

**Vitrinite Reflectance and Organic Petrology,
Tilana 1, T/14P Bass Basin.**

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F 6321 - Part 2 (Amendment)

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REPORT F 6321 - Part 2 - AMENDMENT

YOUR REFERENCE: LPD 1076

TITLE: Vitrinite reflectance and organic
petrology, Tilana-1, T-14-P, Bass Basin

MATERIAL: 19 cuttings samples, 6 sidewall cores,
2 cores

LOCALITY: TILANA-1

DATE RECEIVED: 24 September-17 December 1985

WORK REQUIRED: Vitrinite reflectance determinations and
organic petrology

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1. INTRODUCTION

Cuttings samples from Tilana-1 were received over a four week period (24 September to 23 October 1985). Vitrinite reflectance and organic petrology results were summarised and reported by telex on an urgent basis (24 hour turnaround time) so that the maturity, source richness and source quality of the sedimentary section, could be assessed as the drilling progressed.

This report (Part 2) is a formal presentation of this data and includes the results of the petrology performed on sidewall core and core samples received after the completion of Tilana-1. The interpretation presented in Part 1 of this report has been revised in light of the additional data presented in this report (Part 2).

2. ANALYTICAL PROCEDURE

Representative portions of each sidewall core (crushed to -14+35 BSS mesh) were obtained with a sample splitter and then mounted in cold setting Glasscraft resin using a 2.5 cm diameter mould. Each block was ground flat using a diamond impregnated laps and carborundum paper. The surface was then polished with aluminium oxide and finally magnesium oxide.

Reflectance measurements on vitrinite phytoclasts, were made with a Leitz MPV1.1 microphotometer fitted to a Leitz Ortholux microscope and calibrated against synthetic standards. All measurements were taken using oil immersion ($n = 1.518$) and incident monochromatic light (wavelength 546 nm) at a temperature at $23 \pm 1^\circ\text{C}$. Fluorescence observations were made on the same microscope utilising a 3 mm BG3 excitation filter, a TK400 dichroic mirror and a K510 suppression filter.

3. RESULTS

The vitrinite reflectance data is presented in Table 1. Histogram plots of this data on samples received after 28 November 1985 (i.e. not included in Part 1 of this report) are included in Appendix 1. Figure 1 is a plot of vitrinite reflectance verses depth and includes the locations of the major flows and intrusions.

Descriptions of the dispersed organic matter are summarised and presented in table form (Tables 2-4). Key features of these descriptions are illustrated by a series of plates in Part 1 of this report (Appendix 2).

4. DISCUSSION

4.1 Maturity

The vitrinite reflectance data (Table 1, Figure 1) indicates that the sampled portion of the sedimentary section penetrated by Tilana-1 (1540-3870 metres depth interval) is mature for the generation of light oil from resinite-rich DOM (threshold VR = 0.45%; Snowdon and Powell, 1982). The hydrocarbon generating potential from this type of organic matter should be exhausted at a maturity level of VR = 0.8% (Mukhopadhyay and Gormly, 1984). This level of maturity is exceeded in sediments from the following intervals in Tilana-1:

1660-2300 m
3000-TD

Significant gas generation from woody-herbaceous organic matter (vitrinite and to a lesser extent inertinite) commences at VR = 0.6% (Monnier *et al.*, 1983). On this basis, the sediments below 2300 metres depth in Tilana-1 are the most likely sources of significant quantities of gas.

Oil generation from terrestrial organic matter rich in exinites other than resinite, suberinite and bituminite occurs within the vitrinite reflectance range VR = 0.7-1.2% (Connan and Cassou, 1980). The top of this oil generation window occurs at approximately 2950 metres depth in Tilana-1, although narrow intervals of sediments with maturities in this range occur near the intrusives and volcanics.

Overmature sediments occur in the following intervals (largely due to the presence of igneous rocks rather than burial):

1660-2020 m
2260-2300 m
3800-TD

The assymetrical variation of maturity around the sill (2020-2259 metres depth) may possibly be due to the passage of super-heated steam through permeable reservoir rocks above the sill. Alternatively there may be another intrusion in the interval 1800-2000 metres depth, nearby, but laterally displaced from the Tilana-1 location.

