

Environmental Analysis South, Inc.

4000 East Jackson Blvd. • Jackson, MO 63755 • 573-204-8817 • Fax 573-204-8818



REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1314124
July 27, 2011 through July 29, 2011

2. TEST METHOD SUMMARY

2.1. TEST CONDITIONS AND METHODS:

	<i>Ceriodaphnia dubia</i> :	<i>Pimephales promelas</i> :
Test duration:	48 hours	48 hours
Temperature:	24 - 26 degree Celsius	24 - 26 degree Celsius
Light quality:	Ambient laboratory illumination	Ambient laboratory illumination
Photoperiod:	16 hour light, 8 hours dark	16 hour light, 8 hours dark
Control Water:	Moderately Hard Reconstituted Water	Moderately Hard Reconstituted Water
Dilution Water:	Upstream Water - If unavailable or toxic, then control water will be used.	Upstream Water - If unavailable or toxic, then control water will be used.
Size of test vessel:	30 milliliters	250 milliliters
Volume of test solution:	15 milliliters	200 milliliters
Age of test organisms:	<24 hours	1 -14 days (all same age)
Number of organisms/test vessel:	5	10
Number of replicates/concentration:	4	2
Number of organisms/concentration:	20	40 for a single dilution test and 20 for a multiple dilution test
Feeding regime:	None (fed prior to test)	None (fed prior to test)
Aeration:	None	None
Test acceptability criterion:	90% or greater survival in controls	90% or greater survival in controls

The methodology used for the chemistry data was taken from the *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992). The exception was hardness, which was determined using a Hach EDTA titration test kit. The toxicity tests follow guidelines laid out in the permittee's NPDES permit and were conducted according to EPA approved methods (USEPA 2002).

All test organisms were cultured according to EPA approved methods (USEPA 2002). The *Ceriodaphnia dubia* and the *Pimephales promelas* were obtained from C-K Associates Inc. located in Baton Rouge, Louisiana and shipped overnight for use in the whole effluent toxicity test.

Environmental Analysis South, Inc.

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REPORT OF ACUTE TOXICITY TESTING

City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1314124
July 27, 2011 through July 29, 2011

2.2. REFERENCE TOXICITY TEST:

Environmental Analysis South performs monthly reference toxicity tests. The most recent reference test was initiated on July 6, 2011 using KCL Lot #41713. Following are the results:

- 2.2.1. ***P. promelas*** - 48 hr. Acute Test – LC₅₀ = 1.068 g/l 95%CI (0.7311-1.405 g/l)
EAS %CV = 15.8%
National Warning Limits (75th percentile) = 19%CV
National Control Limits (90th percentile) = 33%CV
- 2.2.2. ***C. dubia*** - 48 hr. Acute Test – LC₅₀ = 0.463 g/l 95%CI (0.294-0.632g/l)
EAS %CV = 18.3%
National Warning Limits (75th percentile) = 29%CV
National Control Limits (90th percentile) = 34%CV

2.3. LITERATURE CITED:

1. APHA. 1992. *Standard methods for the examination of water and wastewater*, 18th Ed. American Public Health Association, Washington, D.C
2. USEPA. 2002. *Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms*, 5th Ed. EPA-821-R-02-012
3. USEPA 2000. *Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications under the National Pollutant Discharge Elimination System*, (Table B-2). June 2000. EPA 833-R-00-003.

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

CLIENT NAME: City of Emerald, IL (Plant)

NPDES NUMBER: multiple dilution, 96 hrs PP & 48 CD, AEC=100%

TYPE OF METHOD: 07/27/11 1600 hrs by City of Emerald

DATE & TIME OF COLLECTION: 07/27/11 1005 hrs by UPS

DATE & TIME OF SUBMISSION: 07/27/11 0710 hrs by Natalie Harris

INITIAL OBSERVATIONS	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	INT	EFEL	INT	UC	INT	RC			
LOG NUMBER / ID NUMBER						1314124	1314124	1314124A	4017					
pH - SU	07/27/11	1015 hrs	SCS	SB114 (8.8-9.2)	8.98	7.84	8.50	7.94						
TEMPERATURE °C RECEIVED	07/27/11	1015 hrs	SCS	EAS 106		2	1	24						
SPECIFIC CONDUCTANCE umhos	07/27/11	1015 hrs	SCS	ERA506-010511(401-457)	434	19350	875	247						
HARDNESS - ppm	07/27/11	1015 hrs	SCS	ERA P170-507(107-134)	120	320	200	80						
CHLORINE - ppm	07/27/11	1015 hrs	SCS	tap water	+	0.72	<0.04	<0.04						
DISSOLVED OXYGEN - ppm	07/27/11	1015 hrs	SCS	cal@840		<2	6.2	7.5						
TOTAL ALKALINITY - ppm	07/28/11	1500 hrs	SCS	ERA506-010511(60.1-71.9)	65.8	949	212	64.7						
INITIAL AMMONIA - ppm	08/03/11	1400 hrs	JPC	EAS #1981 (8-12)	10.1	99.9	0.227	<0.05						
TOTAL DISSOLVED SOLIDS - ppm														
0 HOUR OBSERVATIONS														
pH - SU	07/27/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.98	8.22	8.27	8.13	8.19	8.24	12.50%	6.25%	RCT	8.40
TEMPERATURE °C	07/27/11	1100 hrs	SCS	EAS 106		24.1	24.0	24.5	24.5	24.3	24.1	23.9	24.1	24.1
SPECIFIC CONDUCTANCE umhos	07/27/11	1100 hrs	SCS	ERA506-010511(401-457)	434	257	843	18340	10090	5500	3150	1948	306	7.4
DISSOLVED OXYGEN - ppm	07/27/11	1100 hrs	SCS	cal@840		7.2	8.7	8.4	8.6	8.6	8.7	8.7	8.7	8.7

24 HOUR OBSERVATIONS - PP	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	RCT
pH - SU	07/28/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.91	7.83	8.17	8.27	8.29	8.26	8.32	8.26	7.93
TEMPERATURE °C	07/28/11	1100 hrs	SCS	EAS 106		25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3
SPECIFIC CONDUCTANCE umhos	07/28/11	1100 hrs	SCS	ERA506-010511(401-457)	427	267	846	18250	9990	5480	3130	1938	307
DISSOLVED OXYGEN - ppm	07/28/11	1100 hrs	SCS	cal@840		6.5	6.2	3.4	3.4	4.4	6.2	5.8	6.2
48 HOUR OBSERVATIONS - PP													
pH - SU	07/29/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.93	7.69	8.08	8.33	8.33	8.32	8.35	8.30	8.11
TEMPERATURE °C	07/29/11	1100 hrs	SCS	EAS 106		24.1	24.1	24.1	24.1	24.1	24.1	24.1	24.1
SPECIFIC CONDUCTANCE umhos	07/29/11	1100 hrs	SCS	ERA506-010511(401-457)	424	277	870	18540	10190	5570	3190	1988	326
DISSOLVED OXYGEN - ppm	07/29/11	1100 hrs	SCS	cal@840		6.5	6.5	2.2	3.1	4.1	5.0	5.5	6.8

