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## ENHANCED IN-SITU BIOREMEDIATION

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# **REPORT ON PRELIMINARY FIELD TESTING**

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Prepared for El Dorado Chemical Company El Dorado, Arkansas

October 13, 1999

File No. 3500009153.00

# **URS Greiner Woodward Clyde**

A Division of URS Corporation

2822 O'Neal Lane Baton Rouge, Louisiana 70816 (225) 751-1873

### **URS Greiner Woodward Clyde**

A Division of URS Corporation

2822 O'Neal Lane Baton Rouge, LA 70816 Tel: 225.751.1873 Fax: 225.753.3616 Offices Worldwide

October 13, 1999

Mr. Keith Brown Manager, State Permits, Water Division Arkansas Department of Environmental Quality 8001 National Drive Little Rock, Arkansas 72219-8913

Enhanced In-Situ Bioremediation Re: Report on Preliminary Field Testing El Dorado Chemical Company El Dorado, Arkansas URSGWC File No. 3500009153.00

Dear Mr. Brown:

Attached are three copies of the referenced report for you, Art Riddle, and Belinda Colby. If you have questions or comments, we can be reached at (225) 756-1431.

Sincerely,

Reece 12 min Dennis E. Reece Vice President

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William Beal, P.G., P.E.

Attachments

DER:cm

Art Riddle, ADEQ cc: Belinda Colby, ADEQ

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## ENHANCED IN-SITU BIOREMEDIATION

# **REPORT ON PRELIMINARY FIELD TESTING**

Prepared for El Dorado Chemical Company El Dorado, Arkansas

October 13, 1999

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	Biodegradation Monitoring Results for MW-17
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	Testing

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Appendix A Laboratory Reports

URS Greiner Woodward Clyde

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URSGWC conducted the preliminary field tests in monitor wells MW-11 and MW-17 from May 27 – August 6, 1999 in accordance with the plan presented in the April 14, 1999 report "Initial Sampling and Testing and Plan for Preliminary Field Testing" prepared by URSGWC.

The tests involved pumping groundwater from each monitor well, amending the groundwater by addition of nutrients and pH buffer, and returning the amended groundwater back into the well. The purpose of the amendments was to create conditions in the groundwater at each of the two monitor wells that would be conducive to denitrifying bacteria and consequently to reduce the nitrate concentrations.

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The initial amendments to the groundwater were as follows:

- Groundwater volume withdrawn-initially 20 and 50 gallons at MW-11 and MW-17, respectively, and 7 and 17 gallons, respectively, after May 27, 1999
- Carbon/electron donor source-trisodium citrate at approximately 31 and 27 mg/l at MW-11 and MW-17, respectively
- Phosphate-trisodium phosphate at 3.8 and 10 mg/L at MW-11 and MW-17, respectively
- pH buffering-soda ash to bring pH to 6-6.5

Nitrate, pH and other parameters were monitored in the withdrawn groundwater. Withdrawal and amendment of groundwater was on a weekly basis from May 27 through July 8, 1999 and was completed every other week from July 8 through August 6, 1999.

Based on monitoring results, additional pH buffering and nutrients were added in the amendments during the course of the test. The pH was adjusted to 7.5 - 8.5. Trisodium citrate concentration was increased starting July 1, 1999 to approximately 190 and 624 mg/L at MW-11 and MW-17, respectively. Trisodium phosphate was increased to approximately 19 and 24 mg/L at MW-11 and MW-17, respectively, starting July 1, 1999. The volume of groundwater withdrawn and amended at MW-11 was also increased to 55 gallons starting July 1, 1999. Beginning July 23, 1999, the withdrawn groundwater was also amended with glucose to an approximate concentration of 100 mg/L to provide additional carbon/electron donor source.

To evaluate the capability for denitrification under controlled pH conditions, a laboratory test was conducted as follows:

- On July 23, 1999, four samples were collected of withdrawn groundwater from MW-17 after addition of nutrient and pH buffering amendments. The samples were collected in BOD bottles, sealed and transported to the laboratory. The pH of the amended water was 8.5.
- One bottle was analyzed for nitrate and Total Organic Carbon (TOC) approximately each week for four weeks.

The results were then used to evaluate whether the amended water, under controlled conditions, was capable of fostering growth of denitrifying bacteria and reducing nitrate concentrations.

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Tables 1 and 2 present preliminary summaries of the analytical results for the withdrawn groundwater (pre-addition of amendments) from MW-11 and MW-17, respectively. Note, the field test kit analytical results for nitrate were found to be unreliable, probably due to a negative interference, and are consistently much lower than the concentrations from the laboratory analyses. Consequently, the laboratory results for nitrate were used for interpretation of results rather than the field analyses. Appendix A presents the laboratory reports.

Two analytes (pH and nitrate) are key in interpreting the results. The pH data indicate that the addition of soda ash as a buffering agent during the preliminary field test did not always result in raising the in-situ groundwater pH to near neutral during the duration of the test. This indicates that an improved method for adding alkalinity to the groundwater needs to be developed to create proper pH conditions for denitrification. The pH at MW-11 was essentially unchanged by the addition of the amended groundwater and ranged from only 4.2 to 4.6 during the test. The pH at MW-17 increased from a low of 4.24 to a maximum of 6.2 during the test, but appeared to stabilize at approximately 5.9. Nitrate concentration at MW-11 and MW-17 was essentially unchanged. Nitrate concentration at MW-11 fluctuated within a range of 7.8 to 13 mg/L and at MW-17 fluctuated within a range of 66.9 to 102 mg/L.

By contrast, the samples of amended groundwater withdrawn from MW-17 on July 23, 1999 and analyzed in the laboratory at one-week intervals demonstrated rapid and near complete denitrification. The analytical results were as follows:

- Nitrate concentration at time of sample collection 98 mg/L
- Nitrate concentration at approximately one week after sample collection 0.01 mg/L
- Nitrate concentration at approximately two weeks after sample collection 0.04 mg/L
- Nitrate concentration at approximately three weeks after sample collection 0.03 mg/L
- Nitrate concentration at approximately four weeks after sample collection 0.31 mg/L

These results indicate that the amended groundwater that had been kept in anaerobic conditions similar to that in the subsurface exhibited essentially complete denitrification

## **SECTION**THREE

within one week. Conditions toxic to denitrifying bacteria were not indicated, rather, the results indicate that the conditions in the amended groundwater are very favorable for denitrification. Percent removals of nitrate ranged from 99.68 to 99.99 percent. The resulting nitrate concentrations were far below the MCL of 10 mg/L.

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The laboratory test of the amended groundwater from MW-17 demonstrated that denitrification will proceed rapidly when the pH is raised and sufficient organic carbon is present. The preliminary field test results indicate that the critical factor in achieving denitrification is pH of the in-situ groundwater. The preliminary field test results also indicate that raising the pH will require addition of more base to the groundwater than was accomplished during the preliminary field tests.

Overall, the test results indicate that enhanced in-situ biodegradation can be feasible in conjunction with pH adjustment.

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The preliminary field tests and laboratory test demonstrated that denitrification is potentially applicable to the site and that additional base needs to be added to the groundwater to raise the in-situ pH to a range conducive to denitrification.

