

# **QUARTERLY REPORT CONSENT ADMINISTRATIVE ORDER LIS 98-119**

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Prepared for:

**El Dorado Chemical Company  
PO Box 854  
Oklahoma City, OK 73101**

Prepared by:

**GBM<sup>c</sup> & Associates  
219 Brown Lane  
Bryant, AR 72022**

**April 14, 1999**

# CONTENTS

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<b>1.0</b>	<b>Background .....</b>	<b>1</b>
1.1	Objectives.....	1
<b>2.0</b>	<b>Previous Activities .....</b>	<b>1</b>
2.1	Early Work.....	1
2.2	Identification of Wastewater and Storm Water Streams.....	2
2.3	Development of an Overall Action Plan .....	2
<b>3.0</b>	<b>Current Efforts .....</b>	<b>3</b>
3.1	Development of a Preliminary Design for WM/SS.....	3
3.2	Current Status .....	3
3.2.1	Detail Design .....	4
3.2.2	Northside Outfall Consolidation .....	4
3.2.3	Reverse Osmosis Unit .....	4
3.2.4	Third Street Neutralization .....	4
3.2.5	Outfall Sampling Results .....	4
3.3	Planned Work for Next Quarter .....	4

# ATTACHMENTS

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Attachment 1	Wastewater Minimization Project Schedule
Attachment 2	Outfalls 001and 004 Quarterly Monitoring Sample Results
	Outfall 005 Sample Results

# **1.0 Background**

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## **1.1 Objectives**

The objective of this document is to provide the Arkansas Department of Environmental Quality (ADEQ) a quarterly report on the progress of the projects associated with Consent Administrative Order (CAO) LIS 98-119, Paragraph 2, dated August 14, 1998. This document is the third quarterly report and is for the period from January 1, 1999 through March 31, 1999.

GBM<sup>c</sup> & Associates (GBM<sup>c</sup>) has prepared this quarterly report on behalf of El Dorado Chemical Company (EDCC). GBM<sup>c</sup> is currently providing consulting engineering services associated with the upgrade and improvements for the wastewater collection and treatment systems at the El Dorado plant.

The engineering improvements were initiated by EDCC in anticipation of the new NPDES permit limits. The existing NPDES permit is currently due for renewal and this work will be used to help establish new permit limits.

Various tasks, which will provide the groundwork for the development and implementation of subsequent activities, have already been performed. With the concurrence of ADEQ, a Wastewater Minimization/Stream Segregation (WM/SS) program has been developed and is being implemented at the present time.

This progress report presents brief outlines of the above efforts performed to date and describes the status of the activities currently in progress. A Gantt chart, which presents the overall schedule of activities projected through August of 1999, is also attached.

# **2.0 Previous Activities**

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## **2.1 Early Work**

Initial studies on EDCC's wastewater collection and treatment system were performed by URS Greiner Woodward Clyde (URSGWC) in the spring of 1997. This work indicated that the plant collection system needed improvements with regard to re-routing uncontaminated storm water away from the treatment system and segregating process and contact storm water and routing these flows to treatment. In the existing system, process wastewater, cooling tower blowdown, demineralizer backwash, contact storm water (i.e., rainwater falling within the process areas), and a significant portion of the non-contact storm water (rainwater falling outside of the process areas) are all combined and routed to the treatment system. By segregating these streams according to their characteristics, a more effective and efficient treatment system can be designed.

Cost estimates developed on the basis of this early evaluation work indicated that a new treatment system sized to handle the volumes of wastewater involved would be prohibitively expensive. It was concluded that a necessary initial step would be the development and implementation of a plant-wide stream segregation program to route each wastewater stream to its proper destination, according to its characteristics and composition, coupled with a wastewater minimization program to reduce the volume and contaminant loading of the process wastewaters generated.

The main purpose of such a Wastewater Minimization/Stream Segregation (WM/SS) Program would be to reduce flows and loadings of the wastewater which would need to be processed through the future treatment facility. With these reductions, the design flow for the new facility should be significantly less than existing flows and therefore should result in a smaller and more efficient wastewater treatment system.

Per the schedule established by the CAO, the WM/SS program must be completed with sufficient time remaining to perform a wastewater flow and loading characterization study by August 1, 1999. The new flows and loadings will be incorporated into the NPDES permit renewal application, which is also due to the ADEQ by August 1, 1999. The new flows and loadings will also become a part of the Basis of Design (BOD) document for the new treatment facility.

## **2.2 Identification of Wastewater and Storm Water Streams**

Following the initial studies by URSGWC, implementation of the preliminary phases of the WM/SS program commenced in late spring of 1997. EDCC appointed Mr. Kyle Wimsett, a member of the plant's operations staff, to work full time in coordination with the plant's Environmental Department, on the first phase of the WM/SS program. This phase consisted of a plant-wide, area-by-area characterization of the existing wastewater collection system, including the identification of each of the wastewater streams in the plant and the identification of each stream's point of origin and the specific route to the treatment system.

Dye studies were conducted in each operating area of the plant to develop the information on routing and to delineate the existing system. This phase of the WM/SS program continued through the spring and early summer of 1998. The information developed through these early efforts provided the foundation for defining the next phases of the WM/SS program.

## **2.3 Development of an Overall Action Plan**

The early work performed by plant personnel allowed the formulation and development of a conceptual plan for the remainder of the WM/SS project. This plan is presented in graphical form, Gantt chart in Attachment 1, and shows an overall project schedule and the duration of each specific task.

The duration shown on the second column of the Gantt chart is given in working days (as opposed to calendar days), with the completion of the construction phase scheduled for July 1999. This will not allow sufficient time remaining to perform complete wastewater flow and loading characterization study by August 1, 1999.

Nevertheless, the new wastewater flows and loadings will be incorporated into the NPDES permit renewal application to be submitted by August 1, 1999. The new flows and loadings will also become a part of the Basis of Design (BOD) document for the new treatment facility.

Implementation of the WM/SS program action plan was initiated in June of 1998 and it continues at present, as the attached Gantt chart indicates.

## 3.0 Current Efforts

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### 3.1 Development of a Preliminary Design for WM/SS

The preparation of a preliminary design required several tasks, as follows:

1. **Topographic Survey.** As a necessary initial step for the definition of the overall approach to develop a WM/SS design package, the services of a surveying contractor were obtained to perform a plant-wide topographic survey in sufficient detail to provide the information that will be necessary later in the detail and layout of the containment and curbed areas, rerouting of existing drain lines or the installation of new ones, and the location and design of collection basins and sumps, pump stations and other such installations. The survey work was initiated in early July and was completed in mid-August, 1998.
2. **Existing Drawing File Search.** At the same time that the topographic survey was in progress, an effort was made to locate all of the existing drawings, documents and records which might be useful during the detail design phase of the project.
3. **Basis of Design (BOD).** A conceptual Basis of Design (BOD) for the WM/SS project has been developed to establish the scope of the project, outline the overall project approach and list the specific modifications and improvements to be developed and implemented as part of this effort.
4. **Preliminary Design.** On the basis of the BOD document, a preliminary design was developed. The preliminary design was the basis for the WM/SS projects, listed below as Phase I through Phase V.

### 3.2 Current Status

This section details work accomplished since the January 14, 1999 report. The preliminary design is complete and some phases of the detail design are in progress. The detail design was divided into five phases according to location in the plant. The purpose of developing five design packages was to expedite construction activities for the WM/SS project (i.e., for design activities for one phase to be on-going during construction for another phases). The five detail design phases are as follows:

- Phase I: Northside Outfall Consolidation
- Phase II: Sulfuric Acid and High Density Ammonium Nitrate (AN) Prill Bulk Storage Building Area
- Phase III: Nitric Acid Area
- Phase IV: AN Prilling Areas
- Phase V: Liquid AN Tank Storage and Ammonia Storage Area

The WM/SS project schedule is included as Attachment 1.

### **3.2.1 Detail Design**

Design work is continuing on the WM/SS improvements. The final engineering design for modifications in the Sulfuric Acid and High Density Ammonium Nitrate (AN) Prill Bulk Storage Building Area (Phase II) is mostly complete and is scheduled for submittal to EDCC during the second quarter of 1999. Engineering design of the remaining WM/SS improvement phases should also be submitted for EDCC review during the second quarter of 1999.

### **3.2.2 Northside Outfall Consolidation**

Construction was initiated during the first quarter of 1999 and scheduled for completion during April 1999, weather permitting. Due to soil conditions encountered during construction, storm water runoff from the north side of the plant will not be consolidated into a single outfall, but will be segregated into two outfalls. Consolidation of the storm water into two outfalls instead of one should not have any material impact on the future management of non-contact runoff from the facility.

### **3.2.3 Reverse Osmosis Unit**

A reverse osmosis water treatment system at the Boiler House has been installed and operational since early January 1999. The unit has significantly reduced the sulfate loading to the facility's wastewater treatment system.

### **3.2.4 Third Street Neutralization**

The Third Street Sewer pH Neutralization system is scheduled to be complete in mid-April 1999, assuming no further weather delays.

### **3.2.5 Outfall Sampling Results**

Quarterly monitoring sampling results for Outfalls 001 and 004 are included in Attachment 2. Also included is one of three required analyses of Outfall 005.