24 HOUR OBSERVATIONS - CD	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	RCT
pH - SU	07/28/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.91	8.48	8.34	8.31	8.38	8.35	8.41	8.40	8.16
TEMPERATURE °C	07/28/11	1100 hrs	SCS	EAS 106		25.3	25.3	25.3	25.3	25.3	25.3	25.3	25.3
SPECIFIC CONDUCTANCE umhos	07/28/11	1100 hrs	SCS	ERA506-010511(401-457)	427	263	825	17970	9940	5250	3000	1920	280
DISSOLVED OXYGEN - ppm	07/28/11	1100 hrs	SCS	cal@840		7.1	7.0	6.0	6.6	7.0	7.2	7.2	6.9
8 HOUR OBSERVATIONS - CD													
pH - SU	07/29/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.93	8.27	8.19	8.26	8.45	8.50	8.48	8.39	8.20
TEMPERATURE °C	07/29/11	1100 hrs	SCS	EAS 106		24.1	24.5	24.5	24.5	24.5	24.5	24.5	24.5
SPECIFIC CONDUCTANCE umhos	07/29/11	1100 hrs	SCS	ERA506-010511(401-457)	424	255	795	17620	9770	5190	2980	1880	304
DISSOLVED OXYGEN - ppm	07/29/11	1100 hrs	SCS	cal@840		6.8	7.3	7.4	7.5	7.5	7.4	7.4	7.5

Approved by: *[Signature]* Date: 08/01/2011

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

City of Emerald, IL (Plant) EAS LOG# 1314124

Date Test Began: July 27, 2011 Time Test Began: 1100 hrs Analyst 1: DFW
 Date Test Finished: July 29, 2011 Time Test Finished: 1100 hrs Analyst 2: KJR
 Analyst 3: SCS

P. promelas (PP) AGE: 6 days HATCH NUMBER: 8078 C-K

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	RCT
	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE
0 HR-PP	10,10	10,10	10,10	10,10	10,10	10,10	10,10	10,10
24 HR-PP	10,10	10,10	0,0	0,0	0,0	5,9	10,10	10,10
48 HR-PP	10,10	10,10	0,0	0,0	0,0	0,0	10,9	10,10

Ceriodaphnia dubia (CD) AGE: <24 hours HATCH NUMBER: 2357 C-K

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	RCT
	ALIVE							
0 HR-CD	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5
24 HR-CD	5,5,5,5	5,5,5,5	0,0,0,0	0,0,0,0	0,1,2,2	5,5,5,5	5,5,5,5	5,5,5,5
48 HR-CD	5,5,5,5	5,5,5,5	0,0,0,0	0,0,0,0	0,0,0,0	2,3,3,2	5,5,5,5	5,5,5,5

Date: *08/04/2011*

Approved by: *[Signature]*

114130

Not multiple

SUBCONTRACT ORDER

PDC Laboratories, Inc.

1072876

SENDING LABORATORY:

PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, IL 61615

Project Manager: Kurt C. Stepping
kstepping@pdclab.com Phone: 309-683-1719

RECEIVING LABORATORY:

Environmental Analysis South
4000 East Jackson Blvd
Jackson, MO 63755
Phone :573-204-8817

Sample Origin (State) _____

PO# L-39351

Analysis	Due	Expires	Comments
Sample ID: 1072876-01 01-Wet Single	Water 08/05/11 16:00	Sampled:07/25/11 16:00 07/27/11 16:00	<i>Emerald Upstream!</i> 1314124A <i>PC</i> <i>temp rec'd</i>
Sample ID: 1072876-02 01-Wet Single	Water 08/05/11 16:00	Sampled:07/25/11 16:00 07/27/11 16:00	<i>Emerald Effluent!</i> 1314124 <i>PC</i> <i>(SES)</i>

<i>Regina M. Pearson</i> Relinquished By	<i>7/26/11</i> Date/Time	<i>[Signature]</i> Received By	<i>1313/11</i> Date/Time	Sample Temperature Upon Receipt	_____ C
				Sample(s) Received on Ice	Y or N
				Proper Bottles Received in Good Condition	Y or N
				Bottles Filled with Adequate Volume	Y or N
				Samples Received Within Hold Time	Y or N
				Date/Time Taken From Sample	_____ Y or N



PDC Laboratories, Inc.

P.O. Box 9071 • Peoria, IL 61612-9071

(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689



Emerald Performance Materials
 1550 County Rd 1450 N
 Henry, IL 61537
 Attn: Jim Hastings

Date Received: 10/11/11 13:37
 Report Date: 10/28/11
 Customer #: 202011
 PO#: HE-40014063-UB

Sample No: **1101004-01**
 Sample Description: **UPSTREAM**

Collect Date: **10/10/11 16:00**
 Matrix: **Waste Water Regular Sample**

Parameters	Result	Qual	Analysis Date	Analyst	Method
Miscellaneous - Environmental Analysis South					
WET Testing Single Dilution - subcontracted	SUBCON		10/12/11 00:00		Subcontracted

Sample No: **1101004-02**
 Sample Description: **EFFLUENT**

Collect Date: **10/10/11 16:00**
 Matrix: **Waste Water**

Parameters	Result	Qual	Analysis Date	Analyst	Method
Miscellaneous - Environmental Analysis South					
WET Testing Single Dilution - subcontracted	SUBCON		10/12/11 00:00		Subcontracted

Sample No: **1101004-03**
 Sample Description: **ADDL UP**

Collect Date: **10/12/11 16:00**
 Matrix: **Waste Water Regular Sample**

Parameters	Result	Qual	Analysis Date	Analyst	Method
Miscellaneous - Environmental Analysis South					
WET Testing Single Dilution - subcontracted	SUBCON		10/12/11 00:00		Subcontracted

Sample No: **1101004-04**
 Sample Description: **ADDL EFF**

Collect Date: **10/12/11 16:00**
 Matrix: **Waste Water Regular Sample**

Parameters	Result	Qual	Analysis Date	Analyst	Method
Miscellaneous - Environmental Analysis South					
WET Testing Single Dilution - subcontracted	SUBCON		10/12/11 00:00		Subcontracted



PDC Laboratories, Inc.