Consequently, additional field testing will be conducted. The additional field tests will focus on raising the in-situ pH to neutral or above at MW-17. MW-17 was selected since the nitrate concentration is much higher than at MW-11. Note that nitrate concentrations at MW-11 were frequently (five of seven laboratory analyses) slightly below 10 mg/L during the preliminary field tests. In the additional field testing, pH will be the only parameter monitored until the pH is raised to neutral or above. When the pH has been raised sufficiently, nitrate and TOC will be monitored and nutrients will be added. At the completion of the test, other parameters as listed in Table 3 will be analyzed.

The additional field tests will be conducted as follows:

Four small diameter piezometers will be installed with Geoprobe<sup>®</sup> type techniques in a semicircle upgradient of MW-17. The piezometers will be located approximately 6 feet from MW-17. Periodically, water will be pumped from MW-17 and will be amended with sodium hydroxide to a pH of between 8.5 and 10. The amended water will be recharged into each of the small diameter wells. The amount of water withdrawn and recharged is expected to be considerably greater than that during the previous tests. Initially a total of 500 gallons per week is planned to be added. Depending on the rate of recharge, this volume may be adjusted. pH of the water withdrawn from MW-17 will be measured. When the pH is raised to near neutral, the nitrate and TOC concentrations will be measured for water withdrawn from MW-17, and, as necessary, nutrients (similar to that added in the preliminary field tests) will be added to the water recharged through the temporary wells. A more complete chemical analysis (Table 3) will be completed on a single sample at the completion Duration of the test will depend on the results of the test. of measurements of pH and nitrate. A report of the completed tests will be submitted to the ADEQ within six months of the start of the tests.

TABLES

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### TABLE 1

#### ANALYTICAL RESULTS PRELIMINARY FIELD TESTS IN-SITU ENHANCED BIODEGRADATION MONITORING RESULTS FOR MW-11

Parameter	5/27/99	6/3/99	6/10/99	6/17/99	6/24/99	7/1/99	7/8/99	7/23/99	8/6/99
pH (S.U.)	4.21	4.21	4.2	4.25	4.3	4.3	4.6	4.5	4.3
Dissolved Oxygen (mg/L)	0.42	0.41	0.41	0.34	0.32	0.25	0.35	0.36	0.4
Carbon Dioxide (mg/L)	250	325	400	NA	350	400	350	NA	350
Nitrite (mg/L as N)	0.02	0.08	0.05	NA	0.7	0.07	0.05	NA	0.05
Phosphate (mg/L as P)	ND	ND	ND	ND	ND	ND	NA	0.1	ND
Denitrifying Bacteria (CFU/ml)	Negative	Negative	Negative	NA	Negative	NA	Negative	NA	Negative
Ferrous Iron (mg/L)	0.03	0.08	NA	NA	0.12	NA	NA	NA	ND
Oxidation Reduction Potential (mv)	350	NA	NA	303	322	327	272	192	NA
Field Nitrate (mg/L as N)	7	1	9	5	7	7	4	7	8
Laboratory Nitrate (mg/L as N)	NA	10.9	13	9.6	9	NA*	9.1	7.8	8
Ammonia (mg/L as N)	>3	7	>3	NA	>3	NA	>3	NA	>3
Total Kjeldahl Nitrogen (mg/L as N)	6.2	14	NA	NA	6.7	NA	NA	NA	5.9
Total Organic Carbon (mg/L)	24.2	22.9	21.8	NA	27.8	NA	24.5	NA	40.8
Alkalinity (mg/L as CaCO3)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Temperature (degrees C)	18.5	21.3	20.4	20.7	19.4	20.2	19.4	20.8	20.5

NOTES:

ND = Not Detected

NA = Not Analyzed

\* Indicates sample bottle broke during transport to the laboratory.

#### TABLE 2

#### ANALYTICAL RESULTS PRELIMINARY FIELD TESTS IN-SITU ENHANCED BIODEGRADATION MONITORING RESULTS FOR MW-17

Parameter	5/27/99	6/3/99	6/10/99	6/17/99	6/24/99	7/1/99	7/8/99	7/23/99	8/6/99
pH (S.U.)	3.93	4.24	4.8	4.71	5	5.6	6.2	5.9	5.9
Dissolved Oxygen (mg/L)	0.49	0.51	0.5	0.9	0.43	1.4	3.65	0.43	1.2
Carbon Dioxide (mg/L)	120	130	120	NA	110	110	60	NA	70
Nitrite (mg/L as N)	ND	0.2	0.45	NA	0.4	0.5	0.5	NA	0.3
Phosphate (mg/L as P)	ND	ND	ND	ND	ND	0.15	0.45	0.4	0.8
Denitrifying Bacteria (CFU/ml)	Negative	Negative	Negative	NA	Negative	NA	Negative	NA	Negative
Ferrous Iron (mg/L)	0.02	0.07	NA	NA	0.05	NA	NA	NA	ND
Oxidation Reduction Potential (mv)	352	NA	NA	225	285	264	204	139	169
Field Nitrate (mg/L as N)	20	15	25	22	23	20	13	15	20
Laboratory Nitrate (mg/L as N)	NA	102	75	96	88	NA <sup>*</sup>	66.9	98	73
Ammonia (mg/L as N)	2.3	1.3	2	NA	2.5	NA	2.8	NA	3
Total Kjeldahl Nitrogen (mg/L as N)	ND	ND	NA	NA	ND	NA	NA	NA	ND
Total Organic Carbon (mg/L)	ND	3.9	ND	NA	4.3	NA	4.2	NA	4
Alkalinity (mg/L as CaCO3)	ND	3	ND	ND	ND	NA	70	35	37
Temperature (degrees C)	19.2	21.3	19.4	20.1	20.3	18.8	18.9	19.2	19.5

NOTES:

ND = Not Detected

NA = Not Analyzed

\* Indicates sample bottle broke during transport to the laboratory.

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### TABLE 3

### GROUNDWATER ANALYTICAL PARAMETERS MW-17 AT COMPLETION OF ADDITIONAL TESTING EL DORADO CHEMICAL COMPANY EL DORADO, ARKANSAS

Analyte	<b>Field or Laboratory</b>
pH	Field
Dissolved Oxygen	Field
Carbon Dioxide	Field
Temperature	Field
Denitrifying Bacteria	Field
Nitrite	Laboratory
Nitrate	Laboratory
Ammonia	Laboratory
Total Kjeldahl Nitrogen	Laboratory
Phosphate	Laboratory
Total Organic Carbon	Laboratory

### APPENDIX A

### LABORATORY REPORTS



# ANALYTICAL RESULTS

PERFORMED BY

## **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 06/08/1999** 

GCAL REPORT NO: 9903604

DELIVER TOWOODWARD CLYDE/BRWOODWARD CLYDE CONSULTANTS2882 ONEAL LANEBATON ROUGE, LA 70816ATTENTIONDENNIS REECE

CLIENT ID 0463

## SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9905280058	WATER	MW11	05/27/1999 14:45	05/28/1999 15:15
9905280059	WATER	MW17	05/27/1999 12:05	05/28/1999 15:15

## LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
· NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (504) 769-4900.

BAILEY OPERATIÓNS MANAG

This Report Contains  $\underline{7}$  Pages.

