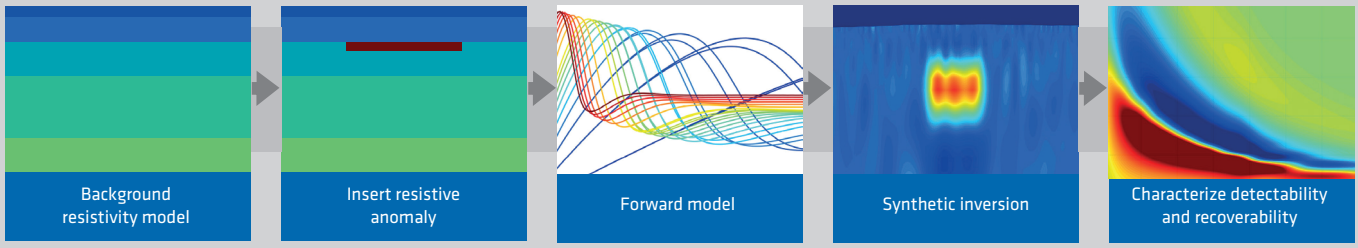
TechNote

Towed Streamer EM



Towed Streamer EM – Feasibility Studies

PGS conducts EM feasibility studies in order to confirm that the Towed Streamer EM system will be sensitive to changes in target resistivity. A typical feasibility study involves forward modeling for a range of water depths, target depths, target sizes and resistivity scenarios. A feasibility study is not a pre-requisite to EM acquisition; rather it is a useful first step when looking at new areas or play types.

Feasibility Study Principles

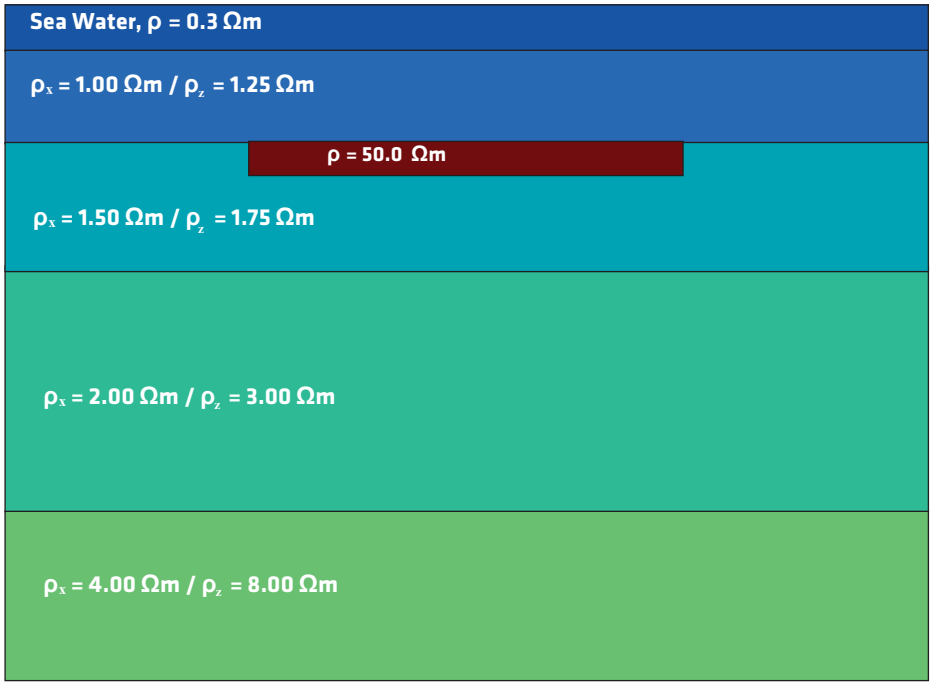
EM specialist geophysicists generate a layered background resistivity model, the structure of which can be influenced by well logs, seismic data, bathymetry and oceanographic information. The model is designed to reflect the realistic background resistivity of the study area of interest. The next stage is to insert a 3D resistive anomaly or target into this model, targets can be characterized by variations in areal extent, resistivity, burial depth and thickness. Synthetic data is generated through forward modeling of a 3D resistive anomaly in a 1D background, noise from field data is included in the process to ensure it is as realistic as possible. Finally detectability is determined for a range of modeled targets, providing a clear image of

Feasibility Study Input Data

Minimum Input Data	Additional Data
Water depth	Location
Target depth	Geological information
Target areal extent	Analogue well(s)
Target thickness	Main horizons of interest
Target resistivity (if available)	Depth maps
Background resistivity	Geo-seismic sections

KEY BENEFITS

- Ensures Towed Streamer EM is used in appropriate exploration scenarios to reliably derisk exploration decision making
- Early customer involvement ensures maximum value is extracted from the data through improved understanding of capabilities and limitations
- Optimal frequency and offset range is determined for survey design to provide best possible target imaging



Example of a layered background resistivity model with a resistive anomaly (target) included

minimum detectability criteria under different assumptions.

Detectability Characterization and Deliverables

An initial first pass feasibility study provides a report describing the work done, including the scenarios modeled and which parameters were varied. Further work can then be conducted if the results are marginal. Analysis of the detectability of each target scenario is undertaken through a review of the feasibility metrics including target response, signal to noise ratio (after the inclusion of realistic noise), sensitivity matrix and where appropriate, synthetic inversion results. The detailed analysis of these metrics is included in the feasibility study report, as is a table for detectability characterization.

Impact of High Density Data on Recoverability

The EM streamer has 72 offset pairs, ranging in length from 200 m at the near offset to 1 100 m at the far offset; this provides exceptionally dense resistivity data, rich in both offsets and frequencies. This rich dataset enables target driven optimization of data selection for inversion. These parameters can be evaluated during the feasibility study phase of a project, ensuring selection of the frequencies and offsets which will be most useful to image the target in question. The benefit of this when interpreting the Towed Streamer EM data is higher resolution (especially in the shallow subsurface) and improved reliability when integrating the resistivity data with seismic. Confidence in the results of QI workflows is improved when compared to more sparsely sampled resistivity data, this increased confidence results in improved decision making. As with all geophysical techniques, a more densely sampled dataset provides the basis for more confident data manipulation and interpretation, ultimately reducing exploration risk.

Request a Feasibility Study

To contact PGS about a Towed Streamer EM feasibility study, or for more information – EM@PGS.com

Target	Areal extent/thickness	HC saturation	Detectability
Target A: Large	4km x 6km x 60m	High	Good
		Moderate	Good
		Low	Good
Target A: Small	2km x 4km x 25m	High	Good
		Moderate	Marginal
		Low	Poor

Example detectability characterisation table