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Emerald Performance Materials
1550 County Rd 1450 N
Henry, IL 61537
Attn: Jim Hastings

Date Received: 10/11/11 13:37
Report Date: 10/28/11
Customer #: 202011
PO#: HE-40014063-UB

Notes

This report shall not be reproduced, except in full, without the written approval of the laboratory.

PDC Laboratories participates in the following accreditation/certification and proficiency programs at the following locations. Endorsement by Federal or State Governments or their agencies is not implied.

- PIA PDC Laboratories - Peoria, IL
NELAC Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications: Kansas (E-10338); Missouri (870); Wisconsin (998284430); Indiana (C-IL-040); Iowa (240)
Wastewater Certifications: Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)
Hazardous/Solid Waste Certifications: Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)
UST Certification; Iowa (240)
- SPM PDC Laboratories - Springfield, MO
EPA DMR-QA Program
- STL PDC Laboratories - St. Louis, MO
NELAC Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS EPA Lab No. E-10389

Certified by: Kurt C. Stepping, Senior Project Manager

CHAIN OF CUSTODY RECORD

PDC LABORATORIES, INC.
 2231 WEST ALTORFER DRIVE
 PEORIA, IL 61615

PHONE # 800-752-6651
 FAX # 309-692-9689

State where samples collected _____

ALL HIGHLIGHTED AREAS MUST BE COMPLETED BY CLIENT (PLEASE PRINT) - (SAMPLE ACCEPTANCE POLICY ON REVERSE)

1 CLIENT Emerald Performance Materials ADDRESS: 1550 CR 1400 N CITY: Henry IL 61037 STATE: IL ZIP: 61037 CONTACT PERSON: Jim Hastings		PROJECT NUMBER P.O. NUMBER PHONE NUMBER FAX NUMBER		MEANS SHIPPED DATE SHIPPED MATRIX TYPES: WW-WASTEWATER DW-DRINKING WATER GW-GROUND WATER WWSL-SLUDGE MS-SOLID WASTE LOFT-LEACHATE OTHER:		ANALYSIS REQUESTED LOGIN # LAB PROJ. # TEMPLATE: PROJ. MGR.:		(FOR LAB USE ONLY) LOGGED BY: LAB PROJ. # TEMPLATE: PROJ. MGR.:	
2 SAMPLE DESCRIPTION AS YOU WANT ON REPORT WET TESTING		DATE COLLECTED TIME COLLECTED DATE COLLECTED TIME COLLECTED DATE COLLECTED TIME COLLECTED		SAMPLE TYPE GRAB COMP MATRIX TYPE BOTTLE COUNT		REMARKS X WET TESTING		REMARKS	
5 TURNDOWN TIME REQUESTED (PLEASE CIRCLE) (RUSH IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE) RUSH RESULTS VIA (PLEASE CIRCLE) FAX		NORMAL RUSH PHONE E-MAIL		DATE RESULTS NEEDED E-MAIL		COMMENTS: (FOR LAB USE ONLY)		COMMENTS: (FOR LAB USE ONLY)	
7 RELINQUISHED BY: (SIGNATURE) RELINQUISHED BY: (SIGNATURE)		RECEIVED BY: (SIGNATURE) RECEIVED BY: (SIGNATURE)		DATE TIME DATE TIME		SAMPLE TEMPERATURE UPON RECEIPT CHILL PROCESS STARTED PRIOR TO RECEIPT SAMPLE(S) RECEIVED ON ICE BOTTLES FILLED WITH ADEQUATE VOLUME SAMPLES RECEIVED WITHIN HOLD TIME(S) EXCLUDES TYPICAL FIELD PARAMETERS DATE AND TIME TAKEN FROM SAMPLE BOTTLE		°C	

Copies: white should accompany samples to PDC Labs. Yellow copy to be retained by the client.

CHAIN OF CUSTODY RECORD

PDC LABORATORIES, INC.
 2231 WEST ALTORFER DRIVE
 PEORIA, IL 61615
 PHONE # 800-752-6651
 FAX # 309-692-9689

State where samples collected

ALL UNTESTED SAMPLES MUST BE COMPLETED BY CLIENT (PLEASE PRINT) (SAMPLE ACCEPTANCE POLICY ON REVERSE)

1 CLIENT: Emerald Per Sec Mans Market ADDRESS: 1550 CR 1430 N CITY: Henry, IL 61830 STATE: IL CONTACT PERSON: Jim Heston		PROJECT NUMBER: F.O. NUMBER: MEANS SHIPPED: Courier PHONE NUMBER: FAX NUMBER: DATE SHIPPED: 10/13/11		ANALYSIS REQUESTED:		4 (FOR LAB USE ONLY) LOGIN # 11088117-108 LOGGED BY: LAB PROJ #: TEMPLATE: PROJ MGR:	
2 SAMPLE DESCRIPTION: WET TESTING AS YOU WANT ON REPORT		DATE COLLECTED: 10/11/11 TIME COLLECTED: 1600 SAMPLE TYPE: 1 GRAB: 1 COMP: 1 MATRIX TYPE: W BOTTLE COUNT: 2		3 ANALYSIS REQUESTED: Xwet Testing		REMARKS:	
5 TURNAROUND TIME REQUESTED (PLEASE CIRCLE) (RUSH TAT IS SUBJECT TO PDC LABS APPROVAL AND SURCHARGE) RUSH RESULTS VIA (PLEASE CIRCLE)		NORMAL: RUSH: DATE RESULTS NEEDED:		6 The sample temperature will be measured upon receipt at the lab. By initialing this area you request that the lab notify you, before proceeding with analysis, if the sample temperature is outside of the range of 0-1-6.0 C. By not initialing this area you allow the lab to proceed with analytical testing regardless of the sample temperature.		COMMENTS (FOR LAB USE ONLY)	
7 RELINQUISHED BY (SIGNATURE): [Signature] DATE: 10/13/11 TIME: 1500		RECEIVED BY (SIGNATURE): [Signature] DATE: 10/13/11 TIME: 1248		8 SAMPLE TEMPERATURE UPON RECEIPT: 5 °C CHILL PROCESS STARTED PRIOR TO RECEIPT: [Initials] SAMPLE(S) RECEIVED ON ICE: [Initials] PROPER BOTTLES RECEIVED IN GOOD CONDITION: [Initials] BOTTLES FILLED WITH ADEQUATE VOLUME: [Initials] SAMPLES RECEIVED WITHIN HOLD TIME(S): [Initials] (EXCLUDES TYPICAL FIELD PARAMETERS) DATE AND TIME TAKEN FROM SAMPLE BOTTLE:		9 RELINQUISHED BY (SIGNATURE): [Signature] DATE: 10/13/11 TIME: 1242	

Copies: white should accompany samples to PDC Labs. Yellow copy to be retained by the client.

