

TABLE OF CONTENTS

	<u>Page</u>
Proprietary Notice	i
Executive Summary	ii
Table of Contents	vi
List of Figures and Tables	vii
Section A. Santos Basin	
Introduction	A-1
Tectonic and Stratigraphic Evolution	A-1
Source Rocks	A-14
Reservoirs	A-14
Biodegradation	A-18
Oil Geochemistry	A-18
Exploration Implications	A-21
Section B. Petroleum Geochemistry and Correlation	
Introduction	B-1
Conclusions	B-2
Results and Discussions	
Crude Oil Quality	B-5
Whole Oil Gas Chromatography	B-9
Stable Carbon Isotopic Compositions	B-11
Biomarker Distributions	B-14
GC/MS Results	B-15
GC/MS-MS Results	B-26
Thermal Maturity	B-27
Multivariate Statistical Analysis	B-30
References/Bibliography	B-36
C. Appendixes	
A. Experimental Procedures	C-1
B. Biomarker Peak Identifications	C-3
C. Metastable Reaction Monitoring (MRM) results	C-4
D. Geochemical Summary Sheets	C-16

LIST OF FIGURES AND TABLES

	<u>Page</u>
Section A. Santos Basin	
A1. Location map of the Santos Basin	A-1
A2. Location map of the Santos Basin with main tectonic features	A-2
A3. Reconstruction of rift phase displaying volcanic activity	A-3
A4. Stratigraphic chart of the Santos Basin	A-4
A5. Satellite-derived crustal Bouguer gravity anomaly map of the southeastern Brazilian region	A-6
A6. Interpreted seismic section across the Santos Basin and São Paulo Plateau	A-8
A7. Interpreted seismic section across the Santos Basin and São Paulo Plateau	A-9
A8. Cross-section along the strike in the northern part of the Santos basin	A-11
A9. Dip-oriented cross-section showing the Cabo Frio Fault	A-12
A10. Structural contour of the evaporite sequence along the Santos Basin	A-13
A11. Geologic cross section through Merluza Oil Fields	A-15
A12. Geologic cross section through the Tubarão oil field	A-16
A13. Permeability as a function of porosity, Guarujá Fm., Santos Basin	A-17
A14. Cluster analysis Dendrogram for Santos oils	A-20
A15. Location map of Santos oil families	A-21
B. Petroleum Geochemistry and Correlation	
B1. Location of Santos oils included in the present study	B-1
B2. Physical properties of Santos oils.	B-7
B3. Distribution of API gravities in Santos Basin	B-7
B4. Wt. % sulfur versus aromatic/saturate ratio for Santos oils	B-8
B5. Distribution of sulfur content in Santos Basin	B-8
B6. Representative whole oil gas chromatograms for Santos oils	B-10
B7a. Pristane/Phytane versus Pristane/n-C ₁₇ for Santos Oils	B-12
B7b. Isoprenoid ratios for Santos Oils	B-12
B8. Stable carbon isotopic compositions of Santos oils	B-13
B9. Pristane/Phytane versus del Oil for Santos Oils	B-14
B10a. Tricyclic terpane mass chromatograms (m/z 191) for Santos oils	B-17
B10b. Pentacyclic terpane mass chromatograms (m/z 191) for Santos oils	B-18
B10c. Sterane mass chromatograms (m/z 217) for Santos oils	B-19
B10d. Rearranged sterane mass chromatograms (m/z 259) for Santos oils	B-20

	<u>Page</u>
B11. C19/C20 tricyclic terpanes versus C24 tetracyclic/C26 tricyclic Terpanes	B-22
B12. C21/C23 tricyclic terpanes versus C26/C25 tricyclic terpanes	B-22
B13. Sterane/hopane versus C30 tetracyclic terpane/C27 diasterane	B-23
B14. $\alpha\beta\beta$ Sterane compositions (m/z 218)	B-23
B15. Low molecular weight steranes versus C29/C30 pentacyclic Terpanes	B-24
B16. Diahopane Index versus Diasterane Index	B-24
B17. Ts/Tm versus C28 tricyclic/C27 pentacyclic terpanes	B-25
B18. MRM results showing relative abundance of C30 steranes	B-26
B19. Ts/Tm versus Diasterane Index as measure of thermal maturity	B-28
B20. C29 Sterane maturity parameters	B-29
B21. Aromatic biomarker maturity parameters	B-29
B22. Cluster Analysis Dendrogram for Santos oils	B-32
B23a. Principal component loading plot	B-33
B23b. Principal component scores plot	B-33
B24. Santos crude oil family location map	B-34

TABLES

Table B-1. Santos sample information.	B-4
Table B-2. Santos oil compositional data.	B-6
Table B-3. Santos Biomarker Parameters	B-16