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PEL 5 AND PEL 6, DALHOUSIE BLOCK

EROMANGA AND PEDIRKA BASINS

MOUNT HAMMERSLEY 1

TEST REPORTS

Submitted by

Santos Ltd
1995

MINES AND ENERGY
SOUTH AUSTRALIA

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ENVELOPE 7116/2

TENEMENT: PEL 5 and PEL 6, Dalhousie Block; Eromanga and Pedirka Basins

TENEMENT HOLDER: Santos Ltd (operator), Delhi Petroleum Pty Ltd, Bridge Oil Ltd, South Australian Oil and Gas Corp. Pty Ltd, Vamgas Ltd and Adelaide Petroleum NL

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Nazneen Saunders
SANTOS Ltd.,
G.P.O. Box 2319
ADELAIDE, SOUTH AUSTRALIA 5001

8.11.88

Dear Nazeen

Please find enclosed vitrinite reflectance measurement analysis sheets, including means, range and number of observation with brief notes on coal and organic matter abundance factors, and exinite fluorescence characteristics for 4 samples from Dalmatia No.1 (x9218-9221), 2 samples from Mt Hammersley No. 1 (x9222-x9223), 4 samples from ~~Dalmatia~~ Ponaruma No. 1 (x9218-9221) and a copies of Invoice No,s 1449-51 for your records.

Yours sincerely

Joan Cook

Encl.

MT. HAMMERSLEY NO. 1

K.K. No.	Depth (ft)	$\bar{R}_v$max	Range	N	Description Including Exinite Fluorescence
x9222	2342 SWC	0.38	0.33-0.43	26	Abundant sporinite and common cutinite, yellow to orange, sparse resinite, yellow. (Coal. I>V>E. Clarodurite>duroclarite>vitrinertite(I)> vitrinertite(V)>inertite>vitrite. Weak brown fluorescence from desmocollinite. Iron oxide rare. Pyrite rare.)
x9223	3748 SWC	0.44	0.34-0.58	26	Common sporinite and sparse cutinite, yellow to orange, rare Reinschia related telalginite, bright yellow. (Siltstone>sandstone. Dom abundant, I>E>V. Inertinite and exinite common, vitrinite sparse. Diffuse humic organic matter sparse. Weak brown fluorescence from desmocollinite. Iron oxide rare. Pyrite sparse.)

ABUNDANCE FACTORS

TOTAL COUNT N- 50

KK No.	PROJECT	FORMATION	DEPTH	TYPE
X9222	Mt Hammersley	Permian Unit C.	2342'	Swc.

COAL — PERCENTAGE IN COAL

	V	I	E
TOTAL COAL % 100	39.5	55	5.5

→ Vitrinosite (v) > Inosite > Vitrite.

MICROLITHOTYPES Clarodurite > durociarite > Vitrinosite (i) >

SHALY COAL — PERCENTAGE IN SHALY COAL *

* CALCULATED ON A MINERAL MATTER FREE BASIS

	V	I	E
TOTAL SHALY COAL % 0			

RELATED MICROLITHOTYPES

DOM (GRAINS IN ABUNDANCE CATEGORIES)	VITRINITE %	VITRINITE CUM %	INERTINITE %	INERTINITE CUM %	EXINITE %	EXINITE CUM %	TOTAL DOM %	TOTAL DOM CUM %
>10% (MAJOR)	0	0	0	0	0	0	0	0
>2% (ABUNDANT)	0	0	0	0	0	0	0	0
>0.5% (COMMON)	0	0	0	0	0	0	0	0
>0.1% (SPARSE)	0	0	0	0	0	0	0	0
APPROXIMATE ABUNDANCE	0		0		0		0	
APPROXIMATE % OF DOM	0		0		0		APPROX. 0 % OF SAMPLE	