<p>SHIPPING ORDER</p> <p>AUTHORIZED BY Mike Strabley</p> <p>PURCHASING DEPT. APPROVAL</p> <p>DATE ENTERED 10-13-11</p> <p>PLANT LOCATION HENRY</p> <p>DEPT. NO. 2478</p> <p>ACCOUNT 6100.1014</p> <p>CHECK REASON FOR SHIPMENT <input type="checkbox"/> REJECT ED - RETURNED FOR CREDIT <input type="checkbox"/> REJECT ED - RETURNED FOR REPLACEMENT <input type="checkbox"/> TO BE PREPARED AND RETURNED TO:</p> <p><input type="checkbox"/> CONTAINERS - RETURNED FOR CREDIT <input type="checkbox"/> SALES OF PROPERTY <input type="checkbox"/> LOAN OF PROPERTY <input checked="" type="checkbox"/> SAMPLE FOR EVALUATION</p>	<p>Emerald Performance Materials 1550 County Road 1450 N. Henry, IL. 61537</p> <p>OUR PURCHASE ORDER NO. HE-40007640</p> <p>SHIPPED FROM Henry, IL 61537</p> <p>SOLD TO PDC Lab</p> <p>SHIP TO PDC Lab</p> <p>SHIP VIA <input type="checkbox"/> PREPAID <input type="checkbox"/> COLLECT</p> <p>DATE SHIPPED 10-13-11</p> <p>F.O.B. _____</p> <p>HAZARDOUS <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>(IF YES, GIVE ADDITIONAL INFORMATION BELOW)</p> <p>DESCRIPTIONS Primary Effluent Plant Effluent</p>	<p>YOUR INVOICE NO. _____</p> <p>YOUR INVOICE DATE _____</p> <p>GROSS WT _____</p> <p>REQUIRED DELIVERY DATE _____</p> <p>VALUE IF OVER \$250 _____</p> <p>Lab Results: _____</p> <p>SHIPPED QUANTITY _____</p> <p>SHIPPED UNIT _____</p> <p>PRICE _____</p> <p>TOTAL _____</p> <p>NCX</p>
<p>SHIPPING ORDER NUMBER P19-110392</p> <p>PLEASE USE THE ABOVE NUMBER WHEN CORRESPONDING</p> <p>BILL OF LADING NUMBER _____</p> <p>O.S.D.&R. REPORT NUMBER _____</p> <p>CHECKED BY _____</p> <p>This is to certify that the above named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation.</p> <p><i>[Signature]</i></p>		
<p>MATERIAL RECEIVED BY: Name: _____ Date Received: _____</p> <p>INSTRUCTION TO VENDOR _____</p>		

Environmental Analysis South, Inc.

4000 East Jackson Blvd. • Jackson, MO 63755 • 573-204-8817 • Fax 573-204-8818



REPORT OF ACUTE TOXICITY TESTING
City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1402207
October 12, 2011 through October 16, 2011

Tests performed by:

John P. Clippard / Chemical Analyst at Environmental Analysis South (EAS)
Kelly J. Ray / Biologist at Environmental Analysis South (EAS)
Sara C. Shields / Lab Supervisor - Chemist at Environmental Analysis South (EAS)
David F. Warren / Lab Director - Chemist at Environmental Analysis South (EAS)

1. **Report Summation**
 - 1.1. **Data Summation**
 - 1.2. **Conclusion**
2. **Method Summation**
 - 2.1. **Test Conditions and Methods**
 - 2.2. **Potassium chloride Reference Salt Test**
 - 2.2.1. *Pimephales promelas* data
 - 2.2.2. *Ceriodaphnia dubia* data
 - 2.3. **Literature Cited**
3. **Raw Data Bench Sheets**
 - 3.1. **Initial observations (page 1)**
 - 3.2. **Zero hour Observations (page 1)**
 - 3.3. **Twenty-four (24) - Forty-eight (48) hour Observations (page 1)**
 - 3.4. **Seventy-two (72) – Ninety-six (96) hour Observations (page 2)**
 - 3.5. **Survival Data Table (page 3-4)**
 - 3.6. **Test Comments (page 5)**
4. **Chain of Custody**

Environmental Analysis South, Inc.

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REPORT OF ACUTE TOXICITY TESTING
City of Emerald, IL
Plant Effluent, AEC = 100%

EAS LOG# 1402207
October 12, 2011 through October 16, 2011

1. REPORT SUMMATION:

1.1. Multiple Dilution Data Summation

Test Solution	<i>Pimephales promelas</i> Acute Toxicity Test 96 Hour Survival	<i>Ceriodaphnia dubia</i> Acute Toxicity Test 48 Hour Survival
Reconstituted Control (RC)	100%	100%
Upstream Control (UC)	100%	100%
6.25% Effluent	95%	100%
12.5% Effluent	85%*	100%
25% Effluent	50%*	70%*
50% Effluent	0%*	15%*
100% Effluent	0%*	0%*
Estimated LC₅₀ Value	22.75% Effluent (18.36% - 28.18%)	31.86% Effluent (26.61% - 38.15%)

* Indicates a significant difference at alpha = 0.5 between effluent and control survival data.

Conclusion:

Pimephales promelas 96 hour WET results:

LC 50 = 22.75% using Trimmed Spearman-Kärber
 NOAEC = 6.25% using Steel's Many-One Rank Test

Ceriodaphnia dubia 48 hour WET results:

LC 50 = 31.86% using Trimmed Spearman-Kärber
 NOAEC = 12.5% using Steel's Many-One Rank Test

Approved by _____

Sara C. Shields, Chemist

Environmental Analysis South, Inc.

4000 East Jackson Blvd. • Jackson, MO 63755 • 573-204-8817 • Fax 573-204-8818



REPORT OF ACUTE TOXICITY TESTING City of Emerald, IL Plant Effluent, AEC = 100%

EAS LOG# 1402207
October 12, 2011 through October 16, 2011

2. TEST METHOD SUMMARY

2.1. TEST CONDITIONS AND METHODS:

	<i>Ceriodaphnia dubia</i> :	<i>Pimephales promelas</i> :
Test duration:	48 hours	96 hours
Temperature:	24 - 26 degree Celsius	24 - 26 degree Celsius
Light quality:	Ambient laboratory illumination	Ambient laboratory illumination
Photoperiod:	16 hour light, 8 hours dark	16 hour light, 8 hours dark
Control Water:	Moderately Hard Reconstituted Water	Moderately Hard Reconstituted Water
Dilution Water:	Upstream Water - If unavailable or toxic, then control water will be used.	Upstream Water - If unavailable or toxic, then control water will be used.
Size of test vessel:	30 milliliters	250 milliliters
Volume of test solution:	15 milliliters	200 milliliters
Age of test organisms:	<24 hours	1 -14 days (all same age)
Number of organisms/test vessel:	5	10
Number of replicates/concentration:	4	2
Number of organisms/concentration:	20	40 for a single dilution test and 20 for a multiple dilution test
Feeding regime:	None (fed prior to test)	None (fed prior to test)
Aeration:	None	None
Test acceptability criterion:	90% or greater survival in controls	90% or greater survival in controls

The methodology used for the chemistry data was taken from the *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992). The exception was hardness, which was determined using a Hach EDTA titration test kit. The toxicity tests follow guidelines laid out in the permittee's NPDES permit and were conducted according to EPA approved methods (USEPA 2002).