The depth interval of overmature sediments immediately below this sill in Tilana-1 is quite similar to the intervals of overmature sediments around the sill in Yolla-1 suggesting that the heat flows from these two sills may be similar.

4.2 Organic Richness

Organic richness ranges from poor to excellent in the samples studied with DOM contents on a whole sample basis, ranging from <0.1% to >40%. Samples with good to excellent organic richness (DOM contents >5%) generally contain coals. The organic content of the shales and siltstones in the Eastern View Coal Measures at the Tilana-1 location generally lie in the range 0.5-2%. However, organic richness is significantly higher in some shales.

Dispersed organic matter is generally very rare or absent from the sandstones in this sequence. The organic matter in these units generally consists of a mixture of inertinite and oil.

4.3 Kerogen type and Source Quality

The Eastern View Coal Measures are rich in vitrinite (60-90%) and exinite (5-30%, generally 15-25%). Inertinite contents are low and lie in the range <5-15%. Coals in the sample from 3597-3600 metres depth were possibly deposited in the Cretaceous and contain significantly more inertinite (35%) and less vitrinite (50%) than coals from the Eastern View Coal Measures.

Sporinite, resinite, cutinite and suberinite are the most abundant exinite macerals in the coals and carbonaceous shales from Tilana-1. The ?Cretaceous coals (3597-3600 metres depth) are slightly richer in cutinite than coals from the Eastern View Coal Measures.

Dispersed organic matter in the shales and siltstone from Tilana-1 is similar to that of the coals although generally more inertinite-rich. Lamalginate and bituminite are commonly major components of the exinite in these sediments along with sporinite, resinite and cutinite.

Free oil and exsudatinite are present in the following samples as indicated:

Depth (metres)		Abundance (% of sample)
1675.7 ⁺	O	≈0.5
2385-2394	E	≈1
2493-2502	E	<0.1
2592-2601	E	<0.1
2700-2709	E	0.1-0.5
2788.8 ⁺	E	0.5-1
2799-2808	O	<0.1
2907*	O	≈0.1
2997-3006	O**	≈0.1
3080*	O	≈0.1
3147-3156	O	≈0.1
3237-3246	O	<0.1
3283*	O	≈0.1
3435-3444	O	<0.1
3546.5	O	<0.1
3584*	O	<0.1
3597-3600	O	<0.1

E = exsudatinite

O = free oil

+ = core

* = SWC

** = possibly a contaminant from the drilling mud

Intervals with the best source quality as indicated by the organic petrology are listed over:

Depth (m)	% of DOM		Major Exinite Macerals
	Exinite	Vitrinite	
1640-1650	60	10	Bituminite
2385-2394	25	65	Sporinite, resinite, suber- inite
2493-2502 coal	25	70	Suberinite, sporinite, resinite,
siltst.	55	5	Lamalginite, liptodetrinite
2592-2601 coal	25	65	Sporinite, resinite,
siltst.	35	60	Lamalginite, telalginate
2700-2709 coal	25	60	Sporinite, resinite,
shl.	25	5	Sporinite, lamalginate
2788.8 coal	25	70	Resinite, sporinite, bituminite
2799-2808 shl+siltst.	35	15	Sporinite, lamalginate
3237-3246 coal+shl.	25	70	Sporinite, resinite

5. CONCLUSIONS

1. Sediments from several intervals in Tilana-1 have good source potential, and sufficient maturity, for the generation of both liquid and gaseous hydrocarbons. Intervals with the best source potential are listed below:

Depth (m)	Type of hydrocarbons likely to have been generated
1640-1650	1
2385-2394	1 & 2
2493-2502	1 & 2
2592-2601	1 & 2
2700-2709	1 & 2
2788.8	1 & 2
3237-3246	1, 2 & 3

- 1 = light naphthenic oil.
 2 = gas/condensate
 3 = oil

2. The vitrinite reflectance data indicates that the sedimentary section is sufficiently mature for the generation of:

- light naphthenic oil and condensate from resinite-rich DOM in the interval 1540-3150 metres depth (VR = 0.45-0.8%).
- gas from the woody-herbaceous DOM (vitrinite) below 2950 metres depth (VR threshold = 0.6%)
- oil from DOM rich in exinites other than resinite, bituminite and suberinite in the interval 2950-3800 metres depth (VR = 0.7-1.4%).

