

EXPERT REPORT

STATE OF LOUISIANA AND  
THE VERMILION PARISH SCHOOL BOARD, et al

Vs.

THE LOUISIANA LAND AND EXPLORATION COMPANY, et al  
SUIT NO. 82.162, DIVISION "D"  
FILE NO. 12224-S

15<sup>TH</sup> JUDICIAL COURT FOR THE PARISH OF VERMILION  
STATE OF LOUISIANA

Prepared By

BAYOU CAJUN ENVIRONMENTAL, SOIL, AND WETLAND SERVICES, INC.  
18729 RUSS ROAD  
ABBEVILLE, LOUISIANA 70510

B. Arville Touchet  
Consultant Soil Scientist  
Licensed Professional Geoscientist

Prepared For

MR. VICTOR GREGOIRE, PARTNER  
KEAN MILER, HAWTHORNE, D'ARMOND, McCOWAN & JARMAN, LLP  
ONE AMERICAN PLACE  
301 MAIN STREET, SUITE 1800  
BATON ROUGE, LOUISIANA 70801

June 16, 2010

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Appendix:(Figure 1 MP & A—Sample Locations):

Vitea of Curriculum  
Rate of Compensation

References:

Soil Survey of Vermilion Parish, La. —USDA—SCS May 1996  
Chemistry of the Soil—Firman E. Bear--1965  
Geology of Cameron and Vermilion Parishes—Nov. 1, 1935  
Soil Taxonomy, Second Edition—USDA—NRCS, 1999

## IDENTIFICATION AND DESCRIPTION OF PROPERTY

The area of interest is located in the Community of Little Prairie, Louisiana. It is southwest of Abbeville, Louisiana, along and west of LA Hwy. 82. Accessed by boat through Schooner Canal, it is located between LA Hwy 82 and Lac Blanc.

It is the Vermilion Parish School Board Section 16, T15S, R1W.

## SOILS, LANDFORMS, AND SURFACE GEOLOGY

This section of land is located on Holocene marsh. This emergent vegetative marsh is less than 10,000 years old. It consists of organic soils greater than 48 inches thick on top of soft clays. In the immediate area, this organic soil and soft clays sit on top of Beaumont-age formation in the form of a river meander belt.

These Holocene-age sediments (marsh soils) were deposited on top of the Beaumont Formation in the last 10,000 years or after sea level attained its present level. The mineral Holocene deposits were and still are derived from the Gulf of Mexico and are naturally saline. Their smectic mineralogy indicated that they really are Mississippi River mud that was salted by saline Gulf of Mexico water while in transport from the Mississippi River delta to the Cheniere Plain by long shore currents.

The coastal Chenieres, which are actually barrier islands in a soft mud and organic marsh, offers some protection from salt-water intrusion from the Gulf of Mexico. This protection from saltwater intrusion gave rise to non-saline organic soil layers on top of soft saline Mississippi River marine mud.

Hurricanes Audrey, Rita, and Ike in recent times have deposited salt waters in the organic layers and recharged the salinity in the soft saline Mississippi River marine muds.

## RETENTION OF B. ARVILLE TOUCHET, CONSULTANT SOIL SCIENTIST AND LICENSED PROFESSIONAL GEOSCIENTIST

Arville Touchet is an international expert in soil and crop science, soil and land classification, land reclamation of salt-impacted areas, soil chemistry, soil physics and wetland expert. He was retained to evaluate the land and analytical data for potential adverse effects of salt on soils and vegetation of the area and design a plan for soil remediation if deemed necessary.

## HISTORY IN BRIEF

Louisiana Land and Exploration Company, et al is being sued by the State of Louisiana and the Vermilion Parish School Board for alleged soil contamination in parts of Section 16, T15S, R1E of Vermilion Parish area said to be caused by activities of exploration and production oil and gas on the property belonging to the plaintiff.

The area of interest is presently in floatant marsh, which produces wetland wildlife and fish.

## SOIL SURVEY OF VERMILION PARISH

According to the Soil Survey of Vermilion Parish issued May, 1996 by USDA—SCS and Louisiana Agricultural Experiment Station, the soil types mapped in the area of interest are the Allemands soil series.

The Allemands soil series consists of very poorly drained soils that formed in moderately thick accumulations of decomposed herbaceous material overlying soft clayey saline coastal muds. These soils are in fresh water coastal marshes that are ponded and flooded most of the time. They are protected from regular daily saline tides by the Cheniere, which are actually barrier islands between them and the Gulf of Mexico. Nevertheless, strong wind tides and hurricane surges such as Hurricanes Audrey, Rita, and Ike brought in saline water to this fresh water marsh and added salt to the soil matrix.