## SAMPLE ANALYSIS

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9905280058	WATER	MWII	05/27/1999 14:45	05/28/1999 15:15

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Total Kjeldahl Nitrogen	4500-NH3 BE	06/01/1999 08:00	06/01/1999 15:50
Total Organic Carbon	5310 B		06/04/1999 20:15

### ANALYTICAL RESULTS

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	24.2	(mg/L C)	1	1	103008	jar
Total Kjeldahl Nitrogen	6.2	(mg/L N)	1	1	102591	ktf

## SAMPLE ANALYSIS

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample 1D	Sample Date	Receive Date
9905280059	WATER	MW17	05/27/1999 12:05	05/28/1999 15:15

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Total Kjeldahl Nitrogen	4500-NH3 BE	06/01/1999 08:00	06/01/1999 15:50
Total Organic Carbon	5310 B		06/04/1999 20:15

### ANALYTICAL RESULTS

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	<dl< td=""><td>(mg/L C)</td><td>1</td><td>1</td><td>103008</td><td>jar</td></dl<>	(mg/L C)	1	1	103008	jar
Total Kjeldahl Nitrogen	<dl< td=""><td>(mg/L N)</td><td>1</td><td>1</td><td>102591</td><td>ktf</td></dl<>	(mg/L N)	1	1	102591	ktf

	Q	UAL	ITY C	ONT port#:	ROL S 9903604		IARY	F				
Parameter	Units	<b>METH</b> Result	<b>IOD BLANK</b> Detection Limit		ORY CONTROL Recovered Amount		Result	<b>DUPLICATE</b> Result 2	RPD	Spiked Amount	<b>SPIKE</b> Recovered Amount	l Percent Recovery
<b>QC Batch 102591</b> Total Kjeldahl Nitrogen	(mg/L N)	<dl< td=""><td>1</td><td>15.0</td><td>14.6</td><td>97</td><td>179000</td><td>171000</td><td>5</td><td>15.0</td><td>13.4</td><td>89</td></dl<>	1	15.0	14.6	97	179000	171000	5	15.0	13.4	89
<b>QC Batch 103008</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>50.5</td><td>101</td><td>11.1</td><td>10.9</td><td>2</td><td>50.0</td><td>46.7</td><td>93</td></dl<>	1	50.0	50.5	101	11.1	10.9	2	50.0	46.7	93
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# **ANALYTICAL RESULTS**

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 06/08/1999** 

### GCAL REPORT NO: 9903604

DELIVER TOWOODWARD CLYDE/BR<br/>WOODWARD CLYDE CONSULTANTS<br/>2882 ONEAL LANE<br/>BATON ROUGE, LA 70816ATTENTIONDENNIS REECECLIENT ID0463

## SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date		
9905280058	WATER	MW11	05/27/1999 14:45	05/28/1999 15:15		
9905280059	WATER	MW17	05/27/1999 12:05	05/28/1999 15:15		

.

## LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

### **ISO GUIDE 25 DECLARATION**

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (504) 769-4900.

OPERATIÓNS MANAG

This Report Contains <u>7</u> Pages.

## SAMPLE ANALYSIS

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9905280058	WATER	MW11	05/27/1999 14:45	05/28/1999 15:15

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Total Kjeldahl Nitrogen	4500-NH3 BE	06/01/1999 08:00	06/01/1999 15:50
Total Organic Carbon	5310 B		06/04/1999 20:15

### ANALYTICAL RESULTS

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	24.2	(mg/L C)	1	1	103008	jar
Total Kjeldahl Nitrogen	6.2	(mg/L N)	1	1	102591	ktf

4

## SAMPLE ANALYSIS

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9905280059	WATER	MW17	05/27/1999 12:05	05/28/1999 15:15

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Total Kjeldahl Nitrogen	4500-NH3 BE	06/01/1999 08:00	06/01/1999 15:50
Total Organic Carbon	5310 B		06/04/1999 20:15

### ANALYTICAL RESULTS

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
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Total Kjeldahl Nitrogen	<dl< td=""><td>(mg/L N)</td><td>1</td><td>1</td><td>102591</td><td>ktf</td></dl<>	(mg/L N)	1	1	102591	ktf

,	Q	UAL		ONTI port#:	ROL S 9903604		IARY					
Parameter	Units	<b>METH</b> Result	Detectior	1	RY CONTROL Recovered Amount		Result	<b>DUPLICATE</b> Result 2	RPD	Spiked Amount	<b>SPIKE</b> Recovered Amount	Percent Recovery
<b>QC Batch 102591</b> Total Kjeldahl Nitrogen	(mg/L N)	<dl< td=""><td>1</td><td>15.0</td><td>14.6</td><td>97</td><td>179000</td><td>171000</td><td>5</td><td>15.0</td><td>13.4</td><td>89</td></dl<>	1	15.0	14.6	97	179000	171000	5	15.0	13.4	89
<b>QC Batch 103008</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>50.5</td><td>101</td><td>11.1</td><td>10.9</td><td>2</td><td>50.0</td><td>46.7</td><td>93</td></dl<>	1	50.0	50.5	101	11.1	10.9	2	50.0	46.7	93
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PROJECT NO. AND LOCATION OF SAM COLLECTOR'S NAM COMPANY NAME: ADDRESS: WITNESS: FIELD INFORMATION TYPES OF SAMPLES FIELD NOTES: TRANSPORTER:	NAME 33 PLE: E E: Dennis URS GI O'Weal O'Weal ON S: LIQUED + Applica	E. E. einer ane GAS	do <u>Ceece</u> <u>Uò</u> SLUDO	OMPA E SC	DIL OTEL	EPHC E: IER (: E:	ONE:	<u>(2</u> : :IFY)	<u>6</u>	rund
PROJECT NO. AND LOCATION OF SAM COLLECTOR'S NAM COMPANY NAME:	NAME 33 PLE: E E: Dennis U.R.S. Gr O'Weal O'Weal ON : LIQUE HAPPIca ER (Origina ED BY S. Reaco	GAS DATE 5-2	dro ⊂ <u>Ceece</u> <u>Uò</u> SLUDO st be	OMPA E SC MRBIL	DIL OTEL L/INVOIC ned with	EPHC E: E: E: h sa IVED	DNE: SPEC mplo BY	<u>(2</u> : :IFY)	<u>6</u>	rund
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# ANALYTICAL RESULTS

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 06/16/1999** 

GCAL REPORT NO: 9903965

DELIVER TOWOODWARD CLYDE/BRWOODWARD CLYDE CONSULTANTS2882 ONEAL LANEBATON ROUGE, LA 70816ATTENTIONDENNIS REECECLIENT ID0463

## SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906110102	WATER	EDC-17	06/10/1999 10:45	06/11/1999 09:20
9906110104	WATER	EDC-11	06/10/1999 13:25	06/11/1999 09:20

## LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MJ	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

### **ISO GUIDE 25 DECLARATION**

Gulf Coast Analytical Laboratories, Inc. is certified by The American Association For Laboratory Accreditation (A2LA). This certification ensures compliance with the laboratory standards outlined in ISO Guide 25. In accordance with ISO Guide 25, this report shall be reproduced only in full, and with the written permission of Gulf Coast Analytical Laboratories, Inc. The results herein relate only to the sample(s) tested. Documented results are shown on the following page(s).

We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

SCOTT

OPERATIONS MANAGER

This Report Contains 7 Pages.