## **3.3 Planned Work for Next Quarter**

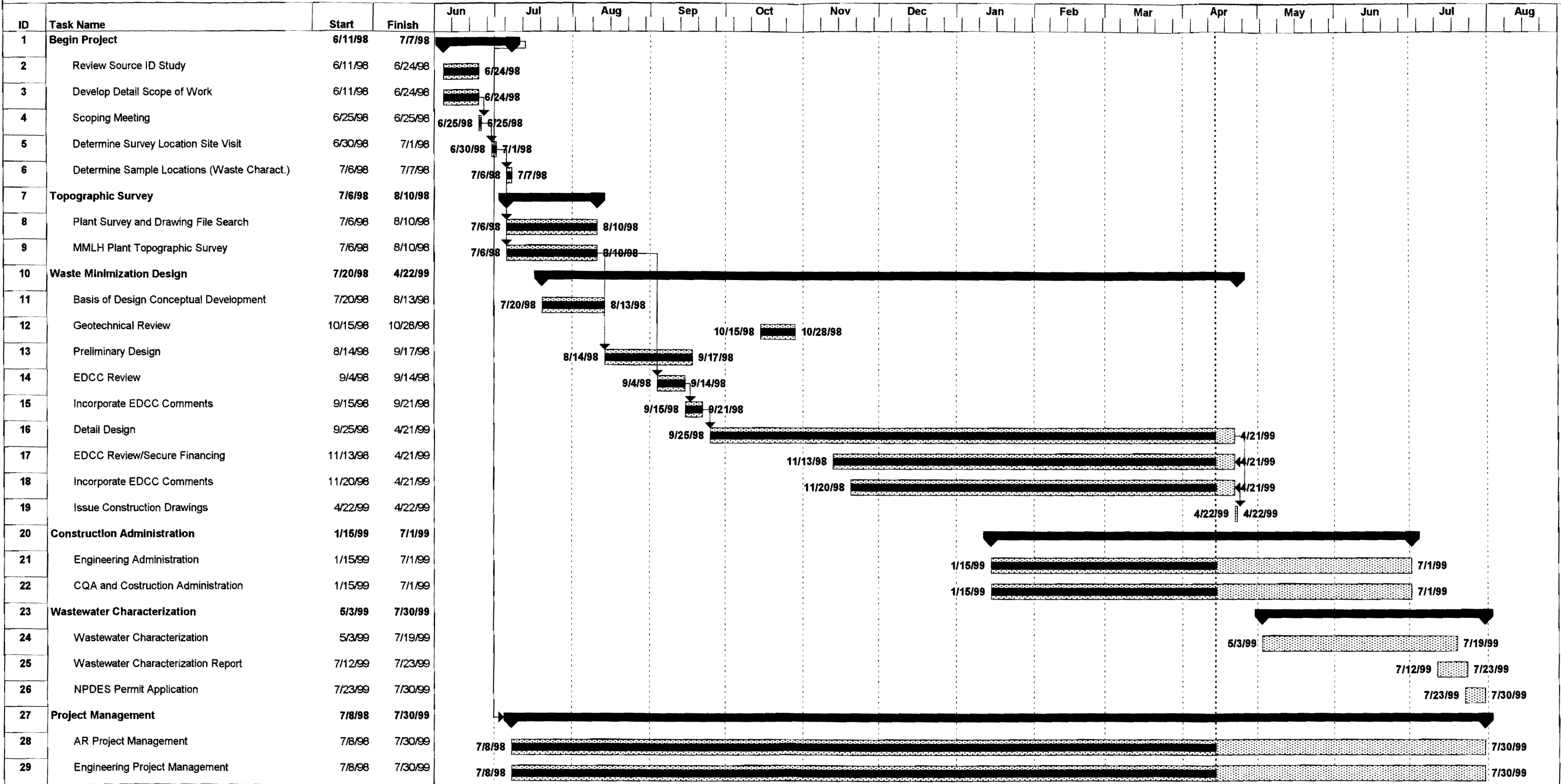
The following tasks are planned for the next quarter (April 1 through June 30, 1999):

1. Complete construction for the Northside Outfall Consolidation.
2. Complete detail design and receive contractor bids for the sulfuric acid area and high-density ammonium nitrate prill bulk storage building WM/SS improvements.
3. Complete design work for the nitric acid, AN prilling area, and liquid AN tank storage/ammonia storage area, WM/SS improvements.
4. Complete construction of the Third Street neutralization system.
5. Continue sampling per Attachment A of the CAO.

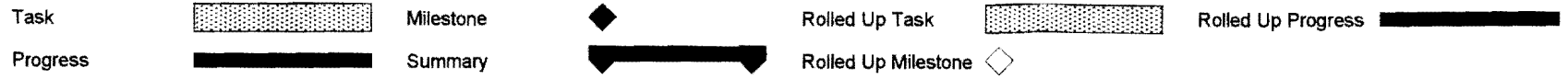
## **Attachment 1**

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# **Wastewater Minimization Project Schedule**



Project: WM/SS  
Date: 4/13/99





## **Attachment 2**

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### **Outfall 001 and 004 Quarterly Monitoring Sample Results Outfall 005 Sample Results**

414 West California Ave  
Ruston, LA 71270



318-255-0060  
318-251-5614 FAX  
800-256-4362

Quality People Working For A Quality Environment

03/18/99

El Dorado Chemical Company  
Wes Morgan  
P.O. Box 231  
El Dorado, AR 71730  
501-863-1484 Fax(501)863-1405

SAMPLE--(G)rab/(C)omp: C  
DATE RECEIVED: 03/10/99  
COLLECTED BY: CLIENT

PRESERVED?: Y  
TIME RECEIVED: 13:30  
BROUGHT IN BY: C

SAMPLE ID	SOURCE	PARAMETER	SAMPLE CONC.	UNITS	MDL	-BEGIN-			METHOD	COLLECTION	
						DATE	TIME	ANL		DATE	TIME
EL62946	001	Cadmium	<0.004	mg/l	0.004	03/16/99	10:00	SL	EPA 200.7	03/10/99	08:25
		Copper	0.018	mg/l	0.002	03/16/99	10:00	SL	EPA 200.7		
		Lead	<0.025	mg/l	0.025	03/16/99	10:00	SL	EPA 200.7		
		Nickel	0.03	mg/l	0.01	03/16/99	10:00	SL	EPA 200.7		
		Selenium	<0.05	mg/l	0.05	03/16/99	10:00	SL	EPA 200.7		
		Silver	<0.003	mg/l	0.003	03/16/99	10:00	SL	EPA 200.7		
		Zinc	0.102	mg/l	0.004	03/16/99	10:00	SL	EPA 200.7		
		Hex Chromium Extraction	Completed	mg/l	0.003	03/10/99	14:00	DW	EPA 218.4		
		Hexavalent Chromium	<0.003	mg/l	0.003	03/11/99	07:45	SL	EPA 218.4		
		Mercury	<0.0002	mg/l	0.0002	03/16/99	11:00	SL	EPA 245.1		
		Total Suspended Solids	30.0	mg/l	1.0	03/11/99	09:15	GL	EPA 160.2		
		Sulfate	106	mg/l	2	03/16/99	16:00	MH	EPA 375.4		
		Cyanide, Total	<0.005	mg/l	0.005	03/12/99	09:30	GC	EPA 335.2		
		Nitrate-N	149.4	mg/l	0.1	03/12/99	09:00	GC	EPA 352.1		
		Ammonia-N Titration	60.4	mg/l	0.3	03/15/99	08:30	EJ	EPA 350.2		
		Chloride	41.9	mg/l	1.0	03/11/99	11:00	GC	EPA 325.3		

*William C. McLean*  
CERTIFIED BY VICE PRESIDENT QA/QC  
*LAR M. McLean*

Analyses conducted in accordance with the list of Approved Test Procedures, published in 40 CFR—Parts 60, 136, and 261. Test procedures are from the 20th edition of Standard Methods for the Examination of Water and Wastewater, Methods for Chemical Analysis of Water and Wastes, 1979 (EPA) ASTM (Annual Book of Standards, Part 31, Water, 1985), or Test Methods for Evaluating Solid Waste (SW-846).

The duplicate analyses and/or spiked samples indicate all methodologies are in control.  
Retain records for three years.

\* Indicates out of compliance limits established by client and/or regulatory agencies. See permit for regulatory reporting requirements.

414 West California Ave  
Ruston, LA 71270



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318-251-5614 FAX  
800-256-4362

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03/18/99

El Dorado Chemical Company  
Wes Morgan  
P.O. Box 231  
El Dorado, AR 71730  
501-863-1484 Fax(501)863-1405

AMPLE--(G)rab/(C)omp: G  
DATE RECEIVED: 03/09/99  
COLLECTED BY: CLIENT

PRESERVED?: Y  
TIME RECEIVED: 11:35  
BROUGHT IN BY: E

SAMPLE ID	SOURCE	PARAMETER	SAMPLE CONC.	UNITS	MDL	--BEGIN--			METHOD	COLLECTION DATE TIME
						DATE	TIME	ANL		
82856	004	Cadmium	<0.004	mg/l	0.004	03/10/99	09:30	SL	EPA 200.7	03/08/99 17:15
		Copper	0.004	mg/l	0.002	03/10/99	09:30	SL	EPA 200.7	
		Lead	<0.025	mg/l	0.025	03/10/99	09:30	SL	EPA 200.7	
		Nickel	0.02	mg/l	0.01	03/10/99	09:30	SL	EPA 200.7	
		Selenium	<0.05	mg/l	0.05	03/10/99	09:30	SL	EPA 200.7	
		Silver	<0.003	mg/l	0.003	03/10/99	09:30	SL	EPA 200.7	
		Zinc	0.134	mg/l	0.004	03/10/99	09:30	SL	EPA 200.7	
		Hexavalent Chromium	<0.003	mg/l	0.003	03/10/99	11:00	SL	EPA 218.4	
		Hex Chromium Extraction	Completed	mg/l	0.003	03/09/99	15:00	DW	EPA 218.4	
		Mercury	<0.0002	mg/l	0.0002	03/10/99	08:00	SL	EPA 245.1	
		Total Suspended Solids	45.0	mg/l	1.0	03/10/99	11:00	JM	EPA 160.2	
		Sulfate	26	mg/l	2	03/16/99	16:00	MH	EPA 375.4	
		Cyanide, Total	<0.005	mg/l	0.005	03/12/99	09:30	GC	EPA 335.2	
		Nitrate-N	200.3	mg/l	0.1	03/10/99	08:00	GC	EPA 352.1	
		Ammonia-N Titration	473.2	mg/l	0.3	03/15/99	08:30	EJ	EPA 350.2	
		Oil & Grease	<1.0	mg/l	1.0	03/10/99	12:40	KJ	EPA 1664	
		Chloride	5.7	mg/l	1.0	03/11/99	11:00	GC	EPA 325.3	

*William C. McNeil*  
CERTIFIED BY VICE PRESIDENT QA/QC  
*WJB McNeil*

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The duplicate analyses and/or spiked samples indicate all methodologies are in control. Retain records for three years.

