

95-3773

**REPORT ON THE SIGNIFICANCE OF THE SHITTIM NO 1
STRATIGRAPHIC COREHOLE, EL1/88
NORTH BRUNY ISLAND, TASMANIA
AS AT SEPTEMBER 5TH 1995.**

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**PREPARED FOR GREAT SOUTHERN MINERALS N.L.
BY
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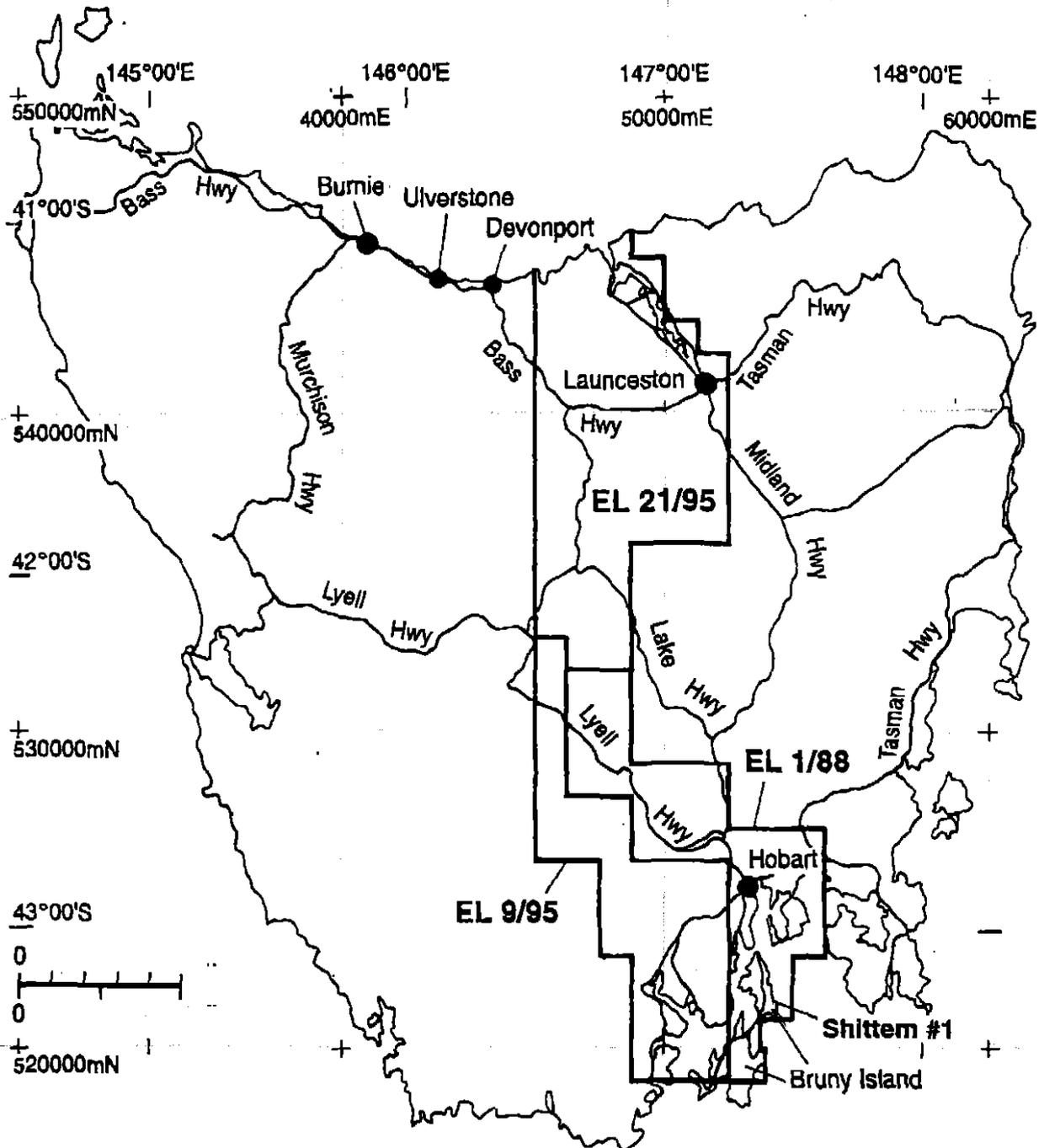


Figure 1

SUMMARY OF THE SIGNIFICANCE OF THE RESULTS OF SHITTIM#1

The results of drilling thus far at Shittim#1 are significant in the following respects.