3. The presence of exsudatinite indicates that hydrocarbons have been generated from sediments in the following intervals:

2385-2394 m
2493-2502 m
2592-2601 m
2700-2709 m
2788.8 m

4. Free oil is present in the following samples:

1675 m
2799-2808 m
2907 m
2997-3006 m
3080 m
3147-3156 m
3237-3246 m
3283 m
3435-3444 m
3546.5 m
3584 m
3597-3600 m

5. Cretaceous coals are richer in inertinite than the Eastern View Coal Measures indicating that they are probably more gas/condensate prone. However, this observation is based on one sample and may not apply to the Cretaceous coals in general.

TABLE 1: SUMMARY OF VITRINITE REFLECTANCE MEASUREMENTS,
TILANA-1

Depth (m)	Mean Maximum Reflectance (%)	Standard Deviation	Range	Number of Determinations
1540-1550	0.57	0.04	0.51-0.62	9
1640-1650	0.60	0.06	0.50-0.71	16
1675.7 ⁺⁺	3.11	0.26	2.66-3.56	8
1737-1746	3.45	0.27	2.92-3.90	32
1836-1845	3.84	0.45	3.26-4.52	19
1944-1953	4.93	0.52	4.14-5.72	18
2043-2052	-	-	-	-
2285-2294	3.55	0.27	2.96-4.04	19
2395-2394	0.73	0.08	0.61-1.01	31
2493-2502	0.65	0.08	0.54-0.84	31
2592-2601	0.69* (0.62)	0.08	0.55-0.84	35
2700-2709	0.74*	0.06	0.57-0.85	36
2788.8 ⁺⁺	0.62	0.03	0.56-0.71	36
2799-2808	0.62	0.05	0.48-0.73	29
2907 ⁺	0.60	0.05	0.52-0.69	16
2997-3006	0.83	0.08	0.70-1.11	28
3080 ⁺	0.75	0.07	0.63-0.86	29
3147-3156	0.83	0.09	0.66-0.96	8
3237-3246	0.92	0.06	0.80-1.02	31
3283 ⁺	0.93	0.08	0.73-1.04	22
3291-3300	0.94	0.07	0.80-1.09	32
3390-3399	0.91	0.02	0.89-0.92	2
3435-3444	0.87	0.06	0.74-0.94	7
3546.5 ⁺	0.98	0.07	0.76-1.10	29
3584 ⁺	1.08	0.06	0.98-1.18	13
3597-3600	1.16	0.08	0.97-1.31	31
3870 ⁺	1.59	0.19	1.30-1.92	24

*Influenced by caved cuttings.

() preferred value.

⁺SWC.

⁺⁺Core.

TABLE 2: PERCENTAGE OF VITRINITE, INERTINITE AND EXINITE IN DISPERSED ORGANIC MATTER, TILANA-1

Depth (m)	Percentage of		
	Vitrinite	Inertinite	Exinite
1540-1550 Sst.+Siltst.	5	85	10
1640-1650 Shale	10	30	60
1675.7 ⁺⁺ Siltstone	10	65	25
1737-1746 Carb Shl+Coal	80	5	15
1836-1845 Shl+Coal	90	5	5
1944-1953 Carb Shl+Coal	85	5	10
2043-2052 Shale	-	100*	-
2285-2294 Shale+Coal	70	20	10
2385-2394 Coal+Siltst.	65	10	25
2493-2502 Coal	70	5	25
Siltstone	5	40	55
2592-2601 Coal	65	10	25
Shale+Siltst.	60	5	35
Carbonate	<5	75	20
2700-2709 Coal	60	15	25
Shale	5	70	25
2788.8 ⁺⁺ Coal	70	<5	25
2799-2808 Sandstone	<5	90	5
Shale+Siltst.	15	55	35
2907 ⁺ Coal	75	5	20
Shale	5	85	10
2997-3006 Shale+Siltst.	10	75	15
Coal	80	5	15
3080 ⁺ Siltstone	30	60	10
3147-3156 Siltstone	<5	85	10
3237-3246 Coal+Carb Shl	70	<5	25
Siltstone	25	60	15
3283 ⁺ Sandstone	5	90	<5

.../cont.