Indicates out of compliance limits established by client and/or regulatory agencies. See permit for regulatory reporting requirements.

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03/19/99

El Dorado Chemical Company  
Wes Morgan  
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501-863-1484 Fax(501)863-1405

SAMPLE--(G)rab/(C)omp: G  
DATE RECEIVED: 03/09/99  
COLLECTED BY: CLIENT

PRESERVED?: Y  
TIME RECEIVED: 11:35  
BROUGHT IN BY: E

SAMPLE ID	SOURCE	PARAMETER	SAMPLE CONC.	UNITS	MDL	--BEGIN--			METHOD	COLLECTION	
						DATE	TIME	ANL		DATE	TIME
EL62857	005	Cadmium	<0.004	mg/l	0.004	03/11/99	09:30	SL	EPA 200.7	03/08/99	17:30
		Copper	0.041	mg/l	0.002	03/11/99	09:30	SL	EPA 200.7		
		Lead	<0.025	mg/l	0.025	03/11/99	09:30	SL	EPA 200.7		
		Nickel	0.02	mg/l	0.01	03/11/99	09:30	SL	EPA 200.7		
		Selenium	<0.05	mg/l	0.05	03/11/99	09:30	SL	EPA 200.7		
		Silver	<0.003	mg/l	0.003	03/11/99	09:30	SL	EPA 200.7		
		Zinc	0.395	mg/l	0.004	03/11/99	09:30	SL	EPA 200.7		
		Hexavalent Chromium	<0.003	mg/l	0.003	03/10/99	11:00	SL	EPA 218.4		
		Hex Chromium Extraction	Completed	mg/l	0.003	03/09/99	15:41	DK	EPA 218.4		
		Mercury	<0.0002	mg/l	0.0002	03/10/99	08:00	SL	EPA 245.1		
		Total Suspended Solids	101.0	mg/l	1.0	03/10/99	11:00	JM	EPA 160.2		
		COD	47.3	mg/l	3.7	03/10/99	08:15	JM	EPA 410.4		
		BOD5	16.0	mg/l	1.0	03/10/99	07:00	GL	EPA 405.1		
		BOD Standard	178.0	mg/l	1.0	03/10/99	07:00	GL	EPA 405.1		
		Sulfate	30	mg/l	2	03/18/99	16:00	MH	EPA 375.4		
		Cyanide, Total	<0.005	mg/l	0.005	03/12/99	09:30	GC	EPA 335.2		
		Phosphorus, Total	0.4	mg/l	0.1	03/15/99	10:00	GC	EPA 365.3		
		Nitrate-N	12.0	mg/l	0.1	03/10/99	08:00	GC	EPA 352.1		
		Ammonia-N Titration	12.8	mg/l	0.3	03/15/99	08:30	EJ	EPA 350.2		
		Oil & Grease	1.6	mg/l	1.0	03/10/99	12:40	KJ	EPA 1664		
		Chloride	6.2	mg/l	1.0	03/11/99	11:00	GC	EPA 325.3		
		TKN	14.8	mg/l	0.3	03/17/99	08:30	EJ	EPA 351.3		

*William C. McArthur*  
CERTIFIED BY VICE PRESIDENT QA/QC  
LAB MANAGER

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March 12, 1999

Mr. Wes Morgan  
El Dorado Chemical Co.  
4500 North West Ave.  
P.O. Box 231  
El Dorado, AR 71731


Dear Mr. Morgan,

Enclosed are the results of the four 24-hr screening toxicity tests which were conducted last week for El Dorado Chemical Co., using stormwater effluent samples collected from Outfall 004 and Outfall 005. The test species used in these 24-hour acute toxicity tests were the fathead minnow (Pimephales promelas) and the cladoceran, Daphnia pulex.

We are pleased to report that both effluent samples were found to show no acute toxicity to either test species. The test species experienced 100% survival in each effluent during the 24-hour testing period.

If you have any questions concerning these biomonitoring tests, please do not hesitate to call us at 1-800-256-4362. Thank you for choosing EarthNet Laboratories for your biomonitoring needs.

Sincerely,

  
John M. Wakeman, Ph.D.  
Biomonitoring Supervisor

THE RESULTS OF FOUR 24-HOUR  
ACUTE SCREENING TOXICITY TESTS

Conducted for

EL DORADO CHEMICAL CO.

(Stormwater from Outfalls 004 and 005)

March 12, 1999

PREPARED BY:

John M. Wakeman, Ph.D.  
Supervisor of Biomonitoring  
EarthNet Laboratories, Inc.  
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Ruston, Louisiana 71270

TABLE OF CONTENTS

	Page
1.0 Introduction.....	2
2.0 Methods and Materials.....	2
2.1 Test Methods.....	2
2.2 Test Organisms.....	2
2.3 Dilution Water.....	2
2.4 Test Concentrations.....	2
2.5 Sample Collection.....	2
2.6 Sample Preparation.....	3
2.7 Monitoring of Bioassays.....	3
2.8 Data Analysis.....	3
3.0 Results and Discussion.....	3
4.0 Conclusions.....	4
5.0 References.....	4
Table 1 - Summary of 24-hour Acute Definitive Toxicity Test Data.....	3
Appendices	
A - Raw Data	
B - Chain of Custody	

## 1.0 Introduction

EarthNet Laboratories, Ruston, Louisiana, conducted four 24-hour acute screening toxicity tests for El Dorado Chemical Co. The effluent samples tested were collected from Outfalls 004 and 005. With each effluent sample, the test organisms were the fathead minnow, Pimephales promelas, and the cladoceran, Daphnia pulex.

## 2.0 Methods and Materials

### 2.1 Test Methods

All test procedures and methods followed were according to "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA 600/4-90/027F).

### 2.2 Test Organisms

The fathead minnows were obtained from Aquatox Inc. and were one day old at test initiation. The minnows were fed with live brine shrimp prior to test initiation, but not during testing.

The cladocerans were obtained from ENL cultures and were less than 24 hours old at test initiation. The cladocerans were fed 0.2 ml/100 ml of standard YCT/algae diet prior to test initiation.

### 2.3 Dilution Water

Dilution water used in the 24-hour acute definitive toxicity tests was moderately hard laboratory water.

### 2.4 Test Concentrations

For each test species, the test concentrations were 100 percent of the stormwater effluent, and a laboratory water control. In each concentration, the test species were tested in two replicates of 10 organisms each for a total of 20 organisms per concentration.

### 2.5 Sample Collection

Effluent grab samples were collected from outfalls 004 and 005 on March 9, 1999 by El Dorado Chemical Co. personnel. The samples were immediately iced to 4° C, and delivered to ENL's Ruston Laboratory (see Appendix B - Chain of Custody).



## 2.6 Sample Preparation

Upon receipt, the samples were logged in, labelled with appropriate identification numbers, and warmed to 20° C. Initial dissolved oxygen, pH, and conductivity measurements were recorded for each effluent sample.

## 2.7 Monitoring of Toxicity Tests

Monitoring of the 24-hour acute definitive toxicity tests consisted of pre and post dissolved oxygen measurements, pH, and conductivity measurements. Survival was also recorded at the end of the 24-hour exposure period. A temperature of 20±1°C was kept constant with a Remcor liquid circulator and monitored diurnally.

## 2.8 Data Analysis

A T-test was used to compare survival in the prepared effluent with survival in the controls.

### 3.0 Results and Discussion

The Outfall 004 data is summarized in Table 1. Both species (fathead minnows and cladocerans) experienced 100% survival in the 100% effluent sample, as well as in the controls. Thus the stormwater effluent sample collected from Outfall 004 was found to show no acute toxicity to either test species. The raw data sheets can be found in Appendix A.

\*\*\*\*\*  
Table 1. Summary of 24-hour Acute Screening Toxicity Test Data for effluent collected from Outfall 004.

<u>Percent Effluent</u>	<u>Percent Survival</u>	
	<u>Pimephales promelas</u>	<u>Daphnia pulex</u>
Control	100	100
100 percent	100	100

\* survival significantly different from control (p = 0.05)

\*\*\*\*\*

The Outfall 005 data is summarized in Table 2. Both species experienced 100% survival in the controls and in the 100% effluent sample. Thus the stormwater effluent sample collected from Outfall 005 was found to show no acute toxicity to either test species. The raw data sheets can be found in Appendix A.

\*\*\*\*\*  
 Table 2. Summary of 24-hour Acute Screening Toxicity Test Data  
 for effluent collected from Outfall 005.

<u>Percent Effluent</u>	<u>Percent Survival</u>	
	<u>Pimephales promelas</u>	<u>Daphnia pulex</u>
Control	100	100
100 percent	100	100

\* survival significantly different from control (p = 0.05)

\*\*\*\*\*

#### 4.0 Conclusions

The effluent samples collected from Outfall 004 and Outfall 005 were found to show no acute 24-hour toxicity to cladocerans, Daphnia pulex, or to the fathead minnows (Pimephales promelas).

#### 5.0 References

U.S. EPA. 1993. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. 4th Edition, Cincinnati, Ohio EPA/600/4-90/027F. August 1993.

APPENDIX A  
RAW DATA SHEETS

EARTHNET LABORATORIES, INC.

