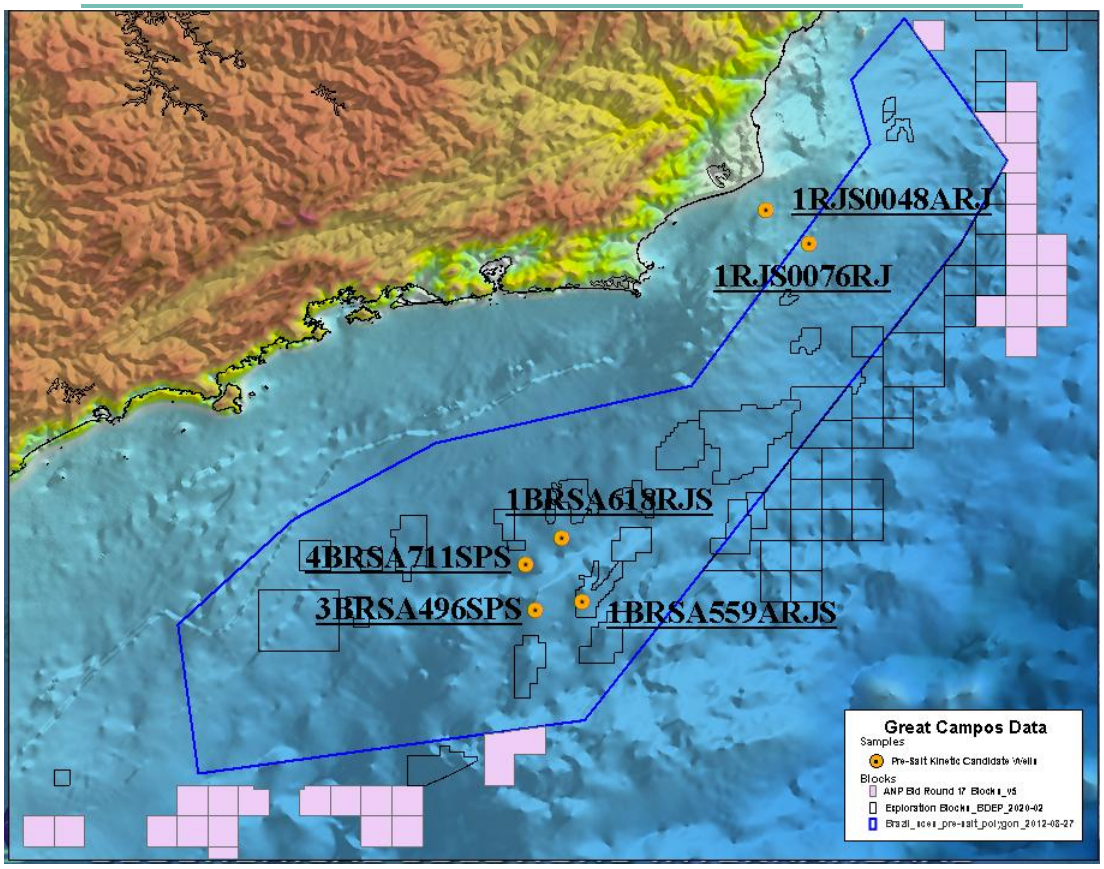
GEOCHEMICAL SOLUTIONS INTERNATIONAL

DETERMINTATION OF KINETIC PARAMETERS FOR PRE-SALT SOURCE ROCKS FROM THE SANTOS AND CAMPOS SUB-BASINS, SOUTHEAST BRAZIL



A New Study from

GEOCHEMICAL SOLUTIONS INTERNATIONAL, INC.

2021

Prospectus

Executive Summary

GEOCHEMICAL SOLUTIONS INTERNATIONAL INC. (GSI) has conducted a study to determine oil generation reaction kinetic data (activation energies and frequency factors) for several key oil-prone source rocks from the Santos portion of the geologically complex pre-salt polygon defined within the Great Campos Basin. The success of petroleum exploration efforts in this area often depends on basin modeling techniques that require a firm understanding of a multitude of variables including the maturation limits at which the onset, main phase and "peak", or end of oil generation is reached. Since different kerogen types respond differently to the effects of burial (i.e., increasing time and temperature), it's important to know oil generation window limits, particularly when both Type I source rocks (pre-salt) and Type II (post-salt) source rocks are present.

Identification of specific intervals of interest was based on detailed bitumen and kerogen data obtained from the **2018 Santos Basin Pre-Salt Source Rock and the 2000 Great Campos Source Rock studies**. The current study includes thirty (30) sidewall core samples (SWC) representing pre-salt sections sampled by the wells listed below.

Well	Operator Name	CADASTRO	Latitude	Longitude	Datum	TD (m)	Water (m)
1-BRSA-559A-RJS	1RJS652ARJS	74316023181	-25.502398	-42.441483	SIRGAS2000	5773	2197
1-BRSA-618-RJS	1RJS656RJS	74316023043	-24.986633	-42.614065	SIRGAS2000	6080	2224
3-BRSA-496-RJS	3RJS646RJS	74316022315	-25.572295	-42.829330	SIRGAS2000	5316	2172
4-BRSA-711-RJS	4RJS747RJS	74316023710	-25.197202	-42.907707	SIRGAS2000	5802	2213
1-RJS-0076-RJ	1RJS 0076 RJ	742810022400	-22.573815	-40.601212	SIRGAS2000	4927	122
1-RJS-0048A-RJ	1RJS 0048A RJ	742810013300	-22.305776	-40.947232	SIRGAS2000	3545	50

Following collection of core samples from storage facilities in Rio and shipment to Stratum Reservoir lab in Houston, samples were first screened for total organic carbon content and by pyrolysis. These results were used to identify eight (8) candidate samples that were first subjected to soxhlet extraction and the extract residue then analyzed by pyrolysis-gas chromatography (PY-GC). The resultant thermal decomposition 'fingerprint' was used to classify organic matter type and to predict likely product. Kinetic parameters were determined by a 5-temp programmed microscale pyrolysis technique to measure the evolution rate of total volatile hydrocarbons using a flame ionization detector (FID) in the Source Rock Analyzer (SRA) pyrolysis unit.

Kinetic data was processed using the Lawrence Livermore Kinetics 2015 software and deliverables include geomodelling data for a discrete distribution with a floating A factor, a discrete geomodel with a fixed A factor of 1.0 + 14/sec and a final gaussian geomodel that are summarized in a brief synthesis of pertinent results.

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