1. It has established the effectiveness of the dolerite seal in this portion of the Tasmania Basin.
2. It has established the presence of fair quality reservoir sandstones at Bruny Island.
3. It has established the presence of gaseous hydrocarbons in this reservoir, thus indirectly confirming the significance of the Johnson's well seep results of the 1930's.
4. It has raised the possibility of a hydrocarbon trap at Bruny, possibly stratigraphic in nature, and the results of Johnson's well and the presence of C4+ gas fractions suggest that an oil leg may not be an impossibility.
5. Just as importantly it provides further encouragement for continuing the exploration effort on the Main Island, and raises the possibility of attracting additional risk funds for expenditure on Tasmanian onshore plays.

It is certainly true that GSM have adopted an innovative approach in attempting to further their exploration endeavours in EL1/88. In the circumstances this has been almost unavoidable. In this context the surprising results of Shittim#1 thus far provide encouragement for further exploration on Bruny Isl., and hopefully, (particularly if supported by quantitative well test data), will provide the technical and financial incentive required to fund the more expensive drilling required to evaluate the main plays located within the depocentre of the Tasmania basin.



INTRODUCTION

Great Southern Minerals Pty Limited ("GSM") now hold three petroleum exploration licences within the Tasmania Basin. The oldest of these is EL1/88, which includes much of the depositional centre of the basin, (generally defined by the valley of the Derwent River), as well as the estuary of the Derwent River, parts of Storm Bay and Frederick Bay, North Bruny Island and parts of South Bruny Island, (refer Figure 1).

Exploration activity early this century was focused on shallow plays dictated largely by the distribution of seeps. A notable result was the recovery of oil and gas in a shallow sandstone reservoir at Johnson's well on North Bruny Island in the 1930's. Whilst in retrospect much of this activity can be seen to have been misguided, due to lack of understanding of the requirements for petroleum generation and entrapment, exploration was, (and continues to be), severely hampered by the wide distribution of substantial dolerite sills throughout the Tasmania Basin.

EXPLORATION STRATEGY

Modern exploration in Tasmania has been concentrated largely within the offshore Bass Basin with minor activity in the offshore Sorrell Basin. Onshore exploration within Tasmania has largely languished for two dominant reasons.

1. **A perceived lack of mature source rocks**, based largely on samples of Parmeener Supergroup samples, in particular the Tasmanite oil shale which although very rich in algal material has lacked sufficient maturity for oil or gas generation where sampled. (Note, however, the absence of samples from the Basin depocentre due to the absence of well control at the depths required. Also note that a recent paper on analysis of samples of the Tasmanite oil shale at Douglas River indicates that it is near the oil window at that location - see Revill et al. in reference).
2. **The formidable problem of attempting to image horizons below the dolerite cover.**

After being granted petroleum exploration licences in the Tasmania Basin in the mid 1980's Conga Oil attempted to address both these problems as follows

- (a) **Lack of mature source rocks**
Studies of conodont colour maturation indices (Burrett) had suggested that the widely distributed Ordovician carbonates (Gordon Limestone) could provide a viable alternative oil source rock which in many parts of Tasmania would be within the oil &/or gas generation window. Conga Oil expended considerable effort sampling both the Gordon River Limestone and the widespread oil seeps recorded in Tasmania.



Some success in relating Gordon Limestone source to seeps has been achieved, but the separate issue of whether Gordon Limestone karst or fracturing could provide adequate reservoir remains to be resolved. Similarly the question of the ultimate potential of the Tasmanite oil shale section awaits appraisal by drilling to depths of >2500 m. in the vicinity of the Tasmania basin depocentre.

- (b) Seismic imaging of structure beneath the dolerite
Recognising the need to be able to map sub-dolerite structure Conga firstly attempted to extend the gravity and magnetics data bases in the Tasman Basin. Whilst this has helped in defining regional trends and lineations, the lack of subsurface control and the limitations of the method itself have limited the usefulness of these techniques for the purpose of identifying potential hydrocarbon traps.