ACUTE TEST SURVIVAL AND WATER QUALITY DATA

EHL # 62854, 62855 Test Initiation: Date 3/9 Time 1400 Test Termination: Date 3/10 Time 1400  
 Client FLDovado Chemical Technician CS  
 Project # 62854, 62855 Test Species/I.D. # D. pulex 1 332 1  
 Sample Description 004, 005 D. pulex 1 631 1

Sample Information									Test Species Information	ID#	ID#	ID#	ID#
Sample ID Number	Collected		Total Residual Chlorine (mg/L)	De-chlorinated (Yes or No)	Sodium Thiosulfate (mg/L)	Salinity (ppt)	Hardness mg/L as CaCO <sub>3</sub>	Alkalinity mg/L as CaCO <sub>3</sub>					
62854	3/8	5:30	None	-	-	-	276	4	Age or Size	226hr	224hr		
62855	3/8	5:15	None	-	-	-	268	6	Loading Rate (gm/L)	0.04%	0.04%		
									Test Container Size	250	250		
									Test Volume (L)	0.2	0.2		
									Feeding: Type	YGT	Brown		
									Amount	7ml	1 drop		
									Aeration: Began	prior to test			
									Amount	Feed			
									Dilution Water 10#	710	710		
									Acclimation Period	2hr	2hr		
									Condition of Survivors	good	good		
Dilution Water									ID #				
									pH	7.7			
									Hardness mg/L as CaCO <sub>3</sub>	96			
									Alkalinity mg/L as CaCO <sub>3</sub>	48			
Comments													











**APPENDIX B**  
**CHAIN OF CUSTODY**

414 West California  
 (318) 255-0060  
 Ruston, LA 71270  
 (800) 256-4362



P.O. # 270 UIC

CHAIN OF CUSTODY

Rush

Standard

Client					Delivered By:				
Name: <i>E/Parado Chemical</i>					Client EarthNet <input checked="" type="checkbox"/> Delivery Service Bus				
Address: <i>4500 N.W. Ave P.O. Box 231</i>					Refrigerate to 4°C				
City, State, Zip: <i>E/Parado AR 71730</i>					Project Name/Location				
Phone Number: <i>870 863-1484</i>			Fax Number: <i>870 863-1499</i>						
Sample Collection									
Sample No.	Date	Time	Comp/Grab	Source	Analysis Required	Cont	Pres	Matrix	Special Instructions
<i>62854</i>	<i>3/5/99</i>	<i>5:30pm</i>	<i>Grab</i>	<i>005</i>	<i>NH<sub>3</sub>-N</i>	<i>16</i>	<i>H<sub>2</sub>SO<sub>4</sub></i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>Oil &amp; Grease</i>	<i>16</i>	<i>HCL</i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>Acute Biomonty</i>	<i>41</i>	<i>4°C</i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>Metals</i>	<i>18</i>	<i>HNO<sub>3</sub></i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>COD</i>	<i>18</i>	<i>H<sub>2</sub>SO<sub>4</sub></i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>TKN</i>	<i>18</i>	<i>H<sub>2</sub>SO<sub>4</sub></i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>BOD</i>	<i>18</i>	<i>4°C</i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>TSS, NO<sub>3</sub>-N, SO<sub>4</sub></i>	<i>18</i>	<i>4°C</i>	<i>W</i>	
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>Chromium Hex, Chlorides, Phos</i>				
	<i>"</i>	<i>"</i>	<i>"</i>	<i>"</i>	<i>Cyanide</i>	<i>16</i>	<i>4°C</i>	<i>W</i>	
All samples will be collected and preserved according to USEPA and/or EarthNet Laboratories, Inc. established protocols.									
Additional Remarks: <i>* Cadmium Total Copper Total Lead Total Mercury Total Nickel Total</i>									
<i>Selenium Total Silver Total Zinc Total <del>Chloride</del></i>									
<i>* Acute Biomonty 24 hr Daphnia pulex 24 hr Fathead minnow</i>									
Sampled by: <i>W. W. [Signature]</i>			Relinquished by: <i>W. W. [Signature]</i>		Date: <i>3/5/99</i>	Time: <i>1:10</i>	Received by: <i>Miles [Signature]</i>		
Relinquished by: <i>Miles [Signature]</i>			Date: <i>3-9-99</i>		Time: <i>11:35</i>	Received by:			Date: Time:
Relinquished by:			Date:		Time:	Received by:			Date: Time:
Relinquished by:			Date:		Time:	Received by:			Date: Time:

(318) 255-0060  
 Ruston, LA 71270  
 (800) 256-4362



P.O. # 113072

CHAIN OF CUSTODY

Rush  Standard

Client		Delivered By:			
Name: <u>El Dorado Chemical</u>	Attn: <u>Les Morgan</u>	Client <input type="checkbox"/>	EarthNet <input checked="" type="checkbox"/>	Delivery Service <input type="checkbox"/>	Bus <input type="checkbox"/>
Address: <u>4500 N.W. AVE P.O. Box 231</u>					
City, State, Zip: <u>El Dorado AR 71730</u>					
Phone Number: <u>870 863-1494</u>		Fax Number: <u>870 863-1499</u>			
Project Name/Location					

Sample Collection					ALL SAMPLES TO BE COOLED TO 4°C				
Sample No.	Date	Time	Comp/Grab	Source	Analysis Required	Container(s)	Preservative	Matrix	Special Instructions
62855	2/8/99	5:50pm	Grab	004	NH <sub>3</sub> -N	1 G	H <sub>2</sub> SO <sub>4</sub>	W	
	3/8/99	11	11	11	Oil & Grease	1 G	HCL	W	
	3/8/99	11	11	11	TSS, NO <sub>3</sub> -N, Chromium Hex, SO <sub>4</sub> Chlorides	1 P	4°C	W	
	3/8/99	5:50pm	Grab	004	Metals*	1 P	HNO <sub>3</sub>	W	
	3/8/99	5:50pm	Grab	004	*Acute Biomonitoring	3 P	4°C	W	
	11	11	11	11	Cyanide	1 G	4°C	W	

All samples will be collected and preserved according to USEPA and/or EarthNet Laboratories, Inc. established protocols.

Additional Remarks: \* Cadmium, Total Copper, Total Lead, Total Mercury, Total Nickel, Total Selenium, Total Silver, Total Zinc, Total ~~Cyanide~~ ~~Chloride~~  
 \* Acute Biomonitoring 24 hr Daphnaphere 24 hr Fathead minnow

Sampled by: <u>W. Morgan</u>	Relinquished by: <u>W. Morgan</u>	Date: <u>3/9/99</u>	Time: <u>10:00</u>	Received by: <u>Mike Sizb</u>	Date: <u>3-9-99</u>	Time: <u>10:00</u>
	Relinquished by: <u>Mike Sizb</u>	Date: <u>3-9-99</u>	Time: <u>11:35</u>	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received by:	Date:	Time:
	Relinquished by:	Date:	Time:	Received for Laboratory by: <u>Ronnie O...</u>	Date: <u>3-9-99</u>	Time: <u>11:35</u>

APPENDIX C  
AGENCY FORMS

414 West California Ave.  
Ruston, LA 71270  
318-255-0060  
800-256-4362  
Fax: 318-251-5614

5570 I-55 South  
Suites B&C  
Jackson, MS 39212  
601-373-3014  
800-256-4362  
Fax: 601-373-0523



2920 Truly Lane  
Shreveport, LA 71118  
318-687-9919  
800-256-4362  
Fax: 318-687-3491

720 N. Burnside Ave.  
Gonzales, LA 70737  
504-647-6955  
800-256-4362  
Fax: 504-647-7621

March 22, 1999

Mr. Wes Morgan  
El Dorado Chemical Co.  
4500 North West Ave.  
P.O. Box 231  
El Dorado, AR 71731


Dear Mr. Morgan,

Enclosed are the results of the two 7-day chronic biomonitoring tests which were conducted last week for El Dorado Chemical Co., using effluent samples collected from Outfall 001. The test species used in these chronic toxicity tests were the fathead minnow (Pimephales promelas) and the cladoceran, Ceriodaphnia dubia.

We regret to report that the effluent samples were found to show acute 7-day toxicity to both test species. The fathead minnows experienced 100% mortality in the 100% effluent concentration and 40% mortality in the 50% dilution. Significant sublethal effects were also observed in terms of reduced minnow growth in the 50% dilution. The cladocerans experienced significant mortality only in the 100% effluent, while sublethal effects in terms of reduced cladoceran reproduction were also observed in the 50% dilution.

If you have any questions concerning these biomonitoring tests, please do not hesitate to call us at 1-800-256-4362. Thank you for choosing EarthNet Laboratories for your biomonitoring needs.

Sincerely,

  
John M. Wakeman, Ph.D.  
Biomonitoring Supervisor

The Results of Two  
7-day Chronic Definitive  
Toxicity Tests  
for El Dorado Chemical Company  
(NPDES Permit #AR0000752)

March 22, 1999

Prepared by:

John M. Wakeman, Ph.D.  
Biomonitoring Supervisor  
EarthNet Laboratories  
414 West California  
Ruston, Louisiana 71270

TABLE OF CONTENTS

	Page
1.0 Introduction.....	1
2.0 Methods and Materials.....	1
2.1 Test Methods.....	1
2.2 Test Organisms.....	1
2.3 Dilution Water.....	1
2.4 Test Concentrations.....	1
2.5 Sample Collection.....	2
2.6 Sample Preparation.....	2
2.7 Monitoring of Chronic Tests.....	2
2.8 Data Analysis.....	2
3.0 Results and Discussion.....	2
4.0 Conclusions.....	4
5.0 References.....	4

Table 1 - Summary of Ceriodaphnia dubia 7-day  
Chronic Survival and Reproduction Data. 3

Table 2 - Summary of Fathead Minnow 7-day  
Chronic Survival and Growth Data..... 3

Table 3 - NaCl 48-Hour Reference Toxicant Test  
Results..... 4

Appendices

- A - Raw Data
- B - Chain of Custody
- C - Data Analysis
- D - Summary of Monthly Reference Toxicity Test Data
- E - Agency Data Forms

## 1.0 Introduction

EarthNet Laboratories (ENL), Ruston, Louisiana, conducted two 7-day chronic definitive tests for El Dorado Chemical Company (EDCC), El Dorado, Arkansas, to fulfill the quarterly NPDES permit requirements. The test organisms used were the cladoceran, Ceriodaphnia dubia, and the fathead minnow, Pimephales promelas.