All test organisms were cultured according to EPA approved methods (USEPA 2002). The *Ceriodaphnia dubia* and the *Pimephales promelas* were obtained from C-K Associates Inc. located in Baton Rouge, Louisiana and shipped overnight for use in the whole effluent toxicity test.

Environmental Analysis South, Inc.

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REPORT OF ACUTE TOXICITY TESTING City of Emerald, IL Plant Effluent, AEC = 100%

EAS LOG# 1402207
October 12, 2011 through October 16, 2011

2.2. REFERENCE TOXICITY TEST:

Environmental Analysis South performs monthly reference toxicity tests. The most recent reference test was initiated on October 5, 2011 using KCL Lot #41713. Following are the results:

- 2.2.1. ***P. promelas*** - 48 hr. Acute Test – LC₅₀ = 1.021 g/l 95%CI (0.708-1.334 g/l)
EAS %CV = 15.3%
National Warning Limits (75th percentile) = 19%CV
National Control Limits (90th percentile) = 33%CV
- 2.2.2. ***C. dubia*** - 48 hr. Acute Test – LC₅₀ = 0.460 g/l 95%CI (0.297-0.623g/l)
EAS %CV = 17.7%
National Warning Limits (75th percentile) = 29%CV
National Control Limits (90th percentile) = 34%CV

2.3. LITERATURE CITED:

1. APHA. 1992. *Standard methods for the examination of water and wastewater*, 18th Ed. American Public Health Association, Washington, D.C
2. USEPA. 2002. *Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms*, 5th Ed. EPA-821-R-02-012
3. USEPA 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications under the National Pollutant Discharge Elimination System, (Table B-2). June 2000. EPA 833-R-00-003.

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

CLIENT NAME: City of Emerald, IL (Plant)

NPDES NUMBER: multiple dilution, 96 hrs PP & 48 CD, AEC=100%

DATE & TIME OF COLLECTION: 10/10/11 1400 hrs

DATE & TIME OF SUBMISSION: 10/12/11 0940 hrs by UPS

Upstream: River
Collected: 10/10/11 1400 hrs by City of Emerald

INITIAL OBSERVATIONS	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	INT EFFL	INT UC	INT RC	100%	50%	25%	12.50%	6.25%	X %AEC
LOG NUMBER / ID NUMBER						1402207	1402207A	RC4023						
pH - SU	10/12/11	1000 hrs	SCS	SB114 (8.8-9.2)	8.93	7.83	8.39	7.80						
TEMPERATURE °C RECEIVED	10/12/11	1000 hrs	SCS	EAS 106		3	2	24						
SPECIFIC CONDUCTANCE umhos	10/12/11	1000 hrs	SCS	ERA506-010511(401-457)	442	7740	823	277						
HARDNESS - ppm	10/12/11	1000 hrs	SCS	ERA P170-507(107-134)	120	420	300	80						
CHLORINE - ppm	10/12/11	1000 hrs	SCS	tap water	+	<0.04	<0.04	<0.04						
DISSOLVED OXYGEN - ppm	10/12/11	1000 hrs	SCS	cal@840		6.9	7.6	7.3						
TOTAL ALKALINITY - ppm	10/12/11	1615 hrs	SCS	ERA506-010511(60.1-71.9)	68.9	168	175	61.9						
INITIAL AMMONIA - ppm	10/17/11	1412 hrs	JPC	EAS #1981 (8-12)	9.77	27.1	0.126	<0.05						
TOTAL DISSOLVED SOLIDS - ppm														
0 HOUR OBSERVATIONS														
pH - SU	10/12/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.93	8.01	8.20	8.12	8.18	8.18	8.33	8.40	8.39	
TEMPERATURE °C	10/12/11	1100 hrs	SCS	EAS 106		23.8	24.4	23.5	23.6	23.6	23.7	24.0	24.2	
SPECIFIC CONDUCTANCE umhos	10/12/11	1100 hrs	SCS	ERA506-010511(401-457)	442	235	772	7360	4350	4350	2570	1630	1183	
DISSOLVED OXYGEN - ppm	10/12/11	1100 hrs	SCS	cal@840		7.1	8.4	9.5	9.3	9.3	9.3	9.3	8.5	

24 HOUR OBSERVATIONS - PP	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	X %AEC
pH - SU	10/13/11	1100 hrs	SCS	SB114 (8.8-9.2)	9.1	7.35	8.12	8.08	8.14	8.17	8.23	8.20	
TEMPERATURE °C	10/13/11	1100 hrs	SCS	EAS 106		25.1	25.1	25.1	25.1	25.1	25.1	25.1	
SPECIFIC CONDUCTANCE umhos	10/13/11	1100 hrs	SCS	ERA506-010511(401-457)	431	252	839	7380	4380	2670	1653	1215	
DISSOLVED OXYGEN - ppm	10/13/11	1100 hrs	SCS	cal@840		6.7	6.6	6.1	6.3	6.3	6.3	6.6	
48 HOUR OBSERVATIONS - PP													
pH - SU	10/14/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.97	7.59	7.99	8.13	8.16	8.17	8.16	8.10	
TEMPERATURE °C	10/14/11	1100 hrs	SCS	EAS 106		24.7	24.7	24.7	24.7	24.7	24.7	24.7	
SPECIFIC CONDUCTANCE umhos	10/14/11	1100 hrs	SCS	ERA506-010511(401-457)	436	280	835	7500	4500	2780	1670	1211	
DISSOLVED OXYGEN - ppm	10/14/11	1100 hrs	SCS	cal@840		6.3	6.6	5.8	6.0	5.9	6.1	6.5	
FINAL AMMONIA - ppm													