Despite earlier discouraging results onshore Tasmania, Conga elected to attempt acquisition of additional data both on the Main Island and North Bruny Island in the vicinity of Johnson's seep. Additional data was acquired offshore in Storm Bay utilising AGSO's Rig Seismic vessel. In general it may be said that the results have proved deeply disappointing. Certainly the poor quality of these records means that none of the sections would be regarded as adequate for the purpose of identifying and mapping a petroleum trap.

The problem faced by the current permit holders (GSM) is how to advance their exploration programme in the absence of useful seismic, this being the most commonly accepted criterion for prospect definition.

As foreshadowed in my report of 1987 and Questa's report of 1991 there is an alternative, high risk option available, namely stratigraphic drilling designed to answer questions related to stratigraphy, reservoir quality and structure. This is essentially the logic behind the drilling of the Shittim#1 well.



Shittim #1, North Bruny Island, Well Log

Well name	Shittim #1	Lat	220 000N
Location	Nth Bruny Is	Long	533 000E
State	Tasmania	Elevation	25 m ASL
Operator	Great Southland Minerals	Rig	Longyear 44
Supervisor	-	Spud Date	November 94
		Projected Depth	1250 m

Hole data							
Interval	Depth m	Rod	OD mm	ID mm	Wt kg/m	Hole L/m	Rod L/m
Conductor	6	air	150	polypipe			
Conductor	80	air	100	polypipe			
Surface casing	181	HQ	89.0	77.8	11.45	7.248	4.754
Intermediate	888	NQ	70.0	60.3	7.58	4.500	2.959