## 2.0 Methods and Materials

### 2.1 Test Methods

All test procedures and methods followed were according to "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA600/89).

### 2.2 Test Organisms

The cladocerans (Ceriodaphnia dubia) were obtained from ENL cultures and were less than 24 hours old at test initiation. The neonates were collected from the same 8-hour time period.

The fathead minnows (Pimephales promelas) were obtained from Aquatox Inc, and were less than 24 hours old at test initiation.

### 2.3 Dilution Water

Due to receiving water toxicity documented in previous testing, the dilution water used for the Ceriodaphnia dubia and fathead minnow 7-day chronic test was moderately hard reconstituted water (EPA600/89).

### 2.4 Test Concentrations

The test concentrations used were 100, 50, 25, 12.5 and 6.25 percent effluent from outfall 001, and a laboratory control.

The fathead minnow 7-day chronic test contained 4 replicates of 10 organisms for a total of 40 organisms per concentration. The Ceriodaphnia dubia 7-day chronic test contained 10 replicates of one organism for a total of 10 organisms per concentration. Forty-eight hour reference toxicant tests using sodium chloride (NaCl) were conducted concurrently with the 7-day chronic tests in order to document organism sensitivity.



## 2.5 Sample Collection

Three consecutive 24-hour composite samples were collected by EDCC's personnel on March 8, 10, and 12, 1999. Upon completion of each composite, the samples were iced to 4°C and immediately shipped to ENL's laboratory in Ruston, Louisiana (See Appendix B - Chain-of-Custody).

## 2.6 Sample Preparation

Upon receipt, the samples were logged, labeled with identification numbers and warmed to 25±1°C. Total Residual Chlorine (TRC) levels were measured and recorded, if present. (See Appendix A - Raw Data Sheets). Initial dissolved oxygen, pH, conductivity and temperature measurements were also recorded.

## 2.7 Monitoring of Chronic Tests

Monitoring of the 7-day chronic tests consisted of daily solution renewal, pre and post renewal dissolved oxygen measurements, pH, and conductivity measurements. Organism survival/mortality was also recorded on a daily basis.

A temperature of 25±1°C was kept constant using a Remcor liquid circulator and water bath combination for the fathead minnow 7-day chronic test, and a Model 818 Precision dual programmable incubator for the Ceriodaphnia dubia test. Test temperature was monitored diurnally for the 7-day period.

## 2.8 Data Analysis

Ceriodaphnia dubia survival and reproduction data and fathead minnow survival and growth data were analyzed using the appropriate statistical tests (Fisher's Test, Dunnett's Test or Steel's Many-One Test) from the Toxstat statistical software package. Reference toxicant LC50 values were generated using an USEPA Epistat software package.

## 3.0 Results and Discussion

Ceriodaphnia dubia survival and reproduction data are summarized in Table 1. The Ceriodaphnia dubia experienced significant (P=0.05) mortality in the 100% effluent concentration (critical dilution), but not at effluent concentrations of 50% or lower.

Significant sublethal effects on cladoceran reproduction were observed in effluent concentrations of 50% and greater. *Ceriodaphnia dubia* reproduction averaged 23.2 neonates per female in the control.

\*\*\*\*\*

Table 1. Summary of *Ceriodaphnia dubia* 7-day Chronic Survival and Reproduction Data.

<u>Concentration</u>	<u>Percent Survival</u>	<u>Average Reproduction per female</u>
Control	100	23.2
6 percent	100	24.0
12 percent	100	24.0
25 percent	100	24.2
50 percent	100	14.1 *
100 percent	0 *	13.0 *

\* Significant difference when compared to the control (P=.05)

\*\*\*\*\*

Fathead minnow survival and growth data are summarized in Table 2. The fathead minnows experienced significant (P = 0.05) mortality at effluent concentrations of 50% and higher. The minnows showed 100% survival in the controls and in effluent concentrations of 25% and lower.

Significant (P = 0.05) sublethal effects on fathead minnow growth were also observed at the 50% effluent concentration, but no sublethal effects were observed at effluent concentrations of 25% or lower. Control growth averaged 0.455 mg per minnow, while growth in the 50% effluent dilution was only 0.248 mg per minnow.

\*\*\*\*\*

Table 2. Summary of Fathead Minnow 7-day Chronic Survival and Growth Data

<u>Concentration</u>	<u>Percent Survival</u>	<u>Average Growth (mg)</u>
Control	100	0.455
6 percent	100	0.470
12 percent	100	0.450
25 percent	100	0.470
50 percent	60 *	0.248 *
100 percent	0 *	

\* Significantly different from Control (p = 0.05)

\*\*\*\*\*

The NaCl reference toxicant test results are summarized in Table 3. The reference toxicant tests indicated that the test organisms were within their respective normal sensitivity ranges.

\*\*\*\*\*  
 Table 3. NaCl Reference Toxicant Test Results.

	48-Hour LC50 *(ppt)	95% Confidence Intervals
<u>Pimephales promelas</u>	8.41	6.0 - 10.0
<u>Ceriodaphnia dubia</u>	2.45	2.0 - 3.0

\* Parts Per Thousand (Salinity)  
 \*\*\*\*\*

#### 4.0 Conclusions

The three composite samples collected at EDCC's NPDES discharge site were found to show significant lethal and sub-lethal toxicity to both test species.

Fathead minnows experienced both lethal and sublethal toxicity effects at effluent concentrations of 50% and higher.

Lethal toxicity to the cladocerans, Ceriodaphnia dubia, was observed only at the 100% concentration. However, the effluent showed significant sublethal effects on cladoceran reproduction at the 50% effluent concentration.

#### 5.0 References

U.S. EPA. 1994. Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. 2nd Edition, Cincinnati, Ohio. EPA/600/4-91/002, July 1994.

**APPENDIX A**  
**RAW DATA SHEETS**

EARTHNET LABORATORIES, INC.

CERIODAPHNIA 7 - DAY SURVIVAL AND REPRODUCTION DATA

ENL# 62807, 62945, 63082 Test Beginning 3/9/99 1445  
 Client: El Dorado Chemical Test Ending 3/16/99 Time 1430  
 Source outfall 001 ID # 62807, 62945, 63082  
 Dilution Water: MH ID # \_\_\_\_\_  
 Technician: Day 0 CS 1 JW 2 JW 3 CS 4 CS 5 CS 6 CS 7 CS 8 \_\_\_\_\_  
 Time: Day 0 1445 1 1600 2 1700 3 1730 4 1415 5 1330 6 1600 7 1430 8 \_\_\_\_\_  
 Tempature: Day 0 25c 1 25c 2 25c 3 25c 4 25c 5 25c 6 25c 7 25c 8 \_\_\_\_\_

Percent Concentration	Day	REPLICATES										# of Live Adults	Total Live Neonates
		A	B	C	D	E	F	G	H	I	J		
Con	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	4	5	4	3	4	4	5	4	4	10	41
	5	7	9	8	7	9	10	8	9	7	9	10	88
	6	0	0	0	0	0	0	0	0	0	0	10	0
	7	10	12	11	10	9	10	12	12	10	12	10	108
	8												
6.25	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	3	5	4	3	4	5	4	4	4	10	40
	5	9	10	10	9	8	9	10	10	9	8	10	92
	6	0	0	0	0	0	0	0	0	0	0	10	0
	7	12	12	10	9	11	11	12	12	10	9	10	106
	8												
12.5	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	5	0	4	3	4	3	2	4	5	10	34
	5	9	10	10	9	10	8	9	10	9	9	10	93
	6	0	0	0	0	0	0	0	0	0	0	10	0
	7	12	12	9	12	10	9	11	12	12	10	10	110
	8												
25	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	5	4	4	3	3	4	3	4	5	10	39
	5	10	10	11	10	9	9	8	9	10	10	10	96
	6	0	0	0	0	0	0	0	0	0	0	10	0
	7	9	12	13	12	12	9	9	8	11	12	10	107
	8												
50	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	5	5	4	5	4	3	4	4	5	4	10	43
	5	10	10	9	8	9	10	10	10	11	11	10	98
	6	0	0	0	0	0	0	0	0	0	0	10	0
	7	0	0	0	0	0	0	0	0	0	0	10	0
	8												
100	1	0	0	0	0	0	0	0	0	0	0	10	0
	2	0	0	0	0	0	0	0	0	0	0	10	0
	3	0	0	0	0	0	0	0	0	0	0	10	0
	4	4	3	4	4	5	4	4	4	3	4	10	39
	5	10	10	9	10	8	7	8	9	9	10	10	90
	6	0	0	0	0	0	0	0	0	0	0	10	0
	7	0	0	0	0	0	0	0	0	0	0	10	0
	8	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		

EARTHNET LABORATORIES, INC.

NUMBER OF NEONATES PER BROOD CERIODAPHNIA

Client: El Dorado Chemical Date: 3/16

ENL#: 62807, 62945, 63082

Replicate (Organism)	Effluent Concentration (%)						
	con	6.25	12.5	25	50	100	
A	21	25	25	23	15	14	
B	25	25	25	27	15...	13	
C	24	25	25	28	13	13	
D	21	22	23	26	13	14	
E	21	22	21	24	13	13	
F	24	24	23	27	13	12	
G	24	27	24	21	14	12	
H	26	26	25	20	14	13	
I	21	23	25	25	16	12	
J	25	21	24	27	15	14	
MEAN	23.2	24.0	24.0	24.2	14.1	13.0	



EARTHNET LABORATORIES, INC.

