

**Lithium Exploration Group Seismic Assessment of Oil Deposits:  
Sulfur Louisiana**

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**OVERVIEW**

This document is a review of a 3D seismic survey planned for selection of petroleum drilling sites for Lithium Exploration Group (Alex Walsh) in Sulfur Louisiana. This review commenced on August 17, 2017 and provides assessment of seismic data acquisition and interpretation from initial staging of shot points and acoustic receivers through all steps in data processing and interpretation. Assessment is based on observation and discussions on all activity. The following text provides continuous updates on reviews and discussions.

**SEISMIC DATA – CHARGES AND RETREIVAL OVERVIEW**

The review of this work site was provided with a tour from GeoSURVEY Systems, August 17, 2017. Seismic profiling was organized and conducted with 1118 shot points (Figure 1) set with 2 lb charges, 25ft down in land soil and marsh and lake sediment (Figure 2). Seismic data was be retrieved with 1812 10Hz landphone, marshphone, and hydrophone (Figure 3) acoustic receivers. The target depth is set in the range of 4000 to 4500 ft and data retrieval is planned with an initial primary focus on P-wave assessment. Seismic data were transferred to a mobile computer lab for initial interpretation (Figure 4).

Common acoustic data retrieval studies focus on P-waves (primary wave) and S-waves (secondary wave). With ground and sediment being nearly incompressible, P-waves transmit energy easily and quickly through the medium. This is the fastest form of a seismic wave, and, consequently, first to arrive at a seismic data station. The P-wave can move through solid rock and fluids, like water or the liquid (oil) layers. This wave changes velocity as a function of variation in the system geology between hard rock, sand, clay, gases and fluids (petroleum and water). S-waves are shear waves, with a perpendicular direction relative to the propagation wave. S-waves do not pass through gases and liquids and wave impedance provides the opportunity to identify oil and water layering. Initial assessment in this study focuses on P-waves. Given the

extensive thorough distribution of shot and P-wave data collection points for this study, spatial variation in transport velocity can be applied for interpretation of gas and liquid loadings. If there is uncertainty in petroleum deposits with the P-wave evaluation, interpretation of S-wave data will refine seismic assessment. Interpretation of S-wave profiling can also contribute to assessment of deep petroleum layering.

Figure 1: Location of land, marsh and lake shock points and acoustic receivers.