## SAMPLE ANALYSIS

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906110102	WATER	EDC-17	06/10/1999 10:45	06/11/1999 09:20

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		06/11/1999 18:58
Total Organic Carbon	5310 B		06/16/1999 04:23

### ANALYTICAL RESULTS

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	<dl< td=""><td>(mg/L C)</td><td>1</td><td>1</td><td>103685</td><td>jar</td></dl<>	(mg/L C)	1	1	103685	jar
Nitrate	75.0	(mg/L N)	5	500	103460	jeb

## SAMPLE ANALYSIS

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906110104	WATER	EDC-11	06/10/1999 13:25	06/11/1999 09:20

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		06/11/1999 18:58
Total Organic Carbon	5310 B		06/16/1999 04:23

### ANALYTICAL RESULTS

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	21.8	(mg/L C)	1	1	103685	jar
Nitrate	13.0	(mg/L N)	1	100	103460	jeb

	QUALITY CONTROL SUMMARY Report#: 9903965											
Parameter	Units	<b>METH</b> Result	<b>OD BLANK</b> Detectior Limit		RY CONTROL Recovered Amount		Result	<b>DUPLICATE</b> Result 2	RPD	Spiked Amount	SPIKE Recovered Amount	Percent Recovery
<b>QC Batch 103460</b> Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.96</td><td>96</td><td>75.0</td><td>95.0</td><td>24</td><td>500</td><td>505</td><td>101</td></dl<>	0.01	1.00	0.96	96	75.0	95.0	24	500	505	101
<b>QC Batch 103685</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>46.5</td><td>93</td><td>1.5</td><td>1.2</td><td>22</td><td>50.0</td><td>43.3</td><td>87</td></dl<>	1	50.0	46.5	93	1.5	1.2	22	50.0	43.3	87
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5) 769-4900 • Fax (225) 767-5717					1			 		
Report to: Client: URSCIWC Idress: #15 U'Aleal Ln. Baton Pouge, LA ontact: Dennis Reace Phone: 800-697-0103	Bill to Client: <u>Same</u> Address: Contact: Phone:	· · · · · · · · · · · · · · · · · · ·			Anal	ytical Req	uests &	Method	Lab use only: Custody Seal usedyes in tactyes Temperature °C	5
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He cannot accept verbal changes. Please fax written changes to (220) 767-5717



# ANALYTICAL RESULTS

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 06/17/1999** 

GCAL REPORT NO: 9903745

DELIVER TOWOODWARD CLYDE/BR<br/>WOODWARD CLYDE CONSULTANTS<br/>2882 ONEAL LANE<br/>BATON ROUGE, LA 70816ATTENTIONDENNIS REESE

CLIENT ID 0463

# SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date		
9906040042	WATER	EDC-17	06/03/1999 12:40	06/04/1999 09:30		
9906040049	WATER	EDC-11	06/03/1999 15:20	06/04/1999 09:30		

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

#### **ISO GUIDE 25 DECLARATION**

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

OPERATIONS MANAGER

This Report Contains + Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906040042	WATER	EDC-17	06/03/1999 12:40	06/04/1999 09:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Ammonia	4500-NH3 BE	06/07/1999 09:45	06/09/1999 15:04
Nitrite + Nitrate	353.2-N+N		06/16/1999 17:40
Total Alkalinity	SM2320 B		06/13/1999 15:28
Total Kjeldahl Nitrogen	4500-NH3 BE	06/08/1999 08:30	06/10/1999 09:00
Total Organic Carbon	5310 B		06/08/1999 06:48
Total Phosphorus	365.1	06/04/1999 15:30	06/10/1999 17:00

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	3.9	(mg/L C)	1	1	103050	ktf
Total Alkalinity	3.0	(mg/L CaCO3)	1	1	103419	jar
Nitrite + Nitrate	102	(mg/L N)	1	100	103794	bmc
Ammonia	1.3	(mg/L N)	1	1	103359	jar
Total Kjeldahl Nitrogen	<dl< td=""><td>(mg/L N)</td><td>1</td><td>  1</td><td>103362</td><td>ktf</td></dl<>	(mg/L N)	1	1	103362	ktf
Total Phosphorus	<dl< td=""><td>(mg/L P)</td><td>0.05</td><td>1</td><td>103299</td><td>bmc</td></dl<>	(mg/L P)	0.05	1	103299	bmc

#### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906040049	WATER	EDC-11	06/03/1999 15:20	06/04/1999 09:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Ammonia	4500-NH3 BE	06/07/1999 09:45	06/09/1999 15:04
Nitrite + Nitrate	353.2-N+N		06/16/1999 17:40
Total Alkalinity	SM2320 B		06/13/1999 15:28
Total Kjeldahl Nitrogen	4500-NH3 BE	06/08/1999 08:30	06/10/1999 09:00
Total Organic Carbon	5310 B		06/08/1999 06:48
Total Phosphorus	365.1	06/04/1999 15:30	06/10/1999 17:00

			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Total Organic Carbon	22.9	(mg/L C)	1	1	103050	ktf
Total Alkalinity	<dl< td=""><td>(mg/L CaCO3)</td><td>1</td><td>1</td><td>103419</td><td>jar</td></dl<>	(mg/L CaCO3)	1	1	103419	jar
Nitrite + Nitrate	10.9	(mg/L N)	0.1	10	103794	bmc
Ammonia	7.0	(mg/L N)	1	1	103359	jar
Total Kjeldahl Nitrogen	14.0	(mg/L N)	1	1	103362	ktf
Total Phosphorus	<dl< td=""><td>(mg/L P)</td><td>0.05</td><td>1</td><td>103299</td><td>bmc</td></dl<>	(mg/L P)	0.05	1	103299	bmc

	METHOD BLANK LABORATORY CONTROL STANDARD						DUPLICATE			SPIKE		
Parameter	Units	Result	Detection Limit	Spiked Amount	Recovered Amount	Percent Recovery		Result 2	RPD	Spiked Amount	Recovered Amount	Percent Recovery
<b>QC Batch 103050</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>49.5</td><td>99</td><td>11.6</td><td>11.8</td><td>2</td><td>50.0</td><td>57.7</td><td>115</td></dl<>	1	50.0	49.5	99	11.6	11.8	2	50.0	57.7	115
QC Batch 103299 Total Phosphorus	(mg/L P)	<dl< td=""><td>0.05</td><td>1.00</td><td>0.97</td><td>97</td><td>1.64</td><td>1.52</td><td>8</td><td>NA</td><td>NA</td><td></td></dl<>	0.05	1.00	0.97	97	1.64	1.52	8	NA	NA	
QC Batch 103359 Ammonia	(mg/L N)	<dl< td=""><td>1</td><td>15.0</td><td>14.0</td><td>93</td><td>7.0</td><td>6.7</td><td>4</td><td>15.0</td><td>14.7</td><td>98</td></dl<>	1	15.0	14.0	93	7.0	6.7	4	15.0	14.7	98
<b>QC Batch 103362</b> Total Kjeldahl Nitrogen	(mg/L N)	<dl< td=""><td>1</td><td>15.0</td><td>14.0</td><td>93</td><td>14.0</td><td>14.6</td><td>4</td><td>15.0</td><td>14.0</td><td>93</td></dl<>	1	15.0	14.0	93	14.0	14.6	4	15.0	14.0	93
<b>QC Batch 103419</b> Total Alkalinity	(mg/L CaCO3)			250	245	98	0.3	0.3	0	50.0	49.0	98
QC Batch 103794 Nitrite + Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.95</td><td>95</td><td>0.05</td><td>0.05</td><td>0</td><td>1.00</td><td>0.81</td><td>81</td></dl<>	0.01	1.00	0.95	95	0.05	0.05	0	1.00	0.81	81
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# ANALYTICAL RESULTS