Saline water from Hurricane Rita inundated the marsh and the toe of the Beaumont Formation behind the Cheniere Barriers for weeks and killed off most of the fresh water emergent vegetation.

Hurricanes Ike and Audrey had the same impacts, but not as ravaging as Hurricane Rita as far as depth of water and duration of flooding.

To the east of the Allemands soil series province is the Clovelly soil series. The Clovelly soil series consist of very poorly drained organic soils that formed in moderately thick accumulation of herbaceous plant material overlying soft clayey saline coastal muds. They are found in brackish marshes.

The line between the fresh water marsh of the Allemands soil series and the brackish water marsh of the Clovelly soil series moves the tides and hurricane surges. In fact, the soils in the area of interest are actually in brackish water from Hurricanes Rita and Ike.

## ELECTRICAL CONDUCTIVITY AND SHALLOW SOIL SEDIMENT SAMPLING PLAN

A shallow soil sediment-sampling plan was designed to produce at least 10 "background" salinity analytical data and 23 "on site" salinity analytical data. A brief summary of these 33 shallow soil sediment sample laboratory analytical data follows:

### 10 Background Plots

Highest EC @ 0-2'-19.1 mmhos/cm @ plot 3  
Highest EC @ 2-4'-24.6 mmhos/cm @ plot 2  
Lowest EC @ 0-2'-10.7 mmhos/cm @ plot 5  
Lowest EC @ 2-4'-8.2 mmhos/cm @ plot 8  
Highest ESP @ 0-2'-16.4% @ plot 2  
Highest ESP @ 2-4'-28.1% @ plot 2  
Lowest ESP @ 0-2'-9.3% @ plot 9  
Lowest ESP @ 2-4'-6.6% @ plot 7  
Highest SAR @ 0-2'-19 @ plot 2  
Highest SAR @ 2-4'-23.4 @ plot 2  
Lowest SAR @ 2-4'-8.47 @ plot 5  
Lowest SAR @ 2-4'-7.63 @ plot 7  
EC average @ 0-2'-13.41 mmhos/cm  
EC average @ 2-4'-14.23 mmhos/cm  
ESP average @ 0-2' 12.54%  
ESP average @ 2-4'-14.74%  
SAR average @ 0-2'-12.54  
SAR average @ 2-4'-12.83

### 23 On-Site Plots

Highest EC @ 0-2'-23.6 /mmhos/cm @ plot 30  
Highest EC @ 2-4'—39.6 mmhos/cm @ plot 31  
Lowest EC @ 0-2'—7.14/mmhos/c @ plot 24  
Lowest EC @ 2-4'-5.73 mmhos/cm @ plot 15  
Highest ESP @ 0-2'-32.7% @ plot 29  
Highest ESP @ 2-4'-56.1% @ plot 30  
Lowest ESP @ 0-2'-6.5% @ plot 19  
Lowest ESP @ 2-4'-5.3% @ plot 20.  
Highest SAR @ 0-2'-27.7 @ plot 29  
Highest SAR @ 2-4'-65.7 @ plot 30  
Lowest SAR @ 0-2'-8.64 @ plot 11  
Lowest SAR @ 2-4'-7.20 @ plot 11  
EC Average @ 0-2'-14.02 mmhos/cm  
EC average @ 2-4'-15.10 mmhos/cm  
ESP average 0-2'-13.28%  
ESP average 2/-4'-15.56%  
SAR average 0-2'-15.87  
SAR average 2-4'-18.05

## CONCLUSIONS

The highest EC readings were from sample sites 30 and 31 within the area of interest; ~~mostly around the tank batteries.~~ The highest EC recorded was 39.6 mmhos/cm. Gulf salinity is EC 35. Conversely, the lowest EC readings were from sites 24 and 15 also within the area of interest. In fact, the lowest EC reading recorded was 5.73 mmhos/cm at site 15 near the center of Section 16.

Laboratory data collected during the soil survey of both Vermilion and Cameron Parish taken in the soft saline Mississippi River marine mud indicated EC's between 10 and 14 mmhos/cm. The last two hurricane surges were 12 feet high or more and stayed on the marshes for more than two weeks. Low rainfall after the hurricanes caused water to evaporate concentrating the salinity in the whole Mermentau Basin. Leaks of salt water into the basin at Black Bayou Locks also contribute to the salinity of the Basin.