LARVAL MINNOW DATA SHEET

EML # 62807, 62945, 63082 Initiation: Date 3/9/99 Time 1500  
 Client El Dorado Chemical Terminated: Date 3/16/99 Time 1500  
 Sample Description outfall 001 Technician(s): CS  
 Sample ID # 62807, 62945, 63082 Species P. promelas Age 224 ID# \_\_\_\_\_  
 Shipper \_\_\_\_\_ Test Temperature Range 25°C ± 1  
 Sample Type: Grab \_\_\_\_\_ Composite \_\_\_\_\_ Other \_\_\_\_\_ Test Salinity \_\_\_\_\_ Artificial Salts Used \_\_\_\_\_  
 Dilution Water: ID# \_\_\_\_\_ Description \_\_\_\_\_ Aeration \_\_\_\_\_  
 Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Day	Effluent				Dilution Water	
	Total Alkalinity (mg/L as CaCO <sub>3</sub> )	Total Hardness (mg/L as CaCO <sub>3</sub> )	Total Residual Chlorine (mg/L)	De-chlorinated (Yes or No)	Total Alkalinity (mg/L as CaCO <sub>3</sub> )	Total Hardness (mg/L as CaCO <sub>3</sub> )
0	21	140			48	90
1	21	140			48	90
2	19	136			48	90
3	19	136			48	90
4	22	144			48	90
5	22	144			48	90
6	22	144			48	90
7	-					



EARTHNET LABORATORIES, INC.

LARVAL MINNOW 7-DAY SURVIVAL AND WATER QUALITY DATA

ENL# 62807, 62945, 63082

Client El Dorado Chemical Date Initiated 3/9/99 Time 1520

Sample Description crud fall 001 Date Terminated 3/16/99 Time 1500

Technician: Day 0 es 1 JW 2 JW 3 es 4 es 5 es 6 es 7 es

Time: Day 0 1520 1 1600 2 1700 3 1800 4 1300 5 1200 6 1340 7 1500

Temperature: Day 0 26°C 1 25°C 2 25°C 3 25°C 4 25°C 5 25°C 6 25°C 7 25°C

PERCENT EXPOSURE	Day	NUMBER OF LIVE ORGANISMS				DISSOLVED OXYGEN (mg/l)		PH		SPECIFIC CONDUCTANCE (µmhos/cm)
		A	B	C	D	PRE- RENEWAL	POST- RENEWAL			
Con	0	10	10	10	10		8.4		7.0	276
	1	10	10	10	10	8.2	8.5	7.6	7.4	271
	2	10	10	10	10	8.0	8.6	7.5	7.5	281
	3	10	10	10	10	8.0	8.4	7.5	7.5	273
	4	10	10	10	10	7.7	8.5	7.6	7.6	276
	5	10	10	10	10	7.5	8.5	7.5	7.6	268
	6	10	10	10	10	7.6	8.6	7.5	7.4	258
	7	10	10	10	10	7.4		7.4		
6.25	0	10	10	10	10		8.4		7.6	269
	1	10	10	10	10	8.2	8.4	7.5	7.6	298
	2	10	10	10	10	8.0	8.5	7.5	7.5	312
	3	10	10	10	10	8.0	8.6	7.4	7.6	366
	4	10	10	10	10	7.7	8.4	7.5	7.6	387
	5	10	10	10	10	7.5	8.6	7.5	7.5	356
	6	10	10	10	10	7.6	8.6	7.5	7.4	466
	7	10	10	10	10	7.4		7.4		
12.5	0	10	10	10	10		8.3		7.6	318
	1	10	10	10	10	8.2	8.2	7.5	7.6	397
	2	10	10	10	10	8.0	8.5	7.5	7.5	426
	3	10	10	10	10	8.0	8.3	7.4	7.6	516
	4	10	10	10	10	7.7	8.5	7.5	7.7	525
	5	10	10	10	10	7.5	8.5	7.4	7.5	427
	6	10	10	10	10	7.6	8.6	7.5	7.6	519
	7	10	10	10	10	7.4		7.4		
25	0	10	10	10	10		8.3		7.7	569
	1	10	10	10	10	8.2	8.2	7.5	7.7	515
	2	10	10	10	10	8.0	8.3	7.6	7.6	568
	3	10	10	10	10	8.0	8.3	7.5	7.7	592
	4	10	10	10	10	7.7	8.5	7.5	7.7	586
	5	10	10	10	10	7.5	8.5	7.4	7.7	515
	6	10	10	10	10	7.6	8.6	7.5	7.9	663
	7	10	10	10	10	7.3		7.4		
50	0	10	10	10	10		8.3		7.7	1036
	1	10	10	10	10	8.2	8.1	7.5	7.7	1123
	2	10	10	10	10	8.0	8.4	7.5	7.6	1046
	3	10	10	10	10	8.0	8.3	7.6	7.7	1039
	4	10	10	10	10	7.8	8.5	7.6	7.8	1032
	5	10	10	10	10	7.4	8.0	7.4	7.7	1018
	6	10	10	7	9	7.5	8.6	7.5	7.9	1008
	7	5	6	6	7	7.2		7.3		
100	0	10	10	10	10		8.2		7.8	1783
	1	8	9	9	10	7.8	8.1	7.6	7.7	1821
	2	6	7	8	7	7.0	8.2	7.5	7.7	1794
	3	6	5	6	6	6.8	8.3	7.5	7.8	1809
	4	6	5	6	6	7.6	8.5	7.6	7.8	1821
	5	4	5	5	4	7.3		7.4	7.7	1791
	6	0	0	0	0	7.0		7.5		
	7	0	0	0	0	X				

EARTHNET LABORATORIES, INC.

FATHEAD MINNOW GROWTH DATA SHEET

Client: El Dorado Chemical

Date of Test: 3/16

Percent Effluent	Rep.	Pan Tare Wt.	Pan Fish Wt.	Wt. of Fish	# of Fish	Avg. Wt. of each Fish
Con	A	1.3332 <sup>U</sup>	1.3378	0.0046	10	0.46
	B	1.3413 <sup>U</sup>	1.3460	0.0047	10	0.47
	C	1.3409 <sup>U</sup>	1.3454	0.0045	10	0.45
	D	1.3225 <sup>U</sup>	1.3269	0.0044	10	0.44
6.25	A	1.3381 <sup>U</sup>	1.3427	0.0046	10	0.46
	B	1.3234 <sup>U</sup>	1.3279	0.0045	10	0.45
	C	1.3390 <sup>U</sup>	1.3376	0.0046	10	0.46
	D	1.3302 <sup>U</sup>	1.3353	0.0051	10	0.51
12.5	A	1.3263 <sup>U</sup>	1.3310	0.0047	10	0.47
	B	1.3250 <sup>U</sup>	1.3293	0.0043	10	0.43
	C	1.3221 <sup>U</sup>	1.3368	0.0047	10	0.47
	D	1.3289 <sup>U</sup>	1.3331	0.0044	10	0.44
25	A	1.3272 <sup>U</sup>	1.3319	0.0047	10	0.47
	B	1.3314 <sup>U</sup>	1.3362	0.0048	10	0.48
	C	1.3300 <sup>U</sup>	1.3348	0.0048	10	0.48
	D	1.3342 <sup>U</sup>	1.3397	0.0045	10	0.45
50	A	1.3382 <sup>U</sup>	1.3395	0.0013	5	0.26
	B	1.3330 <sup>U</sup>	1.3378	0.0018	6	0.30
	C	1.3510 <sup>U</sup>	1.3522	0.0011	6	0.20
	D	1.3240 <sup>U</sup>	1.3256	0.0016	7	0.23
100	A	1.3374 <sup>U</sup>				
	B	1.3508 <sup>U</sup>				
	C	1.3480 <sup>U</sup>				
	D	1.3291 <sup>U</sup>				
	A					
	B					
	C					
	D					

EARTHNET LABORATORIES, INC.

REFERENCE TOXICANT DATA SHEET

EML # 62807, 62945, 63082 Reference Toxicant BNA Cl Test Begin Date 3/9 Time 1400  
 Client El Dorado Chemical Stock Solution 100 ppm Test End Date 3/11 Time 1400  
 Test Organism C.D Dilution Water MH ID # 710  
 Source ENI Total Hardness as CaCO<sub>3</sub> 96 Total Alkalinity as CaCO<sub>3</sub> 48  
 ID # 633 Age c24 hr Conductivity/Salinity 276  
 Technician 0 hr CS 24 hr CS 48 hr CS 72 hr \_\_\_\_\_ 96 hr \_\_\_\_\_  
 Temperature 0 hr 1400 24 hr 1500 48 hr 1400 72 hr \_\_\_\_\_ 96 hr \_\_\_\_\_

Toxicant Concentration mg/L - g/L	Test Replicate Number	Number Surviving					Dissolved Oxygen (mg/L)					pH					Conductivity (µhos/cm)					
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	
1		10	10	10			8.6	8.4			7.6	7.5				1927	1983					
2		10	10	10			8.6	8.4			7.6	7.5				320	3370					
3		10	8	0			8.6	8.4			7.6	7.5				4710	4780					
4		10	1				8.6	8.4			7.6	7.5				7210	7254					
5		10	1				8.6	8.4			7.6	7.5				3130	3170					

Dilution Water Code  
 Recon - reconstituted water  
 VS - very soft  
 S - soft  
 MH - moderately hard  
 H - hard  
 VH - very hard  
 DMW - diluted mineral water  
 Aged - aged water

Statistical Result  
 48 h LC50 2.447489  
 95% conf. Int. 2-3  
 Statistical Method Binomial test  
 Statistician CS

We verify this data is true and correct.  
 Technician CS  
 Laboratory Manager John W. Adams  
 QA Officer \_\_\_\_\_

EARTHNET LABORATORIES, INC.