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 06/21/1999** 

GCAL REPORT NO: 9904128

DELIVER TOWOODWARD CLYDE/BRWOODWARD CLYDE CONSULTANTS2882 ONEAL LANEBATON ROUGE, LA 70816ATTENTIONDENNIS REECECLIENT ID0463

### SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906180041	WATER	EDC-11	06/17/1999 14:45	06/18/1999 09:10
99061 <b>8</b> 0042	WATER	EDC-17	06/17/1999 12:15	06/18/1999 09:10

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

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DO	PARAMETER WAS DILUTED OUT
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MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

#### **ISO GUIDE 25 DECLARATION**

Gulf Coast Analytical Laboratories, Inc. is certified by The American Association For Laboratory Accreditation (A2LA). This certification ensures compliance with the laboratory standards outlined in ISO Guide 25. In accordance with ISO Guide 25, this report shall be reproduced only in full, and with the written permission of Gulf Coast Analytical Laboratories, Inc. The results herein relate only to the sample(s) tested. Documented results are shown on the following page(s).

We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

OPERATIONS MANAGER

This Report Contains  $\mathcal{H}$  Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906180041	WATER	EDC-11	06/17/1999 14:45	06/18/1999 09:10

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		06/18/1999 15:00

			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Nitrate	9.60	(mg/L N)	0.1	10	103895	bmc

#### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906180042	WATER	EDC-17	06/17/1999 12:15	06/18/1999 09:10

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		06/18/1999 15:00

### ANALYTICAL RESULTS

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			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Nitrate	96.0	(mg/L N)	1	100	103895	bmc

·	Q	UALI	ITY C	ONT port#:	ROL S 990412	QUALITY CONTROL SUMMARY Report#: 9904128								
Parameter	Units	METHC Result	Detection				Result	<b>DUPLICATE</b> Result 2		Spiked Amount		i Percent Recovery		
QC Batch 103895 Nitrate	(mg,'ጊ N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.94</td><td>94</td><td>0.34</td><td>0.38</td><td>11</td><td>1.00</td><td>0.94</td><td>94</td></dl<>	0.01	1.00	0.94	94	0.34	0.38	11	1.00	0.94	94		
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We cannot accept verbal changes. Please fax written changes to (225) /67-5/1/



File EDCC/LSB 370000915300 Analytica (Result)

# **ANALYTICAL RESULTS**

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 06/30/1999** 

#### GCAL REPORT NO: 9904281

DELIVER TOWOODWARD CLYDE/BR<br/>WOODWARD CLYDE CONSULTANTS<br/>2882 ONEAL LANE<br/>BATON ROUGE, LA 70816ATTENTIONDENNIS REECE

CLIENT ID 0463

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## SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906250004	WATER	EDC-11	06/24/1999 14:55	06/25/1999 09:20
9906250005	WATER	EDC-17	06/24/1999 11:50	06/25/1999 09:20

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
Ml	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

OPERATIONS MANAGER

This Report Contains \_\_\_\_\_ Pages.

#### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906250004	WATER	EDC-11	06/24/1999 14:55	06/25/1999 09:20

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date		
Nitrate	EPA353.2-NO3		06/25/1999 17:15		
Total Kjeldahl Nitrogen	4500-NH3 BE	06/28/1999 08:00	06/30/1999 12:20		
Total Organic Carbon	5310 B		06/28/1999 15:01		

### ANALYTICAL RESULTS

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			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Total Organic Carbon	27.8	(mg/L C)	1	1	104425	jdt
Total Kjeldahl Nitrogen	6.7	(mg/L N)	1	1	104587	jar
Nitrate	9.0	(mg/L N)	0.1	10	104393	jeb

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9906250005	WATER	EDC-17	06/24/1999 11:50	06/25/1999 09:20

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		06/25/1999 17:15
Total Kjeldahl Nitrogen	4500-NH3 BE	06/28/1999 08:00	06/30/1999 12:20
Total Organic Carbon	5310 B		06/28/1999 15:01

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	4.3	(mg/L C)	1	1	104425	jdt
Total Kjeldahl Nitrogen	<dl< td=""><td>(mg/L N)</td><td>1</td><td>1</td><td>104587</td><td>jar</td></dl<>	(mg/L N)	1	1	104587	jar
Nitrate	88.0	(mg/L N)	1	100	104393	jeb

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Parameter	Units	Result	Detection Limit	Amount		Recovery		Result 2	RPD	Spiked Amount	Recovered Amount	
9 <b>Batch 104393</b> Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.97</td><td>97</td><td>0.77</td><td>0.76</td><td>1</td><td>1.00</td><td>0.86</td><td>86</td></dl<>	0.01	1.00	0.97	97	0.77	0.76	1	1.00	0.86	86
: <b>Batch 104425</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>49.8</td><td>100</td><td>9.0</td><td>10.3</td><td>13</td><td>50.0</td><td>52.8</td><td>106</td></dl<>	1	50.0	49.8	100	9.0	10.3	13	50.0	52.8	106
: <b>Batch 104587</b> Total Kjeldahl Nitrogen	(mg/L N)	<dl< td=""><td>1</td><td>15.0</td><td>14.0</td><td>93</td><td><dl< td=""><td><dl< td=""><td></td><td>15.0</td><td>14.3</td><td>95</td></dl<></td></dl<></td></dl<>	1	15.0	14.0	93	<dl< td=""><td><dl< td=""><td></td><td>15.0</td><td>14.3</td><td>95</td></dl<></td></dl<>	<dl< td=""><td></td><td>15.0</td><td>14.3</td><td>95</td></dl<>		15.0	14.3	95
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# ANALYTICAL RESULTS

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 07/19/1999** 

GCAL REPORT NO: 9904580

DELIVER TOWOODWARD CLYDE/BR<br/>WOODWARD CLYDE CONSULTANTS<br/>2882 ONEAL LANE<br/>BATON ROUGE, LA 70816ATTENTIONDENNIS REECE

CLIENT ID 0463

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## SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9907090014	WATER	EDC-11	07/08/1999 14:20	07/09/1999 09:20
9907090015	WATER	EDC-17	07/08/1999 11:20	07/09/1999 09:20

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

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OPERATIONS MANAGER

This Report Contains \_\_\_\_ Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9907090014	WATER	EDC-11	07/08/1999 14:20	07/09/1999 09:20

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		07/09/1999 11:20
Total Organic Carbon	5310 B		07/12/1999 18:01

### ANALYTICAL RESULTS

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Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	24.5	(mg/L C)	1	1	105073	ktf
Nitrate	9.1	(mg/L N)	0.1	10	105004	jeb

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9907090015	WATER	EDC-17	07/08/1999 11:20	07/09/1999 09:20

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date	
Nitrate	EPA353.2-NO3	3	07/09/1999 11:20	
Total Alkalinity	SM2320 B		07/16/1999 11:00	
Total Organic Carbon	5310 B		07/15/1999 05:01	

