

# Geophysical Prospecting

Geophysical field operations, which collect data for producing geological structural and stratigraphic models, help define drilling targets. Geophysical data does not directly detect oil and gas resources. This data defines geologic structures that could potentially contain an oil or gas reservoir. Geophysical operations are strictly permitted and inspected in order to minimize environmental impacts and ensure public safety. Refining drilling targets with geophysical data greatly reduces overall surface impacts by reducing the number of exploratory wells necessary to discover new oil and gas fields.

Geophysical permit application types:

**Gravity Surveys** – Precise gravity measurements can detect small differences in deep rock density that can aid geologic mapping.

**Magnetic Surveys** – Regional magnetic measurements also can detect deep rock anomalies.

**Seismic Surveys** – Reflection and refraction data of induced sound waves are the industry’s primary tool for geologic modeling and drilling target selection. There are two basic types of seismic exploration:



*Geophysical Drill Buggy in South Florida*

## I. Explosive energy source:

- Explosives (typically 1.1-5.5 lbs) are detonated at regular intervals in shallow boreholes (typically 100 feet deep) as energy sources for sound pulses that reflect off geologic structures.
- Specialized microphones (“geophones”) deployed at the surface capture timing and intensity data from the reflected sound pulses.
- The data is processed and calibrated with nearby well data to model deep stratigraphy and geologic structures.

## II. Vibrating energy source:

- Specialized vehicles are used that vibrate the ground with sound pulse signals that can be recognized by geophones.

- This type of seismic prospecting is faster and has fewer surface impacts, but is less accurate, particularly for deep targets.

Geophones deployed in two-dimensional arrays at the surface can collect sufficient data to construct three-dimensional geological structural models.

*The oil and gas process is governed by Chapter 377, Florida Statutes, and Rules 62C–25 through 62C-30, Florida Administrative Code. The Department’s pollution control authority is also applicable to drilling.*