PERCENTAGE OF ROCK TYPES	SANDSTONE	SILTSTONE	CLAYSTONE	SHALY COAL	COAL	CARBONATE	OTHERS (SPECIFY)
	0	0	0	0	100	-	

ABUNDANCE FACTORS

TOTAL COUNT N= 50

KK No.	PROJECT	FORMATION	DEPTH	TYPE
x9223	Mt Hammersley	Purni	3748'	Swc

PERCENTAGE IN COAL

COAL	V	I	E
TOTAL COAL % -	—	—	—
MICROLITHOTYPES			

PERCENTAGE IN SHALY COAL *

* CALCULATED ON A MINERAL MATTER FREE BASIS

SHALY COAL	V	I	E
TOTAL SHALY COAL % -	—	—	—
RELATED MICROLITHOTYPES			

DOM (GRAINS IN ABUNDANCE CATEGORIES)	VITRINITE %	VITRINITE CUM %	INERTINITE %	INERTINITE CUM %	EXINITE %	EXINITE CUM %	TOTAL DOM %	TOTAL DOM CUM %
>10% (MAJOR)	0	0	0	0	0	0	0	0
>2% (ABUNDANT)	2	2	30	30	8	8	42	42
>0.5% (COMMON)	26	28	36	66	18	26	36	78
>0.1% (SPARSE)	26	54	26	92	50	76	16	94
APPROXIMATE ABUNDANCE	0.4		1.9		0.7		Abundant	
APPROXIMATE % OF DOM	13		63		24		APPROX. 3.0 % % OF SAMPLE	

PERCENTAGE OF ROCK TYPES	SANDSTONE	SILTSTONE	CLAYSTONE	SHALY COAL	COAL	CARBONATE	OTHERS (SPECIFY)
	8	92	-	-	-	-	—

STUDY : MOUNT HAMMERSLY NO.1

BRIEF PALYNOLOGICAL REPORT

REPORT NO. 577/1

SAMPLE	DEPTH	AGE	STRATIGRAPHY		REMARKS
			BIOSTRATIGRAPHICAL UNIT	INFERRED STRATIGRAPHICAL LIMIT	
Core 1	2960' 3"	Late Carboniferous to Early Permian.	PC4 to PP1 ?PP1		Extremely sparse assemblage.
Core 1	2961' 9"		PP1		M. tentula present.
Core 1	2962'		PP1		
Core 1	2963'		PP1		M. tentula present.
Cuttings *	3950'		PP1		M. tentula present.
Cuttings *	4000' to 4010'		PP1		M. tentula present.
Core 2	4267' 5"		PP1		
Core 2	4276' 4"		PP1		M. tentula present.
Core 2	4302'		PP1		
Core 2	4320'		PP1		
Junk Basket A *	5774'	-	-		Barren of miospores.
Junk Basket B *	5774'	Late Carboniferous to Early Permian.	PP1		M. tentula present.
Junk Basket C *	5774'	Late Carboniferous.	PC4		

Misc Exp. File

STUDY: MOUNT HAMMERSLEY NO.1

BRIEF PALYNOLOGICAL REPORT

REPORT NO. 577/1

SAMPLE	DEPTH	AGE	STRATIGRAPHY		REMARKS
			BIOSTRATIGRAPHICAL UNIT	INFERRED STRATIGRAPHICAL LIMIT	
Junk Basket D *	5774'	Early Permian	PP2.1		Down hole contaminate.

1) Both cutting samples and junk basket samples may contain down hole contaminants. Note that the junk basket samples from 5774 ft. were sub-divided into four groups based upon lithologies before palynological processing.

2) The presence of M. tentula suggests that these samples may be assignable to Upper Stage 2 and thus may be equated to the Crown Point Formation of the Pedirka Basin.

Murray J. Jones
8.1.1988

800009

Misc Exp. File

PALYNOLOGY OF THE PERMIAN CARBONIFEROUS SEQUENCE OF THE MOUNT HAMMERSLEY No 1, PEDIRKA BASIN SOUTH AUSTRALIA

BY

SILVIA GAMARRA

SANTOS LIMITED
S. A.EXPLORATION

December 1995

SUMMARY

Late Carboniferous-Early Permian assemblages have been identified through detailed palynological analysis of core and sidewall core samples taken from the Crown Point Formation, Stuart Range Formation equivalent, Mount Toondina Formation equivalent and Purni Formation.