			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Total Organic Carbon	4.2	(mg/L C)	1	1	105181	ktf
Total Alkalinity	70	(mg/L CaCO3)	1	1	105222	ktf
Nitrate	66.9	(mg/L N)	1	100	105004	jeb

		METH			RY CONTROL			DUPLICATE			SPIKE	
Parameter	Units	Result	Detection Limit	Amount		Percent Recovery		Result 2	RPD	Spiked Amount	Recovered Amount	
<b>C Batch 105004</b> Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>1.09</td><td>109</td><td>9.1</td><td>9.2</td><td>1</td><td>10.0</td><td>10.3</td><td>103</td></dl<>	0.01	1.00	1.09	109	9.1	9.2	1	10.0	10.3	103
<b>C Batch 105073</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>51.6</td><td>103</td><td><dl< td=""><td><dl< td=""><td></td><td>50.0</td><td>55.4</td><td>111</td></dl<></td></dl<></td></dl<>	1	50.0	51.6	103	<dl< td=""><td><dl< td=""><td></td><td>50.0</td><td>55.4</td><td>111</td></dl<></td></dl<>	<dl< td=""><td></td><td>50.0</td><td>55.4</td><td>111</td></dl<>		50.0	55.4	111
<b>C Batch 105181</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>50.7</td><td>101</td><td>4.2</td><td>4.6</td><td>9</td><td>50.0</td><td>56.9</td><td>114</td></dl<>	1	50.0	50.7	101	4.2	4.6	9	50.0	56.9	114
<b>C Batch 105222</b> Total Alkalinity	(mg/L CaCO3)			250	245	98	70	68	3	50	50	100

TULF COAST	Снан	N OF CUSTOD	Y RECORD			_
25) 769-4900 • Fax (225) 767-5717	Wood	Wand CU	eple	463 Client #	9904580 Group #	7/1/2/9 Due Date
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ddress: <u>ONeal Ln.</u> BR, LA	Address:				used □ yes in tact □ yes	no
ontact: Dennis Reece	Contact:				Temperature °C .	5
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ampled By: D. Eddington	7		Toc Nitrate Alkalinity			Lab ID
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linguished by: (Signature) Received by:			By submitting the conditions contained	nese samples, you agree ained in our most recent	e to the terms and schedule of services.	

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# ANALYTICAL RESULTS

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 07/30/1999** 

GCAL REPORT NO: 9904945

<b>DELIVER TO</b>	WOODWARD CLYDE/BR
-	WOODWARD CLYDE CONSULTANTS
	2882 ONEAL LANE
	BATON ROUGE, LA 70816
ATTENTION	DENNIS REECE
CLIENT ID	0463
	ATTENTION

ŝ

# SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9907260003	WATER	MW-11	07/23/1999 15:15	07/24/1999 08:30
9907260004	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

#### **ISO GUIDE 25 DECLARATION**

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

OPERATIONS MANAG

This Report Contains + Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9907260003	WATER	MW-11	07/23/1999 15:15	07/24/1999 08:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		07/25/1999 09:00

			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Nitrate	7.80	(mg/L N)	0.1	10	105645	bmc

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9907260004	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		07/25/1999 09:00
Total Alkalinity	SM2320 B		07/28/1999 10:30

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Alkalinity	35	(mg/L CaCO3)	1	1	105727	ktf
Nitrate	98.0	(mg/L N)	1	100	105645	bmc

Parameter	Units	<b>METHO</b> Result	Detection	1	DRY CONTROL Recovered Amount		Result	DUPLICATE Result 2	RPD	Spiked Amount	<b>SPIKE</b> Recovered Amount	
<b>Batch 105645</b> Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.95</td><td>95</td><td>98.0</td><td>95.0</td><td>3</td><td>100</td><td>106</td><td>106</td></dl<>	0.01	1.00	0.95	95	98.0	95.0	3	100	106	106
<b>Batch 105727</b> Total Alkalinity	(mg/L CaCO3)			250	245	98	336	334	1	50	46	92

Gulf	Coast	Labs
AME	RICAN	
	BPLE	X

LABORATORIES

WWC/463/9904945 Due 8-2-99

8600 Kanis Road Little Rock, AR 72204-2322 (501) 224-5060 FAX (501) 224-5072

### **CHAIN OF CUSTODY / ANALYSIS REQUEST FORM**

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GUHF COAST File 3500009153 El Dorado Chemica (/LSB

# **ANALYTICAL RESULTS**

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 08/10/1999** 

#### **GCAL REPORT NO:** 9905109

DELIVER TO WOODWARD CLYDE/BR WOODWARD CLYDE CONSULTANTS 2882 ONEAL LANE BATON ROUGE, LA 70816 ATTENTION **DENNIS REECE** CLIENT ID 0463

## SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908020027	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

DATE: 08/10/1999

•

#### CASE NARRATIVE

Client: WOODWARD CLYDE/BR Date: 08/10/1999 **Group No:** 9905109

#### INORGANIC QUALITY CONTROL CRITERIA:

Holding Times: The Nitrate sample was analyzed out of holding time as per client request.

All other holding times were within method criteria.

Method Blanks: All method blanks were found to be within quality control criteria.

**Spike/Duplicate (S/D):** The RPD for duplicate Nitrate analysis is above the control limit; however, this RPD is not applicable because the batch duplicate sample concentration is less than five times the detection limit.

All other S/D recoveries were within quality control criteria.

Laboratory Control Samples: All LCS analyses met quality control criteria.

**Calibration Verifications:** All ICV, ICB, CCV, CCB analyses met all quality control criteria.

Analysis Comments: No other unusual analytical problems were encountered during the analysis of these samples.

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

SCOTT A OPERATIONS MANAGER

This Report Contains  $\mathcal{T}$  Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908020027	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date		
Nitrate	EPA353.2-NO3		08/03/1999 15:15		
Total Organic Carbon	5310 B		08/06/1999 19:17		

### ANALYTICAL RESULTS

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	53.0	(mg/L C)	1	1	106138	ktf
Nitrate	0.02	(mg/L N)	0.01	1	106035	bmc

Demonstration	the star		OD BLANK Detection	Spiked	RECOVERED	Percent	Result	DUPLICATE Result	225	Spiked	SPIKE Recovered	
Parameter	Units	Result	Limit	Amount	Amount	Recovery	1	2	RPD	Amount	Amount	Recove
Batch 106035 Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.94</td><td>94</td><td>0.02</td><td>0.01</td><td>67 *</td><td>1.00</td><td>1.04</td><td>104</td></dl<>	0.01	1.00	0.94	94	0.02	0.01	67 *	1.00	1.04	104
B <b>atch 106138</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>46.7</td><td>93</td><td>53.0</td><td>51.0</td><td>4</td><td>50.0</td><td>47.0</td><td>94</td></dl<>	1	50.0	46.7	93	53.0	51.0	4	50.0	47.0	94



LABORATORIES

WWC1465149051641 Due 8-9-17

8600 Kanis Road Little Rock, AR 72204-2322 (501) 224-5060 FAX (501) 224-5072

## **CHAIN OF CUSTODY / ANALYSIS REQUEST FORM**

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# ANALYTICAL RESULTS

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 08/25/1999** 

GCAL REPORT NO: 9905288

DELIVER TOWOODWARD CLYDE/BRWOODWARD CLYDE CONSULTANTS2882 ONEAL LANEBATON ROUGE, LA 70816ATTENTIONDENNIS REECE

CLIENT ID 0463

# SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908090061	WATER	EDC-11	08/06/1999 14:50	08/07/1999 11:30
9908090062	WATER	EDC-17	08/06/1999 12:10	08/07/1999 11:30