The EC of 39.6 mmhos/cm at site 31 is greater than the salinity of the Gulf of Mexico by nearly 6 mmhos/cm. ~~There is no doubt in my mind that produced water raised the EC by about 25 mmhos/cm at that sample site.~~ Data such as this are not extensive. About 200 feet northeast of site 31 is site 24. Site 24 data shows EC's of 7.14 and 7.30 mmhos/cm.

## RECOMMENDATIONS:

I recommend that as far as salinity is concerned that we do not destroy any more marsh to remediate this area. This area is in transition from fresh water marsh on soft saline Mississippi River marine mud to brackish water marsh soft saline Mississippi River marine mud. Without storm protection and strict saline water control structures (navigational locks), it probably will become saline water marsh on soft saline Mississippi River marine mud.

If the saline water conversion is slow, the soil and vegetation will change to accommodate the water changes. If the saline water conversion is rapid, the emergent vegetation will be decimated and in its place we will have open water.

I will amend this report according to new or additional data that may become available to me.



*Bayou Cajun Environmental, Soil & Wetland Services Inc.*

18729 Russ Rd. • Abbeville, LA 70510 • B. Arville Touchet, Soil Scientist  
Email: bayoucajun@kaplantal.net Phone: (337) 643-1644 Fax: (337) 643-1644  
Tax #: 72-1222016



June 14, 2010

Mr. Victor Gregoire  
Kean Miller  
One American Place  
301 Main St., Suite 1800  
Baton Rouge, La. 70801

RE: Expert Report for State of Louisiana and The Vermilion Parish School Board, et al  
vs. The Louisiana Land and Exploration Company, et al—Suite No. 82.162, Division  
“D” –File No. 12224-S in 15<sup>th</sup> Judicial Court for the Parish of Vermilion, State of  
Louisiana

Dear Mr. Gregoire:

Bayou Cajun Environmental, Soil and Wetland Services, is pleased to overnight deliver  
this report concerning the above referenced matter.

These reports present opinion based upon soil description, field EC testing, sampling with  
HET, literature review, laboratory analysis and data evaluation.

Sincerely,

A handwritten signature in cursive script that reads "B. Arville Touchet".

B. Arville Touchet  
Consultant Soil Scientist  
Licensed Professional Geoscientist

Attachments: Expert Report  
Invoice

Copy: Ms. Shelby Wilson  
King & Spalding  
1100 Louisiana, Suite 4000  
Houston, Texas 77002-5213



**Bayou Cajun Environmental, Soil & Wetland Services Inc.**

18728 Russ Rd. • Abbeville, LA 70510 • B. Arville Touchet, Soil Scientist  
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**Note:** The following itemized bill was calculated on a pre-job proposal. Any questions concerning this bill should be directed to the attention of Arville Touchet of Bayou Cajun Environmental, Soil & Wetland Services Inc. at the address shown above on this statement.

Invoice # 4352	Billing Date: 6/16/2010		
Beginning Job Date: 4/7/2010	Ending Job Date: 6/15/2010		
Client: The La. Land & Exploration Co. et al vs. State of La.-Vermilion Parish School Board—East White Lake field			
Job description: With Victor Gregoire of Kean Miller of Baton Rouge, La. 4/7,9,13,28/2010: reviewed ICON data; maps and Coastal Environmental report and photos. 5/6 & 24, 2010—Reviewed more ICON data remediation plan. 5/25/2010: Field trip to E. White Lake—6/12,13,14/2010. Suit #82,162 Div." D" 15 <sup>th</sup> JDC-Vermilion Parish, La. File #12224-15 <u>Prepare Report</u>			
<i>Services</i>	Qty.	@	Total
Fee: Office—4/7,9,17,28/2010: ICON data, CE report & photos. 5/6 & 24/2010: ICON data remediation plan. 6/12,13,14/2010: E. White Lake report	80 hrs.	125/hr.	10,000
Fee: Field—5/25/2010: Field trip to E. White Lake	8 hrs.	125/hr.	1,000
Services Total:			11,000
<i>Expenses</i>	Qty.	@	
Lodging:		/day	
Meals:		/day	
Traveling: Air fare:			
Car rental:			
Fuel:			
Car usage:	20 mi.	.585/mi.	11.70
Phone:			
Other: Copies of report, overnight mail, etc.			40.30
Expenses Total:			52.00
<i>Miscellaneous</i>	Qty.		
Misc. Total:			
Payment is due within 30 days of billing date. A service charge of 1.5% per month will be charged on delinquent accounts.	Services Total:		11,000
	Expenses Total:		52
	Total amount due:		11,052