TABLE 2: (Continued)

Depth (m)		Percentage of		
		Vitrinite	Inertinite	Exinite
3291-3300	Coal+Carb. Shl	70	<5	25
	Siltstone	35	45	20
3390-3399	Coal	65	5	30
	Shale+Siltst.	30	60	10
3435-3444	Siltstone	5	90	5
3596.5 ⁺	Siltstone	25	70	<5
3584 ⁺	Siltstone	10	85	5
3597-3600	Coal	50	35	15
	Siltstone	5	80	15
3870	Siltstone	15	75	10

*Graphite.

⁺SWC.

⁺⁺Core.

TABLE 3: ORGANIC MATTER TYPE AND ABUNDANCE,
TILANA-1

Depth (m)	Estimated Volume of		Exinite Macerals
	DOM (%)	Exinites	
1540-1550	0.5-1	Ra	bmite,spo,cut
1640-1650	5-15	Ab	bmite,lipto,spo,cut
1675.7 ⁺⁺	1-3	Ra-Sp	?oil,bmite
1737-1746	10-20	Ra	spo,res,cut
1836-1845	1-2	-	-
1944-1953	~5	Ra	spo,res,cut
2043-2052	0.1*	-	-
2285-2294	5-10	Ra-Sp	spo,lipto,cut
2385-2394	>40	Ab	spo,res,sub,exs,cut,lipto,bmite
2493-2502	5-10	Co	lipto,lama,sub,spo,res,cut,?phyto, exs,thuc
2592-2601	5-10	Sp-Co	lama,spo,res,cut,tela,lipto, ?phyto,sub,exs,bmite
2700-2709	>40	Ab	spo,res,cut,lama,sub,exs,lipto, ?phyto,tela
2788.8 ⁺⁺	>40	Ab	res,spo,bmite,cut,exs
2799-2808	3-5	Ra	spo,res,lama,cut,tela,bmite, phyto,oil
2907 ⁺	0.5-1	Ra	phyto,lama,spo,?oil,tela
2977-3006	1-3	Ra	spo,oil,phyto,lama,cut,res,tela, sub,bmen
3080 ⁺	1-2	Ra-Vr	?oil,spo,cut,lipto,res
3147-3156	<0.5	Vr	lipto,?oil,spo,cut
3237-3246	15-25	Co	spo,res,bmite,cut,sub,oil
3283 ⁺	0.5-1	Vr	?oil,thuc,spo
3291-3300	15-25	Co	res,spo,bmite,lipto,cut
3390-3399	0.5-1	Tr	spo,cut,res,lama,sub
3435-3444	<0.5	Tr	spo,?oil
3546.5	1-2	Vr	spo,?oil,cut,exs
3584 ⁺	~1	Ra	lama,?oil
3597-3600	20-30	Sp	spo,cut,res,?oil
3870 ⁺	1-2	Ra	lama,lipto

*Graphite.

⁺SWC.⁺⁺Core.