/

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

#### **ISO GUIDE 25 DECLARATION**

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

OPERATIC JS MAN FR

This Report Contains \_\_\_\_\_ Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908090061	WATER	EDC-11	08/06/1999 14:50	08/07/1999 11:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date		
Nitrate	EPA353.2-NO3		08/07/1999 19:00		
Total Kjeldahl Nitrogen	4500-NH3 BE	08/13/1999 12:00	08/16/1999 08:20		
Total Organic Carbon	5310 B		08/10/1999 12:50		

### ANALYTICAL RESULTS

			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Total Organic Carbon	40.8	(mg/L C)	1	1	106257	ktf
Nitrate	9.40	(mg/L N)	0.1	10	106213	jeb
Total Kjeldahl Nitrogen	5.9	(mg/L N)	1	1	106448	ktf

#### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908090062	WATER	EDC-17	08/06/1999 12:10	08/07/1999 11:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		08/07/1999 19:00
Total Alkalinity	SM2320 B		08/10/1999 14:25
Total Kjeldahl Nitrogen	4500-NH3 BE	08/13/1999 12:00	08/16/1999 08:20
Total Organic Carbon	5310 B		08/10/1999 12:50

### ANALYTICAL RESULTS

			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Total Organic Carbon	4.0	(mg/L C)	1	1	106257	ktf
Total Alkalinity	37	(mg/L CaCO3)	1	1	106258	ktf
Nitrate	73.0	(mg/L N)	1	100	106213	jeb
Total Kjeldahl Nitrogen	<dl< td=""><td>(mg/L N)</td><td>1</td><td>1</td><td>106448</td><td>ktf</td></dl<>	(mg/L N)	1	1	106448	ktf

	QUALITY CONTROL SOMMARY Report#: 9905288													
Parameter	Units	<b>METH</b> Result	<b>DD BLANK</b> Detectior Limit	1	Recovered Amount			<b>DUPLICATE</b> Result 2	RPD	Spiked Amount	SPIKE Recovered Amount			
<b>QC Batch 106213</b> Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>1.03</td><td>103</td><td>9.40</td><td>8.80</td><td>7</td><td>NA</td><td>NA</td><td></td></dl<>	0.01	1.00	1.03	103	9.40	8.80	7	NA	NA			
<b>QC Batch 106257</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>54.0</td><td>108</td><td><dl< td=""><td><dl< td=""><td></td><td>50.0</td><td>60.9</td><td>122</td></dl<></td></dl<></td></dl<>	1	50.0	54.0	108	<dl< td=""><td><dl< td=""><td></td><td>50.0</td><td>60.9</td><td>122</td></dl<></td></dl<>	<dl< td=""><td></td><td>50.0</td><td>60.9</td><td>122</td></dl<>		50.0	60.9	122		
<b>QC Batch 106258</b> Total Alkalinity	(mg/L CaCO3)			250	250	100	37	35	6	50	53	106		
<b>QC Batch 106448</b> Total Kjeldahl Nitrogen	(mg/L N)	<dl< td=""><td>1</td><td>15.0</td><td>14.0</td><td>93</td><td><dl< td=""><td><dl< td=""><td></td><td>15.0</td><td>14.0</td><td>93</td></dl<></td></dl<></td></dl<>	1	15.0	14.0	93	<dl< td=""><td><dl< td=""><td></td><td>15.0</td><td>14.0</td><td>93</td></dl<></td></dl<>	<dl< td=""><td></td><td>15.0</td><td>14.0</td><td>93</td></dl<>		15.0	14.0	93		

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Task PROJECT REFERENCE EDC In Situ PROJECT NO WASGELL BIOREM. 350000915300 000 PROJECT LOC. SAMPLER(S) NAME (State) AR Dave Eddington FAX CLIENT NAME URSGWC Dennis Reese CLIENT ADDRESS (CITY, STATE, ZIP) Baton Rotage, CA SAMPLE SI	6970103	REQUIRED	ANALYSES	PAGE OF STANDARD BEPORT DELIVERY EXPEDITED REPORT DELIVERY(surcharge) Date Due
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File 350000915300 El Dorredo Chemica //LSB

# **ANALYTICAL RESULTS**

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 08/16/1999** 

GCAL REPORT NO: 9905277

DELIVER TOWOODWARD CLYDE/BRWOODWARD CLYDE CONSULTANTS2882 ONEAL LANEBATON ROUGE, LA 70816ATTENTIONDENNIS REECE

CLIENT ID 0463

# SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908090003	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

#### CASE NARRATIVE

Client: WOODWARD CLYDE/BR Date: 08/16/1999 **Group No:** 9905277

#### INORGANIC QUALITY CONTROL CRITERIA:

Holding Times: The Nitrate analysis was analyzed out of holding time as per client request.

All other holding times were within method criteria.

Method Blanks: All method blanks were found to be within quality control criteria.

**Spike/Duplicate (S/D):** The RPD for duplicate Nitrate analysis is above the control limit; however, this RPD is not applicable because the batch duplicate sample concentration is less than five times the detection limit.

All other S/D recoveries were within quality control criteria.

Laboratory Control Samples: All LCS analyses met quality control criteria.

**Calibration Verifications:** All ICV, ICB, CCV, CCB analyses met all quality control criteria.

Analysis Comments: No other unusual analytical problems were encountered during the analysis of these samples.

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

RESULT IS LESS THAN THE DETECTION LIMIT
PARAMETER WAS DILUTED OUT
PARAMETER WAS PERFORMED IN THE FIELD
MATRIX INTERFERENCE
NOT APPLICABLE
NOT DETECTED
ANALYSIS WAS SUBCONTRACTED
TOO NUMEROUS TO COUNT
TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

### **ISO GUIDE 25 DECLARATION**

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

SCOTT A BAILEY OPERATIONS MANAGER

This Report Contains  $\underline{\mathcal{T}}$  Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908090003	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		08/11/1999 09:30
Total Organic Carbon	5310 B		08/13/1999 17:32

### ANALYTICAL RESULTS

			Detection			
Miscellaneous Analyses	Result	Unit	Limit	Dilution	QC Batch	By
Total Organic Carbon	42.0	(mg/L C)	1	1	106438	jdt
Nitrate	0.04	(mg/L N)	0.01	1	106266	jdt

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Parameter	Units	<b>METH</b> Result	Detection			L <b>STANDARD</b> d Percent Recovery	Result	<b>DUPLICATE</b> Result 2	RPD	Spiked Amount	<b>SPIKE</b> Recovered Amount	l Percent Recovery
QC Batch 106266 Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>1.05</td><td>105</td><td>0.04</td><td>0.02</td><td>67 *</td><td>1.00</td><td>1.06</td><td>106</td></dl<>	0.01	1.00	1.05	105	0.04	0.02	67 *	1.00	1.06	106
<b>QC Batch 106438</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>48.9</td><td>98</td><td><dl< td=""><td><dl< td=""><td></td><td>50.0</td><td>52.5</td><td>105</td></dl<></td></dl<></td></dl<>	1	50.0	48.9	98	<dl< td=""><td><dl< td=""><td></td><td>50.0</td><td>52.5</td><td>105</td></dl<></td></dl<>	<dl< td=""><td></td><td>50.0</td><td>52.5</td><td>105</td></dl<>		50.0	52.5	105
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AMERICAN COMPORATION