24 HOUR OBSERVATIONS - CD	DATE	TIME	ANALYST	QC LOT	QC EXP VALUE	RC	UC	100%	50%	25%	12.50%	6.25%	X %AEC
pH - SU	10/13/11	1100 hrs	SCS	SB114 (8.8-9.2)	9.1	8.00	8.21	8.13	8.25	8.31	8.32	8.27	
TEMPERATURE °C	10/13/11	1100 hrs	SCS	EAS 106		25.1	25.1	25.1	25.1	25.1	25.1	25.1	
SPECIFIC CONDUCTANCE umhos	10/13/11	1100 hrs	SCS	ERA506-010511(401-457)	431	246	797	7180	4250	2560	1636	1216	
DISSOLVED OXYGEN - ppm	10/13/11	1100 hrs	SCS	cal@840		7.1	7.1	7.0	7.0	7.0	7.0	6.9	
48 HOUR OBSERVATIONS - CD													
pH - SU	10/14/11	1100 hrs	SCS	SB114 (8.8-9.2)	8.97	8.09	8.01	8.24	8.28	8.28	8.26	8.16	
TEMPERATURE °C	10/14/11	1100 hrs	SCS	EAS 106		24.7	24.7	24.7	24.7	24.7	24.7	24.7	
SPECIFIC CONDUCTANCE umhos	10/14/11	1100 hrs	SCS	ERA506-010511(401-457)	436	276	780	7060	4210	2530	1616	1190	
DISSOLVED OXYGEN - ppm	10/14/11	1100 hrs	SCS	cal@840		6.8	6.7	6.5	6.4	6.6	6.5	6.3	
FINAL AMMONIA - ppm													

Date: 10/27/2011

Approved by: *[Signature]*

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

City of Emerald, IL (Plant) EAS LOG# 1402207

Date Test Began: Time Test Began: Analyst 1:
 Date Test Finished: Time Test Finished: Analyst 2:
 Analyst 3:

P. promelas (PP) AGE: days HATCH NUMBER:

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE
0 HR-PP	10,10	10,10	10,10	10,10	10,10	10,10	10,10	
24 HR-PP	10,10	10,10	3,4	10,10	10,10	10,10	10,10	
48 HR-PP	10/17/2011	10,10	0,0	7,4	10,10	10,10	10,10	

Ceriodaphnia dubia (CD) AGE: hours HATCH NUMBER:

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
	ALIVE	ALIVE						
0 HR-CD	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	5,5,5,5	
24 HR-CD	5,5,5,5	5,5,5,5	2,2,0,1	1,3,4,3	5,5,5,5	5,5,5,5	5,5,5,5	
48 HR-CD	5,5,5,5	5,5,5,5	0,0,0,0	0,1,1,1	4,4,3,3	5,5,5,5	5,5,5,5	

Approved by:  Date: 10/27/2011

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

City of Emerald, IL (Plant) EAS LOG# 1402207

Date Test Began: Time Test Began:
 Date Test Finished: Time Test Finished:
 Analyst 1:
 Analyst 2:
 Analyst 3:

P. promelas (PP) AGE: days HATCH NUMBER:

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE
48 HR-PP	10,10	10,10	0,0	7,4	10,10	10,10	10,10	
72 HR-PP	10,10	10,10	0,0	0,0	8,8	9,10	10,10	
96 HR-PP	10/17/2011	10,10	0,0	0,0	6,4	8,9	10,9	

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<input type="text"/>								

Approved by: *[Signature]* Date: 10/27/2011

115054

*multiple
Alabr*

SUBCONTRACT ORDER

**PDC Laboratories, Inc.
1101004**

10/11/2011

PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, IL 61615
Project Manager: Kurt C. Stepping
kstepping@pdclab.com Phone: 309-683-1719

Environmental Analysis South
4000 East Jackson Blvd
Jackson, MO 63755
Phone :(573) 204-8817

Sample Origin (State) IL
PO# L40741

Emerald

Analysis	Due	Expires	Comments
Sample ID: 1101004-01			Waste Water Sampled: 10/10/11 14:00 <i>Upstream</i> 1402207 <i>temp rec 20C</i>
Wet Testing - Single Dilution	10/21/11 16:00	10/12/11 14:00	
Sample ID: 1101004-02			Waste Water Sampled: 10/10/11 14:00 <i>Effluent</i> 1402207 <i>20C</i>
Wet Testing - Single Dilution	10/21/11 16:00	10/12/11 14:00	

<i>Alan J. Stepping</i>	<i>10-11-11 14:00</i>			Sample Temperature Upon Receipt	___ C
Relinquished By	Date/Time	Received By	Date/Time	Sample(s) Received on Ice	Y or N
<i>/</i>		<i>Julio...</i>	<i>10/12/11</i>	Proper Bottles Received in Good Condition	Y or N
Relinquished By	Date/Time	Received By	Date/Time	Bottles Filled with Adequate Volume	Y or N
		<i>940 UPS</i>		Samples Received Within Hold Time	Y or N
				Date/Time Taken From Sample Bottle	Y or N

Renewal for 1402207

SUBCONTRACT ORDER

PDC Laboratories, Inc.

1101004

SENDING LABORATORY:

PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, IL 61615
Phone: 309.692.9688
Fax: 309.692.9689
Project Manager: Kurt C. Stepping

RECEIVING LABORATORY:

Environmental Analysis South
4000 East Jackson Blvd
Jackson, MO 63755
Phone : (573) 204-8817
Fax: (573) 204-8818

Analysis	Due	Expires	Laboratory ID	Comments
Sample ID: 1101004-01	Water	Sampled: 10/10/11 16:00	[REDACTED]	
01-Wet Single	10/21/11 16:00	10/12/11 16:00		
Containers Supplied:				
Sample ID: 1101004-02	Water	Sampled: 10/10/11 16:00	[REDACTED]	
01-Wet Single	10/21/11 16:00	10/12/11 16:00		
Containers Supplied:				
Sample ID: 1101004-03	Water	Sampled: 10/12/11 16:00	[REDACTED]	temp rec'd = 2°C (SS) - A ADDITIONAL SAMPLE
01-Wet Single	10/21/11 16:00	10/14/11 16:00		
Containers Supplied:				
Sample ID: 1101004-04	Water	Sampled: 10/12/11 16:00	[REDACTED]	temp rec'd = 3°C (SS) 11 11
01-Wet Single	10/21/11 16:00	10/14/11 16:00		
Containers Supplied:				

Released By: *[Signature]* Date: 10-13-11 14:00
 Received By: *[Signature]* Date: 10/14/11 10:25 UPS

Released By: _____ Date: _____
 Received By: _____ Date: _____



PDC Laboratories, Inc.
 P.O. Box 9071 • Peoria, IL 61612-9071
 (309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689



Emerald Performance Materials
 1550 County Rd 1450 N
 Henry, IL 61537
 Attn: Jim Hastings

Date Received: 01/24/12 13:18
 Report Date: 02/21/12
 Customer #: 202011
 PO#: HE-40014063-UB

Laboratory Results

Sample No: **2012627-01**
 Sample Description: **EFFLUENT**

Collect Date: **01/23/12 23:59**
 Matrix: **Waste Water**

Parameters	Result	Qual	Analysis Date	Analyst	Method
<u>Miscellaneous - Environmental Analysis South</u>					
WET Testing Single Dilution - subcontracted	<				Subcontracted

Sample No: **2012627-02REAM**
 Sample Description: **UPSTREAM**

Collect Date: **01/24/12 06:00**
 Matrix: **Waste Water**

Parameters	Result	Qual	Analysis Date	Analyst	Method
<u>Miscellaneous - Environmental Analysis South</u>					
WET Testing Single Dilution - subcontracted	<				Subcontracted



PDC Laboratories, Inc.