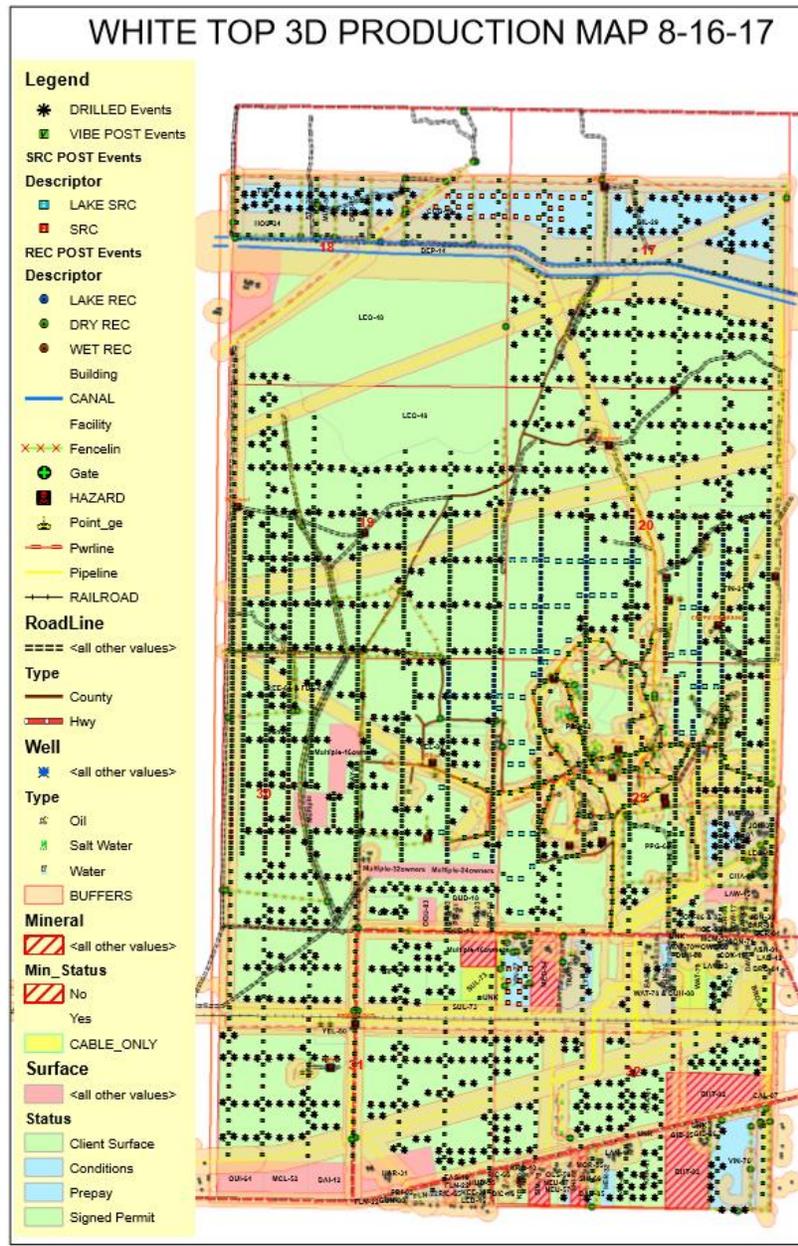


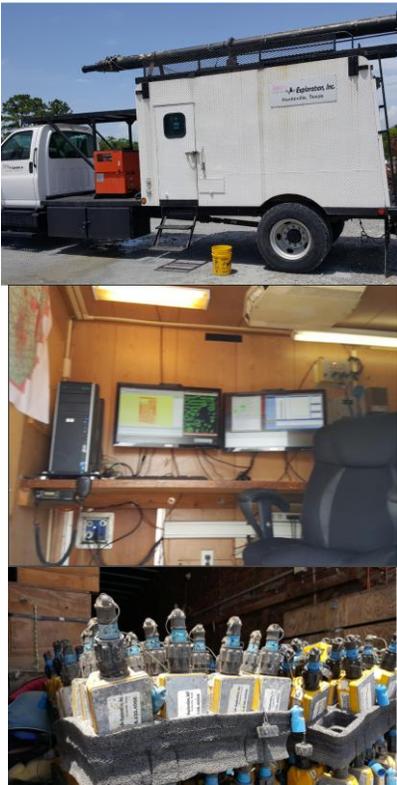
Figure 2: Land, lake and marsh based shot point installation gear.



Figure 3: Lake, land and marsh acoustic data collection.



Figure 4: Seismic data sending and receiving operations.



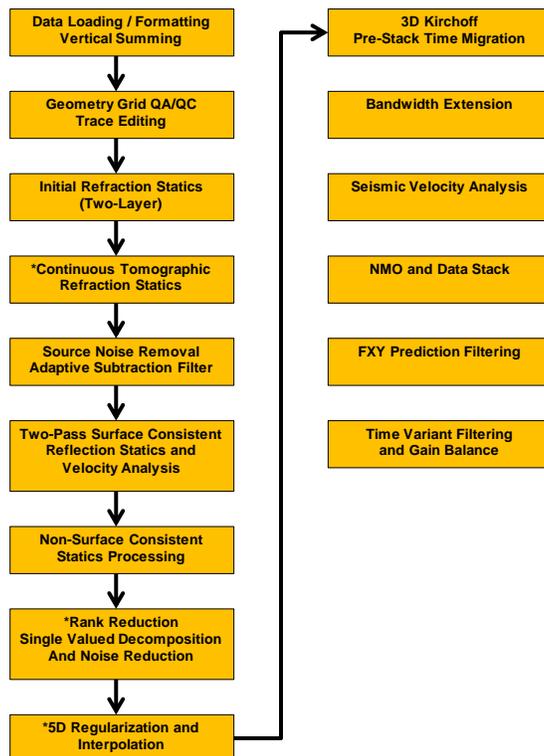
## SEISMIC DATA PROCESSING

Acquired seismic data is being processed and interpreted by GeoSURVEY Inc., a broad geology-geophysics company that has experience with land and ocean geophysical surveys using sea, land and aircraft. Their data acquisition protocol and interpretation includes 2D and 3D seismic, electrical resistivity, electromagnetics, gravity and magnetometry. This data acquisition capability has been applied to oil and gas exploration, mineral exploration, geo-engineering, geotechnical and civil engineering and environmental assessment and monitoring at a broad range of locations around the world and provides extensive experience that will result in thorough assessment of the current study site.

For this study, 3D seismic data were obtained through a thorough spatial distribution of dynamite charges (1118 shot points) set below surface in land, marsh and lake locations. Acoustic receivers (10Hz) retrieved data for seismic processing at 1812 locations. This staging for the seismic data interpretation was a through distribution of receivers and is expected to provide an in depth interpretation of sites for petroleum loading as well as strata laying and fractures. While initial focus is set for 2500-4500 ft, retrieved data can be processed for prediction of potential deep focus sites in the future. Initial seismic data assessment is conducted according to Figure 5 where exact steps through the processing depend on the initial data quality. This data retrieval is expected to provide very thorough assessment of near surface reservoirs as well as potential for future deep prospects.