TABLE 4: EXINITE MACERAL ABUNDANCE AND FLUORESCENCE CHARACTERISTICS, TILANA-1

Depth (m)	Exinite Macerals	Lithology/Comments
1540-1550	bmite(Ra;d0),spo(Vr;mY-m0),cut(Tr;m0)	chiefly silty sandstone, 10-20% siltstone. Caved coals of lower and higher maturity.
1675.7 ⁺⁺	?oil(Ra-Sp;i0),bmite(Ra;d0-NoF1)	siltstone. Bituminite is extensively micrinitised ?oil occurs as small accumulations (up to 0.03 mm).
1640-1650	bmite(Ab;d0-dB),lipto(Ra;mY-m0),spo(Ra-Vr;m0-d0),cut(Vr;m0)	shale with silty bands.
1737-1746	spo(Ra;NoF1),res(Vr;NoF1),cut(Vr;NoF1)	chiefly silty sandstone and siltstone, ~20% coal (anthracite), ~10% carbonaceous shale. The lack of exinite fluorescence is a function of overmaturity.
1836-1845	spo(Ra;NoF1),res(Vr;NoF1)	chiefly sandstone, 5-10% shale, <5% coal (anthracite) and coke. Exinite fluorescence as above.
1944-1953	spo(Ra;NoF1),res(Ra;NoF1),cut(Vr;NoF1)	chiefly sandstone, ~5% carbonaceous shale, ~5% coal (anthracite); exinite fluorescence as above.
2043-2052	-	chiefly igneous rocks, ~1% shale.
2285-2294	spo(Ra;NoF1),lipto(Ra;NoF1),cut(Ra;NoF1)	chiefly shale, 5-10% coal (anthracite) and coke, ~5% carbonate; exinite fluorescence as above.
2385-2394	spo(Ab;m0-d0),res(Ab;d0-dB),sub(Co-Ab;d0-dB),exs(Sp-Co;mY-dB),cut(Sp;m0-d0),lipto(Ra;m0-dB),bmite(Vr;d0)	chiefly coal, ~20% sandstone, 5-10% siltstone with DOM rich bands; the variation of fluorescence colours of exsudatinite (primary oil) indicate the possibility more than one phase of oil generation.
2493-2502	lipto(Co;m0),lama(Sp;mY-d0),spo(Sp;mY-m0),res(Sp;m0-dB),cut(Ra;mY-m0),?phyto(Tr;m0),exs(Tr;m0),thuc(Tr;m0-d0)	chiefly siltstone, 5-10% coal, ~5% carbonate; thucholite is evidence of oil migration. Exsudatinite is primary oil (i.e. formed in situ).
2592-2601	lama(Ra-Sp,mY-d0),spo(Ra-Sp;m0-d0),res(Ra;m0-dB),cut(Ra;m0-d0),tela(Ra;iY-m0),lipto(Ra;m0-d0),phyto(Ra-Vr;mY),sub(Vr;NoF1),exs(Tr;iYG),bmite(Tr;d0)	chiefly shale and siltstone, 10-20% carbonate, 5-10% coal; some coals contain up to 30% exinite (mostly sporinite and resinite).
2700-2709	spo(Ab;m0-d0),res(Ab;m0-dB),cut(Co;m0-d0),lama(Ra;m0),sub(Vr;d0),exs(Vr;iY-iG,d0-dB),lipto(Vr;m0-d0),?phyto(Vr-Tr;mY),tela(Tr;iY)	chiefly coal, 10-20% siltstone; resinite and suberinite are extensively micrinitised and have dull fluorescence, indicating that oil generation from these macerals is nearly complete.
2788.8 ⁺⁺	res(Ab;iG-d0),spo(Ab;mY-d0),bmite(Ab-d0),cut(Co-Ab;m0),exs(Sp;dB)	coal; resinite as above. Some coal fragments contain up to 35% exinite. Some sporinite is slightly oxidised.
2799-2808	spo(Ra;m0-d0),res(Ra;m0-NoF1),lama(Ra;mY-m0),cut(Vr;m0-d0),tela(Vr;m0),bmite(Vr;d0),phyto(Tr;m0),oil(Tr;iYG)	chiefly sandstone, 5-10% siltstone and shale, <5% coal; resinite as above. Oil occurs as small accumulations (<0.03 mm) in the siltstone cuttings.

TABLE 4: (Continued)