REFERENCE TOXICANT DATA SHEET

EML # 1-2507, 1-2745, 63082 Reference Toxicant NaCl Test Begin Date 3/9 Time 1400  
 Client EV Porzdo Chemical Stock Solution 100 ppm Test End Date 3/11 Time 1400  
 Test Organism O. Parvulus Dilution Water MH ID # 710  
 Source AT Total Hardness as CaCO<sub>3</sub> 276 96 Total Alkalinity as CaCO<sub>3</sub> 48  
 ID # 632 Age 2-4 hr Conductivity/Salinity 276  
 Technician 0 hr \_\_\_\_\_ 24 hr \_\_\_\_\_ 48 hr \_\_\_\_\_ 72 hr \_\_\_\_\_ 96 hr \_\_\_\_\_  
 Temperature 0 hr \_\_\_\_\_ 24 hr \_\_\_\_\_ 48 hr \_\_\_\_\_ 72 hr \_\_\_\_\_ 96 hr \_\_\_\_\_

Toxicant Concentration mg/L - g/L	Test Replicate Number	Number Surviving					Dissolved Oxygen (mg/L)					pH					Conductivity (µhos/cm)					
		0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	
U		10	10	10			8.6	8.5				7.6	7.3				11800					
6		10	10	10			8.6	8.5				7.6	7.3				11800					
8		10	10	17			8.6	8.5				7.6	7.3				12700					
10		10	2	0			8.6	8.5				7.6	7.3				11800					
12		10	1	0			8.6	8.5				7.6	7.3				18800					

Dilution Water Code  
 Recon - reconstituted water  
 VS - very soft  
 S - soft  
 MH - moderately hard  
 H - hard  
 VH - very hard  
 DMW - diluted mineral water  
 Aged - aged water

Statistical Result  
 48 h LC50 8.418062  
 95% conf. Int. 6-10  
 Statistical Method Binomial test  
 Statistician CS

We verify this data is true and correct.  
 Technician CS  
 Laboratory Manager John A. Aceman  
 QA Officer \_\_\_\_\_

**APPENDIX B**  
**CHAIN-OF-CUSTODY**

Ruston, LA 71270  
(800) 256-4362



CHAIN OF CUSTODY

Rush

Standard

Client					Delivered By:					
Name: El Dorado Chemical Company					Client EarthNet <input checked="" type="checkbox"/> Delivery Service Bus <input checked="" type="checkbox"/>					
Address: 4500 Northwest Avenue					Refrigerate to 4°C					
City, State, Zip: El Dorado, AR 71731					Project Name/Location					
Phone Number: 870-863-1484			Fax Number: 870-863-1499							
Sample Collection										
Sample No.	Date	Time	Comp/Grab	Source	Analysis Required	Cont	Pres	Matrix	Special Instructions	
62807	3/8/99	8:15A	Comp	Outfall 001	TSS, Nitrate-N, Sulfate	1 P	4°C	W		
	"	"	"	"	Ammonia-N	1 G	H <sub>2</sub> SO <sub>4</sub>	W		
	"	"	"	"	Biomonitoring	4 P	4°C	W		
All samples will be collected and preserved according to USEPA and/or EarthNet Laboratories, Inc. established protocols.										
Additional Remarks:										
Sampled by: <i>W. Morgan</i>					Relinquished by: <i>W. Morgan</i>		Date: 3/8/99	Time: 8:55A	Received by: <i>M. Morgan</i>	
Relinquished by:			Date:	Time:	Received by:			Date:	Time:	
Relinquished by:			Date:	Time:	Received by:			Date:	Time:	
Relinquished by:			Date:	Time:	Received by:			Date:	Time:	
Relinquished by:			Date:	Time:	Received for Laboratory by: <i>R. Morgan</i>			Date: 3-8-99	Time: 16:00	

(3 55-01  
Ruston, LA 71270  
(800) 256-4362



CHAIN OF CUSTODY

Rush

Standard

Client					Delivered By:				
Name: El Dorado Chemical Company					Client EarthNet <input checked="" type="checkbox"/> Delivery Service Bus <input checked="" type="checkbox"/>				
Address: 4500 Northwest Avenue					Refrigerate to 4°C				
City, State, Zip: El Dorado, AR 71731					Project Name/Location				
Phone Number: 870-863-1484			Fax Number: 870-863-1499						
Sample Collection									
Sample No.	Date	Time	Comp/Grab	Source	Analysis Required	Cont	Pres	Matrix	Special Instructions
62945	3/10/99	8:25A	Comp	Outfall 001	Chloride TSS, Nitrate-N, Sulfate, Hex	1 P	4°C	W	
	"	"	"	"	Ammonia-N	1 G	H <sub>2</sub> SO <sub>4</sub>	W	
	"	"	"	"	Biomonitoring	4P	4°C	W	
	"	"	"	"	Metals*	1P	HNO <sub>3</sub>	W	
	"	"	"	"	Cyanide	1G	NaOH	W	
All samples will be collected and preserved according to USEPA and/or EarthNet Laboratories, Inc. established protocols.									
Additional Remarks: * Cadmium Total, Copper Total, Lead Total, Mercury Total, Nickel Total, Selenium Total, Silver Total, Zinc Total,									
Sampled by: <i>W. My</i>			Relinquished by: <i>W. My</i>		Date: 3/10/99		Time: 05:30		Received by: <i>M. My</i>
Relinquished by:			Date:		Time:		Received by:		Date:
Relinquished by:			Date:		Time:		Received by:		Date:
Relinquished by:			Date:		Time:		Received by:		Date:
Relinquished by:			Date:		Time:		Received for Laboratory by: <i>Rory D</i>		Date: 3-10-99
									Time: 13:30

Rust  
(800) 256-4362

CHAIN OF CUSTODY

Rush

Standard

Client					Delivered By:				
Name: El Dorado Chemical Company					Client EarthNet <input checked="" type="checkbox"/> Delivery Service Bus <input checked="" type="checkbox"/>				
Address: 4500 Northwest Avenue					Refrigerate to 4°C				
City, State, Zip: El Dorado, AR 71731					Project Name/Location				
Phone Number: 870-863-1484			Fax Number: 870-863-1499						
Sample Collection									
Sample No.	Date	Time	Comp/Grab	Source	Analysis Required	Cont	Pres	Matrix	Special Instructions
<del>63081</del>	3/12/99	8:29A	Comp	Outfall 001	TSS, Nitrate-N, Sulfate	1 P	4°C	W	
63082	"	"	"	"	Ammonia-N	1 G	H <sub>2</sub> SO <sub>4</sub>	W	
	"	"	"	"	Chronic Biomonitoring	6 P	4°C	W	
All samples will be collected and preserved according to USEPA and/or EarthNet Laboratories, Inc. established protocols.									
Additional Remarks:									
Sampled by: <i>[Signature]</i>			Relinquished by: <i>[Signature]</i>		Date: 3/12/99	Time: 8:52	Received by: <i>[Signature]</i>		
Relinquished by:			Date:	Time:	Received by:		Date:	Time:	
Relinquished by:			Date:	Time:	Received by:		Date:	Time:	
Relinquished by:			Date:	Time:	Received by:		Date:	Time:	
Relinquished by:			Date:	Time:	Received for Laboratory by: <i>[Signature]</i>		Date: 3-12-99	Time: 11:00	



**APPENDIX C**  
**DATA ANALYSIS**

EL DORADO SUR

File: C:\TOXSTAT\ELDORSUR.

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

---

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	4	1.000	1.000	1.000
2	6.25	4	1.000	1.000	1.000
3	12.5	4	1.000	1.000	1.000
4	25	4	1.000	1.000	1.000
5	50	4	0.500	0.700	0.600
6	100	4	0.000	0.000	0.000

---

EL DORADO SUR

File: C:\TOXSTAT\ELDORSUR.

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

---

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	0.000	0.000	0.000
2	6.25	0.000	0.000	0.000
3	12.5	0.000	0.000	0.000
4	25	0.000	0.000	0.000
5	50	0.007	0.082	0.041
6	100	0.000	0.000	0.000

---

EL DORADO SUR

File: C:\TOXSTAT\ELDORSUR.

Transform: ARC SINE(SQUARE ROOT(Y))

STEELS MANY-ONE RANK TEST

-

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	control	1.412				
2	6.25	1.412	18.00	10.00	4.00	
3	12.5	1.412	18.00	10.00	4.00	
4	25	1.412	18.00	10.00	4.00	
5	50	0.887	10.00	10.00	4.00	*
6	100	0.159	10.00	10.00	4.00	*

Critical values use  $k = 5$ , are 1 tailed, and  $\alpha = 0.05$

L DORADOPPGRW

File: C:\TOXSTAT\ELDOPPGR.

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

---

RP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	4	0.440	0.470	0.455
2	6.25	4	0.450	0.510	0.470
	12.5	4	0.430	0.470	0.450
4	25	4	0.450	0.480	0.470
5	50	4	0.200	0.300	0.248

---

L DORADOPPGRW

File: C:\TOXSTAT\ELDOPPGR.

Transform: NO TRANSFORM

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

---

RP	IDENTIFICATION	VARIANCE	SD	SEM
	control	0.000	0.013	0.006
2	6.25	0.001	0.027	0.014
	12.5	0.001	0.023	0.012
4	25	0.000	0.014	0.007
5	50	0.002	0.043	0.021

---

L DORADOPPGRW

file: C:\TOXSTAT\ELDOPPGR.

Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 1 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T-STAT	SIG
1	control	0.455	0.455		
2	6.25	0.470	0.470	-0.802	
3	12.5	0.450	0.450	0.267	
4	25	0.470	0.470	-0.802	
5	50	0.248	0.248	11.091	*

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, df=15,4)

L DORADOPPGRW

file: C:\TOXSTAT\ELDOPPGR.

Transform: NO TRANSFORMATION

DUNNETTS TEST - TABLE 2 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	control	4			
2	6.25	4	0.044	9.7	-0.015
3	12.5	4	0.044	9.7	0.005
4	25	4	0.044	9.7	-0.015
5	50	4	0.044	9.7	0.208

CONTROL	10	0	10
100	0	10	10
-----			
TOTAL	10	10	20
=====			

CRITICAL FISHERS VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 0.  
 Since b is less than or equal to 6 there is a significant difference  
 between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHERS EXACT TESTS

GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG (P=.05)
	CONTROL	10	0	
1	6.25	10	0	
2	12.5	10	0	
3	25	10	0	
4	50	10	0	
5	100	10	10	*

eldorrepro

file: C:\TOXSTAT\ELDORREP.

Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 1 of 2

---

GRP	IDENTIFICATION	N	MIN	MAX	MEAN
1	control	10	21.000	26.000	23.200
2	6	10	21.000	27.000	24.000
3	12	10	21.000	25.000	24.000
4	25	10	20.000	28.000	24.200
5	50	10	13.000	16.000	14.100
6	100	10	12.000	14.000	13.000

---

ldorrepro

file: C:\TOXSTAT\ELDORREP.

Transform: NO TRANSFORMATION

SUMMARY STATISTICS ON TRANSFORMED DATA TABLE 2 of 2

---

GRP	IDENTIFICATION	VARIANCE	SD	SEM
1	control	3.956	1.989	0.629
2	6	3.778	1.944	0.615
3	12	1.778	1.333	0.422
4	25	8.178	2.860	0.904
5	50	1.211	1.101	0.348
6	100	0.667	0.816	0.258

---

ldorrepro

le: C:\TOXSTAT\ELDORREP.

Transform: NO TRANSFORMATION

STEELS MANY-ONE RANK TEST

-

Ho:Control<Treatment

---

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	control	23.200				
2	6	24.000	118.00	75.00	10.00	
3	12	24.000	116.00	75.00	10.00	
4	25	24.200	116.00	75.00	10.00	
5	50	14.100	55.00	75.00	10.00	*
6	100	13.000	55.00	75.00	10.00	*

---

Critical values use  $k = 5$ , are 1 tailed, and  $\alpha = 0.05$



CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
5	10	10	100	9.765625E-02
4	10	10	100	9.765625E-02
3	10	10	100	9.765625E-02
2	10	0	0	9.765625E-02
1	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 2 AND 3 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.80469 PERCENT. APPROXIMATE LC50 FOR THIS SET OF DATA IS 2.449489

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE ROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

CONC.	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB. (%)
12	10	10	100	9.765625E-02
10	10	10	100	9.765625E-02
3	10	3	30	17.1875
6	10	0	0	9.765625E-02
4	10	0	0	9.765625E-02

THE BINOMIAL TEST SHOWS THAT 6 AND 10 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.80469 PERCENT. AN APPROXIMATE LC50 FOR THIS SET OF DATA IS 8.418062

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

*APPENDIX D*

*SUMMARY OF MONTHLY REFERENCE TOXICITY TEST DATA*

**APPENDIX E**  
**AGENCY DATA FORMS**

SUMMARY REPORTING FORMS CHRONIC BIOMONITORING (CON'T)

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL  
(Pimephales promelas)

Permittee El Dorado Chemical Co NPDES NO. \_\_\_\_\_

Composite 1 Collected From Time 0810 Date 3/7 To Time 0810 Date 3/8  
 Composite 2 Collected From Time 0825 Date 3/9 To Time 0825 Date 3/10  
 Composite 3 Collected From Time 0820 Date 3/11 To Time 0820 Date 3/12

Test initiated: 3/9 1500 am/pm 3/9 date

Test terminated: 1500 am/pm 3/16 date

Dilution water used: \_\_\_\_\_ Receiving  Reconstituted

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival In Replicate Chambers					Mean Percent Survival			CV%*
	A	B	C	D	E	24h	48h	7days	
Con	100	100	100	100		100	100	100	0
6.25	100	100	100	100		100	100	100	0
12.5	100	100	100	100		100	100	100	0
25	100	100	100	100		100	100	100	0
50	50	60	60	70		100	100	100	13.7
100	0	0	0	0		90	70	0	0

\* coefficient of variation = standard deviation x 100/mean

DATA TABLE FOR GROWTH

Effluent Conc. %	Average Dry Weight in milligrams in replicate chambers					Mean Dry Weight (mg)	CV%*
	A	B	C	D	E		
Con	0.46	0.47	0.45	0.44		0.455	2.9
6.25	0.46	0.45	0.46	0.51		0.470	5.7
12.5	0.47	0.43	0.47	0.44		0.450	5.1
25	0.47	0.48	0.48	0.45		0.470	0.3
50	0.26	0.30	0.20	0.23		0.248	17.3
100	0	0	0	0		0	

\* coefficient of variation = standard deviation x 100/mean

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL(con't)  
(Pimephales promelas)

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

- a.) LOW FLOW OR CRITICAL DILUTION (100%): ✓ YES        NO  
b.) 1/2 LOW FLOW OR 2 X  
CRITICAL DILUTION (100%): ✓ YES        NO

2. Dunnett's Procedure:

Is the mean dry weight (growth) at 7 days effluent significantly different (p=0.05) than the control's dry weight (growth) for the % effluent corresponding to (significant non-lethal effects):

- a.) LOW FLOW OR CRITICAL DILUTION (100%): ✓ YES        NO  
b.) 1/2 LOW FLOW OR 2 X  
CRITICAL DILUTION (100%): ✓ YES        NO

3. If you answered NO to 1.a) and 2.a) enter [0] otherwise enter [1]:   1

4. If you answered NO to 1.b) and 2.b) enter [0] otherwise enter [1]:   1

5. Enter response to item 3 on DMR Form, parameter # TEP6C.

6. Enter response to item 4 on DMR Form, parameter #TFP6C.

- 7: Enter percent effluent corresponding to each NOEL below and circle lowest number:

a.) NOEL survival =   25   % effluent  
b.) NOEL growth =   25   % effluent

Ceriodaphnia dubia  
SURVIVAL AND REPRODUCTION (con't)

1. Fisher's Exact Test:

Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to (lethality):

- a.) LOW FLOW OR CRITICAL DILUTION (100%): ✓ YES        NO  
b.) 1/2 LOW FLOW OR 2 X  
    CRITICAL DILUTION (100%): ✓ YES        NO

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

Is the mean number of young produced per female significantly different (p=0.05) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

- a.) LOW FLOW OR CRITICAL DILUTION (100%): ✓ YES        NO  
b.) 1/2 LOW FLOW OR 2 X  
    CRITICAL DILUTION (100%): ✓ YES        NO

3. If you answered NO to 1.a) and 2.a) enter [0] otherwise enter [1]:   1  

4. If you answered NO to 1.b) and 2.b) enter [0] otherwise enter [1]:   1  

5. Enter response to item 3 on DMR Form, parameter #TEP3B.

6. Enter response to item 4 on DMR Form, parameter #TFP3B.

7. Enter percent effluent corresponding to each NOEL below and circle lowest number:

- a.) NOEL survival =   50   % effluent  
b.) NOEL reproduction =   25   % effluent

SUMMARY REPORTING FORMS  
CHRONIC BIOMONITORING

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION

Permittee: El Dorado Chemical NPDES NO. \_\_\_\_\_

	Collected From	Time	Date	To	Time	Date
Composite 1		<u>0810</u>	<u>3/7</u>		<u>0810</u>	<u>3/8</u>
Composite 2		<u>0825</u>	<u>3/9</u>		<u>0825</u>	<u>3/10</u>
Composite 3		<u>0820</u>	<u>3/11</u>		<u>0820</u>	<u>3/12</u>

Test initiated: 1745 am/pm 3/9 date  
 Test terminated: 1430 am/pm 3/16 date  
 Dilution water used: \_\_\_\_\_ Receiving  Reconstituted

PERCENT SURVIVAL

Time of Reading	Percent Effluent					
	0%	6.25%	12.5%	25%	50%	100%
24h	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
48h	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
7 day	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>	<u>0</u>

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

PERCENT EFFLUENT (%)

REP	0%	6.25%	12.5%	25%	50%	100%
A	<u>21</u>	<u>25</u>	<u>25</u>	<u>23</u>	<u>15</u>	<u>14</u>
B	<u>25</u>	<u>25</u>	<u>25</u>	<u>27</u>	<u>15</u>	<u>13</u>
C	<u>24</u>	<u>25</u>	<u>25</u>	<u>28</u>	<u>13</u>	<u>13</u>
D	<u>21</u>	<u>22</u>	<u>23</u>	<u>26</u>	<u>13</u>	<u>14</u>
E	<u>21</u>	<u>22</u>	<u>21</u>	<u>24</u>	<u>13</u>	<u>13</u>
F	<u>24</u>	<u>24</u>	<u>23</u>	<u>21</u>	<u>14</u>	<u>12</u>
G	<u>24</u>	<u>27</u>	<u>24</u>	<u>21</u>	<u>14</u>	<u>12</u>
H	<u>26</u>	<u>26</u>	<u>25</u>	<u>20</u>	<u>16</u>	<u>13</u>
I	<u>21</u>	<u>23</u>	<u>25</u>	<u>25</u>	<u>15</u>	<u>12</u>
J	<u>25</u>	<u>21</u>	<u>24</u>	<u>27</u>	<u>13</u>	<u>14</u>

CV%\* 5.6 8.1 5.6 11.8 7.8 6.3

\* coefficient of variation = standard deviation x 100/mean