LABORATORIES

WWC | 463 199 05277 / Due 8-1699

8600 Kanis Road Little Rock, AR 72204-2322 (501) 224-5060 FAX (501) 224-5072

### CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

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# **ANALYTICAL RESULTS**

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 08/19/1999** 

GCAL REPORT NO: 9905431

DELIVER TOWOODWARD CLYDE/BRWOODWARD CLYDE CONSULTANTS2882 ONEAL LANEBATON ROUGE, LA 70816ATTENTIONDENNIS REECE

CLIENT ID 0463

### SAMPLE CROSS-REFERENCE

#### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908160018	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

#### CASE NARRATIVE

Client: WOODWARD CLYDE/BR Date: 08/19/1999 **Group No:** 9905431

#### INORGANIC QUALITY CONTROL CRITERIA:

Holding Times: The Nitrate sample was added and analyzed out of hold time as requested by the client.

All other holding times were within method criteria.

Method Blanks: All method blanks were found to be within quality control criteria.

**Spike/Duplicate (S/D):** All S/D recoveries were within quality control criteria.

Laboratory Control Samples: All LCS analyses met quality control criteria.

**Calibration Verifications:** All ICV, ICB, CCV, CCB analyses met all quality control criteria.

Analysis Comments: No other unusual analytical problems were encountered during the analysis of these samples.

### LABORATORY ENDORSEMENT

Sample receipt at Gulf Coast Analytical Laboratories, Inc. is documented for your designated sample(s). Chainof-custody documentation, if provided, is included in this report.

Sample analysis was performed in accordance with Environmental Protection Agency protocol or other approved methods as designated in this report. All Quality Control criteria were found to be within Method Control Limits unless otherwise noted in the Case Narrative of this report. All results reported are to be considered Wet Weight Results unless dry weight determinations are made and the Case Narrative includes a statement that results are reported on a Dry Weight Basis.

<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

#### **REPORT QUALIFIERS**

\*\* These fields will appear in the analyst column

#### **ISO GUIDE 25 DECLARATION**

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We appreciate this opportunity to provide you with this analytical service. If we can be of further assistance, please do not hesitate to contact us at (225)769-4900.

OPERATIONS MANAGER

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908160018	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		08/16/1999 08:55
Total Organic Carbon	5310 B		08/18/1999 20:52

### ANALYTICAL RESULTS

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Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	52.0	(mg/L C)	1	1	106603	ktf
Nitrate	0.03	(mg/L N)	0.01	1	106462	bmc

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Parameter	Units	<b>METH</b> Result	Detection		ORY CONTROL Recovered Amount		t Result	<b>DUPLICATE</b> Result 2	RPD	Spiked Amount	<b>SPIKE</b> Recovered Amount	d Percent Recovery
<b>QC Batch 106462</b> Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.96</td><td>96</td><td>0.03</td><td>0.03</td><td>0</td><td>1.00</td><td>0.99</td><td>99</td></dl<>	0.01	1.00	0.96	96	0.03	0.03	0	1.00	0.99	99
<b>QC Batch 106603</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>48.8</td><td>98</td><td>3.0</td><td>3.0</td><td>0</td><td>50.0</td><td>55.7</td><td>111</td></dl<>	1	50.0	48.8	98	3.0	3.0	0	50.0	55.7	111
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# ANALYTICAL RESULTS

PERFORMED BY

### **GULF COAST ANALYTICAL LABORATORIES, INC.**

**REPORT DATE: 08/25/1999** 

#### GCAL REPORT NO: 9905600

DELIVER TOWOODWARD CLYDE/BR<br/>WOODWARD CLYDE CONSULTANTS<br/>2882 ONEAL LANE<br/>BATON ROUGE, LA 70816ATTENTIONDENNIS REECE

CLIENT ID 0463

## SAMPLE CROSS-REFERENCE

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908230013	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

,

#### CASE NARRATIVE

Client: WOODWARD CLYDE/BR Date: 08/25/1999 Group No: 9905600

#### INORGANIC QUALITY CONTROL CRITERIA:

Holding Times: The Nitrate was analyzed out of hold time as per the client request.

All other holding times were within method criteria.

Method Blanks: All method blanks were found to be within quality control criteria.

**Spike/Duplicate (S/D):** All S/D recoveries were within quality control criteria.

Laboratory Control Samples: All LCS analyses met quality control criteria.

**Calibration Verifications:** All ICV, ICB, CCV, CCB analyses met all quality control criteria.

Analysis Comments: No other unusual analytical problems were encountered during the analysis of these samples.

### LABORATORY ENDORSEMENT

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<dl< th=""><th>RESULT IS LESS THAN THE DETECTION LIMIT</th></dl<>	RESULT IS LESS THAN THE DETECTION LIMIT
DO	PARAMETER WAS DILUTED OUT
fld **	PARAMETER WAS PERFORMED IN THE FIELD
MI	MATRIX INTERFERENCE
NA	NOT APPLICABLE
ND	NOT DETECTED
subc **	ANALYSIS WAS SUBCONTRACTED
TNTC	TOO NUMEROUS TO COUNT
00:00	TIME NOT PROVIDED OR MIDNIGHT

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OPERATIONS MAN GER

This Report Contains  $\mathcal{F}$  Pages.

### SAMPLE IDENTIFICATION

Sample#	Matrix	Sample ID	Sample Date	Receive Date
9908230013	WATER	MW-17	07/23/1999 12:00	07/24/1999 08:30

### **METHOD SUMMARY**

Test	Method	Prep Date	Analysis Date
Nitrate	EPA353.2-NO3		08/23/1999 09:40
Total Organic Carbon	5310 B		08/25/1999 03:18

### **ANALYTICAL RESULTS**

Miscellaneous Analyses	Result	Unit	Detection Limit	Dilution	QC Batch	By
Total Organic Carbon	255	(mg/L C)	1	1	106830	jdt
Nitrate	0.31	(mg/L N)	0.01	1	106751	bmc

Parameter	Units	Result	OD BLANK Detection Limit		ORY CONTROL Recovered Amount		Result	DUPLICATE Result 2	RPD	Spiked Amount	SPIKE Recovered Amount	
QC Batch 106751												
Nitrate	(mg/L N)	<dl< td=""><td>0.01</td><td>1.00</td><td>0.95</td><td>95</td><td>0.31</td><td>0.29</td><td>7</td><td>1.00</td><td>0.84</td><td>84</td></dl<>	0.01	1.00	0.95	95	0.31	0.29	7	1.00	0.84	84
<b>QC Batch 106830</b> Total Organic Carbon	(mg/L C)	<dl< td=""><td>1</td><td>50.0</td><td>51.6</td><td>103</td><td>16.2</td><td>15.9</td><td>2</td><td>50.0</td><td>47.4</td><td>95</td></dl<>	1	50.0	51.6	103	16.2	15.9	2	50.0	47.4	95
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AMERICAN WWC/46.

CORPORATION

LABORATORIES

WWC/463/9405600/ Nue 8-30-47

8600 Kanis Road Little Rock, AR 72204-2322 (501) 224-5060 FAX (501) 224-5072

### CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

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