322014

Depth (m)	Exinite Macerals	Lithology/Comments
2907 ⁺	phyto(Ra;iY),lama(Ra;m0),spo(Vr;m0),?oil(Vr-Tr;iYG-iY),tela(Tr;iY-i0)	shale with silty bands; ?oil occurs in silty sections.
2997-3006	spo(Ra;m0-d0),oil(Ra-Vr;iG-i0),phyto(Vr;m0),lama(Vr;m0),cut(Vr-Tr;m0-d0),res(Vr-Tr;m0-d0),tela(Tr;m0),sub(Tr;d0),bmen(Tr;d0)	chiefly sandstone, 10-15% siltstone, <5% coal; oil and bitumen occur interstitial to quartz grains in the sandstone and siltstone cuttings.
3080 ⁺	?oil(Ra-Vr;iY-G),spo(Vr-d0),cut(Vr;d0),lipto(Vr;m0-d0),res(Tr;dB)	sandy siltstone; oil is most abundant in the sandy portions.
3147-3156	lipto(Vr;m0-d0),?oil(Vr;iYG),spo(Vr;m0),cut(Vr;m0)	chiefly sandstone, 10-15% siltstone; oil as above.
3237-3246	spo(Co;m0-d0),res(Sp-Co;d0-NoF1),bmite(Sp;d0),cut(Ra;m0-d0),sub(Vr;d0-dB),?oil(Tr;iG,m0)	chiefly sandstone, 15-20% coal, 10-15% siltstone, ~10% carbonaceous shale; resinite and suberinite as above. Oil as above.
3283 ⁺	?oil(Vr;iG-iY),spo(Tr;d0),thuc(Tr;NoF1)	silty sandstone; thucholite is evidence of oil migration.
3291-3300	res(Co;dB-NoF1),spo(Co;d0),bmite(Co;dB-NoF1),lipto(Sp;d0-dB),cut(Ra;d0)	chiefly carbonaceous shale, 20-30% sandstone, 10-20% coal, 10-15% siltstone; fluorescence colours of resinite and bituminite indicate oil generation from these macerals is nearly complete.
3390-3399	spo(Tr;m0),cut(Tr;m0),res(Tr;m0),lama(Tr;m0),sub(Tr;d0)	chiefly volcanics, <5% siltstone and shale, <1% coal.
3435-3444	spo(Tr;d0),?oil(Tr;iY)	chiefly sandstone, ~10% volcanics, <5% siltstone; ?oil as above.
3546.5 ⁺	spo(Vr;d0),?oil(Vr-Tr;iY),cut(Tr;dB),cut(Tr;d0)	siltstone with stringers of coal, oil as above.
3584 ⁺	lama(Ra;NoF1),?oil(Vr-Tr;iYG)	siltstone; fluorescence colour of the sporinite in this sample indicates that this sample is over-mature for oil generation.
3597-3600	spo(Sp;NoF1),cut(Sp;NoF1),res(Sp;NoF1),?oil(Tr;iY)	chiefly sandstone, 20-30% coal, 10-20% siltstone; oil as above. Exinite fluorescence colours indicate that this sample is over-mature.
3870 ⁺	lama(Ra;NoF1),lipto(Ra;NoF1)	Siltstone; exinite as above.

⁺SWC.⁺⁺Core.

KEY TO DISPERSED ORGANIC MATTER DESCRIPTIONS

MACERAL GROUPS

V Vitrinite
I Inertinite
E Exinite

EXINITE MACERALS

spo Sporinite
cut Cutinite
res Resinite
sub Suberinite
lipto Liptodetrinite
fluor Fluorinite
exs Exsudatinite
phyto Phytoplankton
tela Telalginite
lama Lamalginite
bmite Bituminite
bmen Bitumen
thuc Thucholite

ABUNDANCE (by vol.)

Ma Major >15%
Ab Abundant 2-15%
Co Common 1-2%
Sp Sparse 0.5-1%
Ra Rare 0.1-0.5%
Vr Very Rare ~0.1%
Tr Trace <0.1%