Three different intervals with a distinctive palynological association were established:

The interval 4634' - 4209', corresponds to the Crown Point Formation. The palynofloral assemblage is moderately preserved and very sparce. The occurrence of *Microbaculispora tentula* in this interval is evidence for Zone PP1.2 of Asselian to Early Sakmarian age.

Interval 4038' - 2960'3", corresponds to the Stuart Range Formation equivalent and Mount Toondina Formation equivalent. The palynomorphs recovered from this interval are better preserved and more diverse than the previous interval. The occurrence of *Microbaculispora tentula* which is considered a diagnostic taxon for its first appearence in earliest Asselian indicates that the palynological assemblage from this interval corresponds to the zone PP1.2 of Asselian to early Sakmarian age.

Interval 2790'-2168', belongs to the Purni Formation of the Eringa Trough. The first appearence of *Pseudoreticulatispora pseudoreticulata* indicates that the assemblage present in this interval corresponds to the PP2.1 zone of Sakmarian age.

One sample at 1999' of the uppermost part of the Purni Formation contains a very well preserved and diverse palynoflora. The zone PP2 is suggested for this sample due to the first appearence of *Granulatisporites trisinus.*

A disconformity in the contact between the Mount Toondina Formation equivalent with the overlying Purni Formation is suggested due the absence of the *Granulatisporites confluens* zone which is equivalent to the upper part of PP1.2 Zone. Only one specimen of *G. confluens* was identified and this occurred associated with *Pseudoreticulatispora pseudoreticulata* and *Diatomozonotriletes townrowii* which are diagnostic taxa of the overlying Zone PP2.1.

1. INTRODUCTION

The Mount Hammersley N 1 Well is located in the westernmost part of the Early Permian Pedirka Basin adjacent to the Eringa Trough. The most recent summary of the Permian Carboniferous succession is the one established by Alexander and Jensen-Schmidt (1995). In ascending stratigraphic order this succession comprises: the Crown Point Formation, a glacigene unit of diamictites; the Stuart Range Formation equivalent, which has only been intersected in Mount Hammersley 1 consisting of light to medium green sticky siltstone and claystone; the Mount Toondina Formation equivalent, also intersected in Mount Hammersley 1, consists of pale grey sandstone, medium grey siltstone and conglomerate beds; and the Purni Formation, which disconformably overlies Crown Point Formation over much of the Pedirka Basin characterized by interbedded siltstone and coal with minor sandstone beds. Alexander and Jensen Schmidt (1995) present in their study an Early Permian correlation between the Pedirka, Cooper and Ackaringa Basins and Eringa Trough.

The present palynological study includes primarily the Permian succession intersected by Mount Hammersley 1. Thirteen (13) sidewall core samples and eight (8) core samples were studied. Just two of them failed to yield pollen and spores. Each sample was examined in detail and palynomorphs were counted for each of the higher yielding samples. A figure of 200 counts was considered to be a reasonable statistical minimum. Photomicrography was carried out using a Zeiss photomicroscope III camera.

2. PALYNOSTRATIGRAPHY

For the present study the palynostratigraphical units of the Cooper/ Galilee/ Eromanga and the Surat/ Bowen regions (Price et al. 1985) were used and in addition some of the palynological findings of the study of the Joe Joe Group, Galilee Basin (Jones and Truswell, 1992) for the lower part of the section were included.

Interval 4634'-4209'- Zone PP1.2

The palynomorphs recovered from this interval are in general moderately preserved. Two samples in the base of the interval (4552' and 4634') were barren. The assemblages in this interval were sparce and in some samples extremely sparce. This interval is defined by the presence of *Microbaculispora tentula, Protohaploxypinus spp, Horriditriletes ramosus, Cycadopites cymbatus, Leiotriletes directus,* and *Verrucosisporites andersonii.*

The most frequent forms overall are monosaccate pollen such as *Potoneisporites spp* and *Plicatipollenites spp.*

The occurrence of *Microbaculispora tentula* in this interval is evidence for zone PP1.2 (Jones and Truswell, 1992) which suggests an Asselian to Early Sakmarian age.

This interval corresponds to the Crown Point Formation that correlates with the Boorthanna Formation of the Arckaringa Basin.