Figure 5: 3D Seismic data processing flow chart for protocol applied to Sulfur LA seismic data.

General 3D Seismic Data Processing Flow



LEXG and Strategic Carbon LLC conducted an initial discussion regarding the status of data processing on December 12, 2017 in the GeoSURVEY in Houston TX. Representatives of LEXG included Alex Walsh, Lee Long and Richard Coffin (SCLLC) and key representatives of the processing team. Discussions pertaining to the data processing focused on; 1) the total data processing schedule; 2) initial data interpretation, and 3) subsequent data interpretation. The following text is a review of this discussion.

#### **A. Scheduling**

- 1) Current data analysis status – There has been a thorough and productive initial data review. Results of this review are outlined in the subsequent review categories.
- 2) Next data discussions – A comprehensive overview of initial observation of refractions, bright spots and fractures is planned to be available around January 7. This data will be available online for review by L. Long and R. Coffin. A discussion of this stage of the seismic data analysis will be planned around January 17.
- 3) Time depth and velocity profiles – Initial time depth and velocity passes will be completed by the first week of February. These data will be provided on line to L. Long and R. Coffin for a second round in the review. It is expected this data set will start to set an initial overview of 3-5 drill sites. The second data interpretation meeting will be planned in Houston for around February 15.

#### **B. Initial Data Interpretation**

- 1) Data quality – The initial data quality assessment was provided through discussions with the processing team and a brief initial 2D view of acquired data. There were strong statements of a high quality conventional attribute seismic data profile in discussions with the processing team. In this initial observation provided there was a clear observation of vertical wiggle fault patterns representative of fluid and gas vertical migration and very strong bright reflections at 3.5 second acoustic return times suggesting clear locations of oil layers. Initial seismic data was also well defined through longer return times indicating potential for a very thorough shallow and deep data assessment. This clear high quality data pattern is not commonly observed during the initial seismic data processing and suggests strong capability for thorough shallow and deep oil assessment.
- 2) Distribution of existing well logs – We discussed availability of existing well log data to provide capability of more accurate new seismic data interpretation. It was stated that there are approximately 305 wells in the study area and there can be a review of; 1) resistivity logs to differentiate between layers filled with salty water versus hydrocarbons, 2) gamma ray to assess vertical distribution of sands, shale and siliclastic layering, and 3) sonic logging to determine vertical profile variation in lithology, rock texture and porosity. The selection of locations for interpretation of the well log data will be based on a thorough review of the initial seismic data processing.
- 3) Bright spots and wiggle fault patterns – There is a clear initial observation of bright spots indicative of oil layering and wiggle faults patterns that indicate vertical fluid and gas migration. The initial data interpretation will provide an overview of shallow and deep spatial variation in these patterns.

### C. Subsequent Data Interpretation

- 1) Spatial variation in structural and stratigraphic petroleum traps – A key to focus on the selection of drill sites will be a thorough evaluation of shallow and deep structural and stratigraphic layering where oil is concentrated. This will be assessed with the following data review.
- 2) Previous seismic data integration - Existing 2D and 3D data from 1992 and 1997 surveys is present and will be reviewed for potential integration with the new data to provide a more thorough overview of shallow and deep oil layers.
- 3) S-wave data interpretation – As described above consideration of horizontal S-wave data integration with P-wave will provide a more complete assessment of the oil layers in the deep system and toward the boundaries of the new seismic survey. There was a general consensus that inclusion of S-wave processing would be a strong contribution to the data processing and should be included to provide a complete site assessment.
- 4) Additional Parameters – There was a discussion on additional parameters that could be included for the seismic data interpretation. Selection will be based on the review of the initial data set. One key focus for refining the data interpretation is deconvolution and integration with well logs, common midpoint stacking, and seismic time migration. This will provide accurate estimates of the oil layer depths. Further data interpretation with instantaneous amplitude, phase and frequency assessment for an overview of rock, fluid formation and pressure; reflection continuity and reservoir edge compartments, subtle faults and stratigraphic pinchouts, and conversion to 3D coherency volume for refined review of fault intensity and patterns will assist in prediction of the oil volumes.

### CURRENT STATUS SUMMARY

Initial evaluation of this high-quality data show clear and consistent seismic patterns required to select drill site locations. These data will provide a robust selection of shallow and deep drill sites; with shallow sites being the initial focus. With initial data processing well underway certain bright spots and wiggle fractures are easily identified. These bright spots do assist in the initial assessment of oil drilling site locations. A combination of bright spots and fracture assessment provide initial insurance for long term oil acquisition. After completion of this first round in the seismic data will be integrated with well log data and previous 2D and 3D seismic data to focus selection of drill sites and provide an initial estimate of the oil loading. With the current status in seismic data processing we predict an opportunity to identify 3 shallow well sites by the end of February 2018.