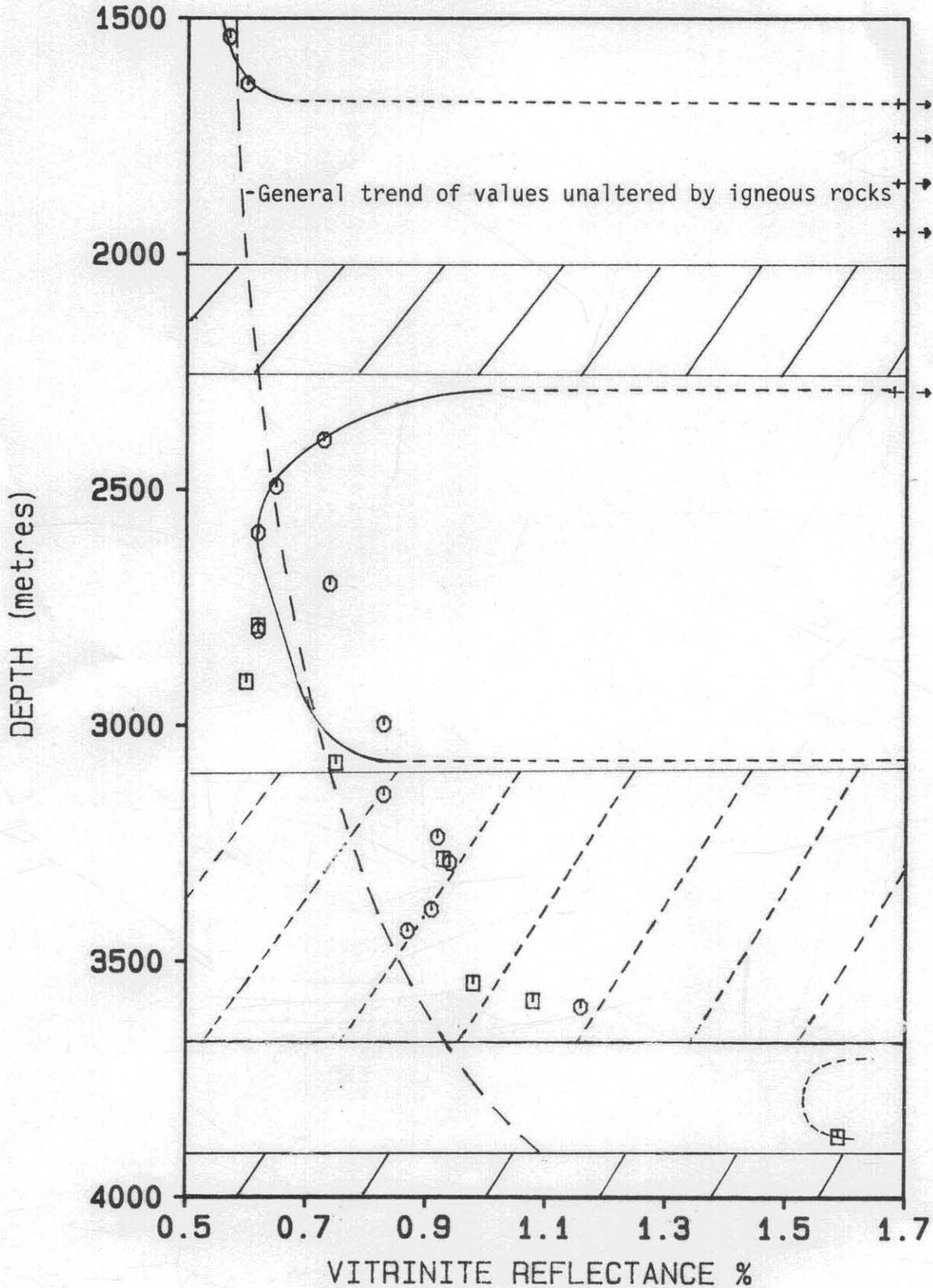
FLUORESCENCE COLOUR AND INTENSITY

G	Green	i	Intense
Y	Yellow	m	Moderate
O	Orange	d	Dull
B	Brown		

322016

VITRINITE REFLECTANCE Vs. DEPTH PLOT, TILANA-1

5 cm



- Cuttings
- Core or Sidewall Core
- ◻ Igneous Rocks
- ◻ Mostly Igneous Rocks

322017

TILANA #1

1675.7 M ; CORE #1

SORTED LIST

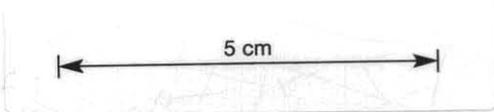
2.66 2.94 3.02 3.04 3.08 3.3 3.32 3.56
Number of values= 8