Interval 4038'-2960'3"- Zone PP1.2

The palynomorphs recovered from this interval are better preserved and more diverse than the previous interval. The association present in this interval is dominated by the presence of radial monosaccate pollen and include other forms such as *Microbaculispora tentula, Punctatisporites gretensis, Horriditriletes ramosus, Protohaploxypinus spp., Apiculatisporis spp. and Cycadopites cymbatus* as a consistent background element. Common occurrences of *Leiosphaeridia spp.* were found in samples 2960'3" and 4038'.

The occurrence of *Microbaculispora tentula* which is considered a diagnostic taxon for its first appearence in earliest Asselian (Jones, 1992) indicates that the palynological assemblage from this interval corresponds to the zone PP1.2 of Asselian to early Sakmarian age.

This interval corresponds to the Stuart Range Formation equivalent and Mount Toondina Formation equivalent of Pedirka Basin stratigraphy described in Alexander and Jensen-Schmidt (1995). These units are tentatively correlated to the Stuart Range Formation and Mount Toondina Formation of the Arckaringa basin.

The contact between the Mount Toondina Formation equivalent with the overlying Purni Formation was interpreted as a disconformity on the basis of recent seismic data from the Eringa Trough (MESA, 1994) and from a revision of Mount Hammersley 1 stratigraphy.

In the present study it is suggested the existence of this disconformity due the absence of the *Granulatisporites confluens* zone (Foster and Waterhouse, 1988) which is equivalent to the upper part of PP1.2 Zone (PP1.2.2 Zone, unpublished). The *Granulatisporites confluens* zone was established in the Gran Group of the northern Canning Basin. The definitive characteristic of this zone is the first appearence of *G. confluens.* Other common species include *Microbaculispora micronodosa, Horriditriletes ramosus and H. tereteangulatus.*

Only one specimen of *G. confluens* was identified in the present study and this occurred associated with *Pseudoreticulatispora pseudoreticulata* and *Diatomozonotriletes townrowii*, which are diagnostic taxa of the overlying zone PP2.1 in the sample from 2790'. In the Arckaringa Basin, first appearences of *G. confluens* were recorded in the wells Newmont NB/SR Stuart Range Bore and Birribiana 1 (Jones, 1987) in the Boorthanna Formation below the first appearences of *Pseudoreticulatispora pseudoreticulata.*

Interval 2790-2168 - Zone PP2.1

The palynomorphs present in this sample are generally well preserved and highly diverse. The base of this interval is marked by the first occurrence of *Pseudoreticulatispora pseudoreticulata* and the abundant presence of *Scheuringipollenites ovatus and S. maximus, Microbaculispora tentula* is also common in many samples; but radial monosaccate pollen are significantly less abundant than in PP1.2. Other forms that appear in this interval include *Diatomozonotriletes townrowii, Marsupipollenites triradiatus, Microbaculispora micronodosa, Limitisporites rectus, Platysaccus leschikii and Indotriradites splendens.*

The first appearence of *Pseudoreticulatispora pseudoreticulata* at the base of this interval indicates that the assemblage mentioned above corresponds to the PP2.1 zone of Sakmarian age (Price et al 1985)

This interval belongs to the Purni Formation, which is correlated to the Patchawarra Formation of the Cooper Basin which has similar lithology, environments of deposition and age and according to Alexander and Jensen Schmidt 1995) it is not present in the Arckaringa Basin.

Sample 1999' - Zone PP2.2

This sample contains a very well preserved and diverse palynoflora. The association is quite similar to the previous interval with the exception of the first appearence of *Granulatisporites trisinus.* The most abundant species are *Scheuringipollenites maximus, S. ovatus, Striatobeites multistriatus, Microbaculispora micronodosa* and *Leiotriletes directus.* Other taxa in this assemblage are *Platysaccus leschikii, Microbaculispora tentula, Marsupipollenites striatus and Retusotriletes diversiformis*; less frequent is the presence of *Marsupipollenites triradiatus, Limitisporites rectus and Jayantisporites variabilis.*

The zone PP2.2.2 is suggested for this interval due to the first appearence of *G. trisinus* which indicates the base of this zone (Price et al. 1985). This side wall core sample corresponds to the uppermost part of the Purni Formation.

3. REFERENCES

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