P.O. Box 9071 • Peoria, IL 61612-9071

(309) 692-9688 • (800) 752-6651 • FAX (309) 692-9689



Emerald Performance Materials
1550 County Rd 1450 N
Henry, IL 61537
Attn: Jim Hastings

Date Received: 01/24/12 13:18
Report Date: 02/21/12
Customer #: 202011
PO#: HE-40014063-UB

Laboratory Results

Notes

This report shall not be reproduced, except in full, without the written approval of the laboratory.

PDC Laboratories participates in the following accreditation/certification and proficiency programs at the following locations. Endorsement by Federal or State Governments or their agencies is not implied.

- PIA PDC Laboratories - Peoria, IL
NELAC Accreditation for Drinking Water, Wastewater, Hazardous and Solid Wastes Fields of Testing through IL EPA Lab No. 100230
Illinois Department of Public Health Bacteriological Analysis in Drinking Water Approved Laboratory Registry No. 17553
Drinking Water Certifications: Kansas (E-10338); Missouri (870); Wisconsin (998284430); Indiana (C-IL-040); Iowa (240)
Wastewater Certifications: Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)
Hazardous/Solid Waste Certifications; Arkansas (88-0677); Wisconsin (998284430); Iowa (240); Kansas (E-10335)
UST Certification; Iowa (240)
- SPM PDC Laboratories - Springfield, MO
EPA DMR-QA Program
- STL PDC Laboratories - St. Louis, MO
NELAC Accreditation for Wastewater, Hazardous and Solid Wastes Fields of Testing through KS EPA Lab No. E-10389

WET Analysis subcontracted, report attached.

Certified by: Kurt C. Stepping, Senior Project Manager

ENVIRONMENTAL ANALYSIS SOUTH, INC.

4000 East Jackson Blvd
Jackson, MO 63755
Phone: (573) 204-8817 Fax: (573) 204-8818



2007-2/14

**WHOLE EFFLUENT TOXICITY TESTING
CHAIN OF CUSTODY**

1/24/12 13:11

CLIENT: Emerald Performance Materials

NPDES PERMIT NUMBER: IL 0001392

EFFLUENT NAME: Outfall 001 GRAB 24 HR COMPOSITE
(LEGAL NAME)

COLLECTION DATA: START DATE: 23 Jan 2012 START TIME: 00:01

FINISH DATE: 23 Jan 2012 FINISH TIME: 23:59

UPSTREAM NAME: Illinois River (GRAB SAMPLE)
(LEGAL NAME)

COLLECTION DATA: DATE: 24 Jan 2012 TIME: 06:44

SAMPLER NAME: Harold Crouch CARRIER: _____
(PRINT NAME)

Disclaimer: Environmental Analysis South, Inc. shall not be held financially liable for invalid whole effluent toxicity test (WET) or shipping charges resulting from the following reasons:

- Sampling & holding time errors (Will results in a setup charge of \$100 to the client)
- Commercial carrier delivery problems or errors (Will results in a setup charge of \$100 to the client)
- Problems with health or delivery of test organisms by vendor (No setup charge to client)

SAMPLER CHECK LIST

NO HEADSPACE IN BOTTLES
SHIP SAMPLES BY NEXT DAY CARRIER OR DELIVER TO LAB ON _____
SAMPLES TO BE HAND DELIVERED TO LABORATORY SAME DAY AS TEST SETUP
SUFFICIENT ICE TO COOL SAMPLES TO A RANGE OF 0 - 6° C WHEN SHIPPING OVERNIGHT

RELINQUISHED BY: Harold Crouch DATE: 24 Jan 2012 TIME: 07:34

LABORATORY USE ONLY

EFFLUENT LOG NUMBER: 20120272
RECEIVED TEMPERATURE: 1 °C THERMOMETER ASSIGNED NUMBER: #6

HEADSPACE: YES or NO NO SAMPLES ICED or DELIVERED SAME DAY AS TEST

UPSTREAM LOG NUMBER: _____
RECEIVED TEMPERATURE: 1 °C THERMOMETER ASSIGNED NUMBER: #6

HEADSPACE: YES or NO NO SAMPLES ICED or DELIVERED SAME DAY AS TEST

RECEIVED BY: [Signature] DATE: 1/24/12 TIME: 13:18

Environmental Analysis South, Inc.

4000 East Jackson Blvd. • Jackson, MO 63755 • 573-204-8817 • Fax 573-204-8818



**REPORT OF ACUTE TOXICITY TESTING
Emerald Performance Materials
Effluent, AEC = 100%**

**EAS LOG# 1407821
January 25, 2012 through January 27, 2012**

Tests performed by:

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Environmental Analysis South, Inc.

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REPORT OF ACUTE TOXICITY TESTING
Emerald Performance Materials
Effluent, AEC = 100%

EAS LOG# 1407821
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1. REPORT SUMMATION:

1.1. Multiple Dilution Data Summation

Test Solution	<i>Pimephales promelas</i> Acute Toxicity Test 96 Hour Survival	<i>Ceriodaphnia dubia</i> Acute Toxicity Test 48 Hour Survival
Reconstituted Control (RC)	100%	100%
Upstream Control (UC)	100%	100%
6.25% Effluent	25%*	95%
12.5% Effluent	0%*	15%*
25% Effluent	0%*	0%*
50% Effluent	0%*	0%*
100% Effluent	0%*	0%*
Estimated LC₅₀ Value	<6.25% Effluent	9.42% Effluent (8.34% - 10.65%)

* Indicates a significant difference at alpha = 0.5 between effluent and control survival data.

Note: Calculations were performed on the 48 hr *Pimephales promelas* data rather than 96 hr due to UPS failure to deliver the renewal effluent.