MEAN OF VALUES 3.115
STD DEVIATION .257

HISTOGRAM OF RESULTS

Values are reflectance multiplied by 100

266 - 270	■
271 - 275	
276 - 280	
281 - 285	
286 - 290	
291 - 295	■
296 - 300	
301 - 305	■■
306 - 310	■
311 - 315	
316 - 320	
321 - 325	
326 - 330	■
331 - 335	■
336 - 340	
341 - 345	
346 - 350	
351 - 355	
356 - 360	■



322019

TILANA #1

2907 M ; SWC 8

SORTED LIST

.52 .54 .55 .56 .57 .57 .59 .59 .59 .62
.62 .63 .64 .65 .66 .69

Number of values= 16

MEAN OF VALUES .599
STD DEVIATION .046

HISTOGRAM OF RESULTS

Values are reflectance multiplied by 100

52 - 54	■■■
55 - 57	■■■■
58 - 60	■■■■
61 - 63	■■■■
64 - 66	■■■■
67 - 69	■■

5 cm

TILANA #1

3080 M ; SWC 76

SORTED LIST

.63 .63 .65 .65 .66 .67 .68 .7 .71 .71
 .74 .74 .75 .76 .77 .77 .77 .77 .77 .78
 .78 .8 .8 .8 .81 .81 .84 .84 .86

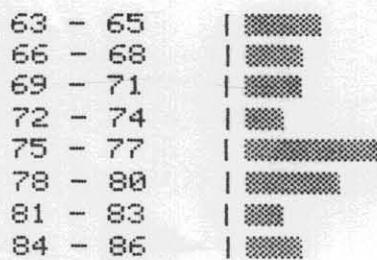
Number of values= 29

MEAN OF VALUES .747

STD DEVIATION .065

HISTOGRAM OF RESULTS

Values are reflectance multiplied by 100



← 5 cm →

TILANA #1

3283 M ; SWC 66

SORTED LIST

.73 .78 .84 .87 .87 .89 .91 .92 .92 .93
 .93 .93 .94 .95 .98 .99 .99 .99 1.01 1.03 1.03
 1.03 1.04

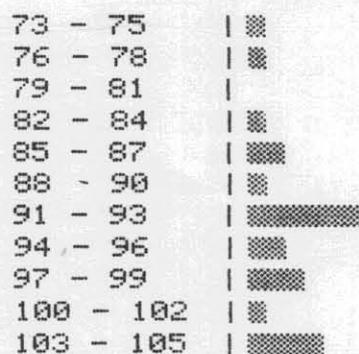
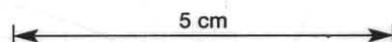
Number of values= 22

MEAN OF VALUES .932

STD DEVIATION .079

HISTOGRAM OF RESULTS

Values are reflectance multiplied by 100

5 cm

TILANA #1

3546.5 M ; SWC 33

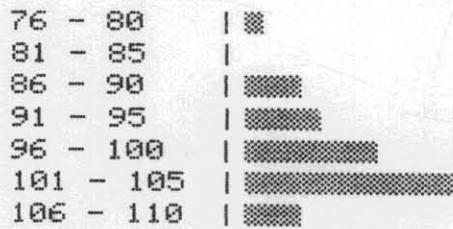
SORTED LIST

.76 .86 .86 .9 .92 .92 .92 .94 .97 .97
 .98 .98 .99 .99 1 1.01 1.01 1.01 1.02 1.02
 1.02 1.02 1.03 1.04 1.04 1.05 1.07 1.08 1.1
 Number of values= 29

MEAN OF VALUES .982
 STD DEVIATION .073

HISTOGRAM OF RESULTS

Values are reflectance multiplied by 100



← 5 cm →

TILANA #1

3584 M ; SWC 61

SORTED LIST

.98 1 1.02 1.06 1.06 1.08 1.08 1.12 1.12 1.12
1.12 1.14 1.18

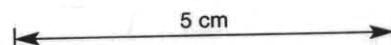
Number of values= 13

MEAN OF VALUES 1.083
STD DEVIATION .056

HISTOGRAM OF RESULTS

Values are reflectance multiplied by 100

98 - 102		██████
103 - 107		██████
108 - 112		██████████
113 - 117		██████
118 - 122		██████



5 cm