Conclusion:

Pimephales promelas 96 hour WET results: LC 50 < 6.25% using Trimmed Spearman-Kärber
 NOAEC < 6.25% by the Steel's Many-One Rank Test
Ceriodaphnia dubia 48 hour WET results: LC 50 = 9.42% using Trimmed Spearman-Kärber
 NOAEC = 6.25% by the Steel's Many-One Rank Test

Approved by _____

Sara C. Shields, Chemist

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2. TEST METHOD SUMMARY

2.1. TEST CONDITIONS AND METHODS:

	<i>Ceriodaphnia dubia</i> :	<i>Pimephales promelas</i> :
Test duration:	48 hours	48 hours
Temperature:	24 - 26 degree Celsius	24 - 26 degree Celsius
Light quality:	Ambient laboratory illumination	Ambient laboratory illumination
Photoperiod:	16 hour light, 8 hours dark	16 hour light, 8 hours dark
Control Water:	Moderately Hard Reconstituted Water	Moderately Hard Reconstituted Water
Dilution Water:	Upstream Water - If unavailable or toxic, then control water will be used.	Upstream Water - If unavailable or toxic, then control water will be used.
Size of test vessel:	30 milliliters	250 milliliters
Volume of test solution:	15 milliliters	200 milliliters
Age of test organisms:	<24 hours	1 -14 days (all same age)
Number of organisms/test vessel:	5	10
Number of replicates/concentration:	4	2
Number of organisms/concentration:	20	40 for a single dilution test and 20 for a multiple dilution test
Feeding regime:	None (fed prior to test)	None (fed prior to test)
Aeration:	None	None
Test acceptability criterion:	90% or greater survival in controls	90% or greater survival in controls

The methodology used for the chemistry data was taken from the *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992). The exception was hardness, which was determined using a Hach EDTA titration test kit. The toxicity tests follow guidelines laid out in the permittee's NPDES permit and were conducted according to EPA approved methods (USEPA 2002).

All test organisms were cultured according to EPA approved methods (USEPA 2002). The *Ceriodaphnia dubia* and the *Pimephales promelas* were obtained from C-K Associates Inc. located in Baton Rouge, Louisiana and shipped overnight for use in the whole effluent toxicity test.

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2.2. REFERENCE TOXICITY TEST:

Environmental Analysis South performs monthly reference toxicity tests. The most recent reference test was initiated on January 11, 2012 using KCL Lot #41713. Following are the results:

- 2.2.1. *P. promelas* - 48 hr. Acute Test – LC₅₀ = 0.978 g/l 95%CI (0.733 g/l -1.222 g/l)
EAS %CV = 12.5%
National Warning Limits (75th percentile) = 19%CV
National Control Limits (90th percentile) = 33%CV
- 2.2.2. *C. dubia* - 48 hr. Acute Test – LC₅₀ = 0.474 g/l 95%CI (0.304 g/l - 0.644g/l)
EAS %CV = 17.9%
National Warning Limits (75th percentile) = 29%CV
National Control Limits (90th percentile) = 34%CV

2.3. LITERATURE CITED:

1. APHA. 1992. *Standard methods for the examination of water and wastewater*, 18th Ed. American Public Health Association, Washington, D.C
2. USEPA. 2002. *Methods for measuring the acute toxicity of effluents and receiving waters to freshwater and marine organisms*, 5th Ed. EPA-821-R-02-012
3. USEPA 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications under the National Pollutant Discharge Elimination System, (Table B-2). June 2000. EPA 833-R-00-003.

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

Emerald Permacore Materials, Effluent, EAS LOG# 1407821

Date Test Began: Time Test Began: Analyst 1:
 Date Test Finished: Time Test Finished: Analyst 2:
 Analyst 3:

P. promelas (PP) AGE: days HATCH NUMBER:

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE
0 HR-PP	10,10	10,10	10,10	10,10	10,10	10,10	10,10	
24 HR-PP	10,10	10,10	0,0	0,0	2,1	8,7	8,9	
48 HR-PP	10,10	10,10	0,0	0,0	0,0	0,0	4,1	

Ceriodaphnia dubia (CD) AGE: hours HATCH NUMBER:

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
	ALIVE	ALIVE						
0 HR-CD	5.5.5.5	5.5.5.5	5.5.5.5	5.5.5.5	5.5.5.5	5.5.5.5	5.5.5.5	
24 HR-CD	5.5.5.5	5.5.5.5	0,0,0,0	0,0,0,0	2,4,3,5	5,5,5,5	5,5,5,5	
48 HR-CD	5.5.5.5	5.5.5.5	0,0,0,0	0,0,0,0	0,0,0,0	0,0,1,2	5,4,5,5	

Approved by: *J. Thibault*
Date: *02/02/2012*

WHOLE EFFLUENT TEST conducted in accordance with US EPA 600/4-90/027
Fifth Edition October 2002

Emerald Permacne Materials, Effluent, EAS LOG# 1407821

Date Test Began: Time Test Began: Analyst 1:
 Date Test Finished: Time Test Finished: Analyst 2:
 Analyst 3:

HATCH NUMBER:

AGE: days

P. promelas (PP)

PERIOD	RC	UC	100%	50%	25%	12.50%	6.25%	X% AEC
48 HR-PP	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE	ALIVE
72 HR-PP								
96 HR-PP								

Date: *08/02/2012*

Approved by: *[Signature]*

116119

IL-960w

SUBCONTRACT ORDER

PDC Laboratories, Inc.
2012627

1/24/2012

PDC Laboratories, Inc.
2231 W. Altorfer Drive
Peoria, IL 61615
Project Manager: Kurt C. Stepping
kstepping@pdclab.com Phone: 309-683-1719

Environmental Analysis South
4000 East Jackson Blvd
Jackson, MO 63755
Phone : (573) 204-8817

Sample Origin (State) IL
PO# L 40833

Emerald

Analysis	Due	Expires	Comments
Sample ID: 2012627-01 - <i>Est Hunt</i> Waste Water			Sampled: 01/23/12 23:59 1407821 <i>temp rec 3°C</i>
Wet Testing - Single Dilution	02/03/12 16:00	01/25/12 23:59	
Sample ID: 2012627-02 - <i>River</i> Waste Water			Sampled: 01/24/12 06:00 1407821-A <i>3°C</i>
Wet Testing - Single Dilution	02/03/12 16:00	01/26/12 06:00	

Relinquished By *Alan R. [Signature]* Date/Time 1-24-12 13:30
 Relinquished By *[Signature]* Date/Time 1/25/12 10:30
 Received By *[Signature]* Date/Time UPS

Sample Temperature Upon Receipt _____ C
 Sample(s) Received on Ice Y or N
 Proper Bottles Received in Good Condition Y or N
 Bottles Filled with Adequate Volume Y or N
 Samples Received Within Hold Time Y or N
 Date/Time Taken From Sample Bottle Y or N