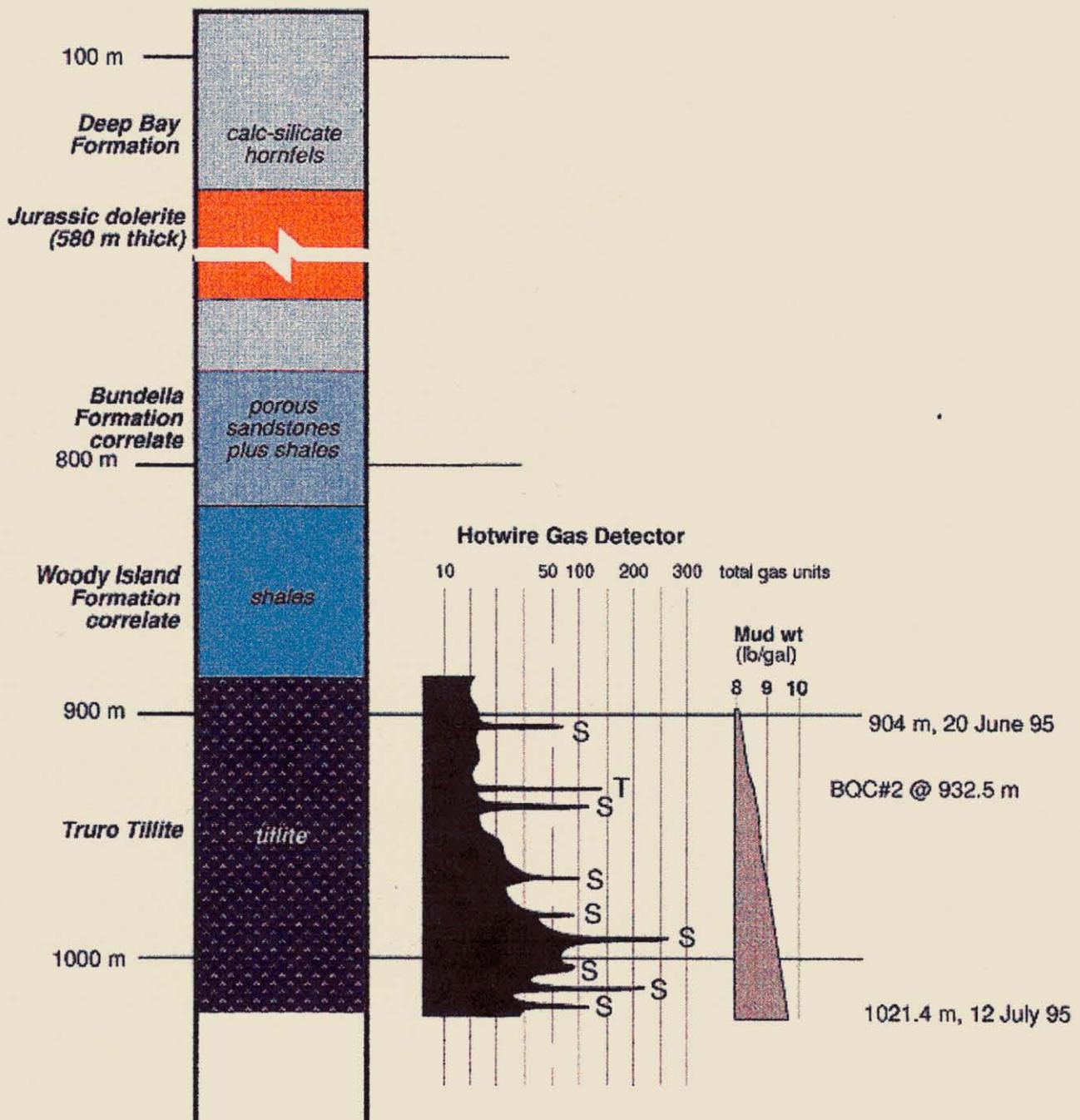


Figure 2

Shittim#1 Well

I have reviewed the results of the well to date with Dr Clive Burrett, and also briefly examined the core from this well. The drilling results are summarised in figure 2.

Shittim#1 well is located on North Bruny Island, several hundred metres to the east of Johnson's well. The well was designed to resolve the question of the nature of basement at Bruny Island, in particular whether the Gordon Limestone section is present at depth, as well as providing stratigraphic/petrophysical information on possible migration paths, reservoirs and seals, (refer Leaman, D. "Prognosis for a well, North Bruny Isl.")

The well spudded in November 1994, and at the time of my visit (5/9/95) was shut in waiting on cement, having reached a depth of 1021.4 m. The operator, Great Southland Minerals, were in the process of checking out equipment prior to installing a BOP stack, following flows of gas encountered in the well.

The important results to date are as follows:

1. The dolerite thickness is greater than expected (580m.), suggesting the possibility that the location is close to a feeder.
2. The Bundella Fm equivalent sandstones possess porosity and permeability of reservoir quality for production of gas and possibly also for oil (marginal). Results of core analysis from Shittim#1 cores were as follows:

787 m, porosity 7.4%, horizontal permeability 0.07 mdarcy.
 803.5 m, porosity 8.6%, horizontal permeability 0.96 mdarcy.
 805 m, porosity 11.9%, horizontal permeability 6.8 mdarcy.
 811 m, porosity 11.4%, horizontal permeability 9.0 mdarcy.

From my inspection of the core I suspect that this porosity may be secondary, but this matter should shortly be resolved as I understand GSM are submitting samples for petrological analysis.

3. The Woody Island equivalent shales exhibit high vitrinite reflectance (of order 3.7) showing they are over mature for sourcing of both oil & gas.
4. Sands of the Bundella Fm equivalent and the Truro Tillite have both yielded significant gas shows. A gas detector was installed at a depth of ca. 880 m. The continuing flows of gas into the borehole have necessitated weighting up of the drilling fluid and finally cessation of drilling to enable BOP's to be installed. I am also informed that gas shows were encountered near the base of the dolerite, presumably associated with fractures. No quantitative data is available for these shows.



The gas detector equipment on site does not include a chromatograph at this stage, but analysis of samples has been undertaken at AMDEL. Considerable air contamination is noted, presumably due to the inadequacy of on site sampling facilities, but the analysis does indicate the gas has fractions up to C₄ and higher.

5. Pressure data is qualitative at this stage, but I am informed that drilling fluid weights in excess of 9.5 lb/gal. have been required to contain gas production from the well. This is suggestive of over-pressuring

CONCLUSIONS:

Several conclusions can be drawn from the drilling results thus far.

1. **Reservoir** quality sands exist within the Bundella equivalent sandstones at Bruny Island North. Sampling of outcrop of time equivalents of these sands elsewhere in Tasmania has yielded porosity values of 12.8% (Mt Nassau Faulkner Gp.) and up to 19.9% porosity and 386 mdarcy (Poatine & vicinity, Nth tasmania). If this porosity proves to be secondary it opens up the possibility of a widespread but unpredictable distribution of reservoir in sediments which may have been ignored as potential targets to date.
2. **Seal.**
It has been demonstrated that the dolerite is capable of acting as an effective seal. Variations in its thickness would appear to be difficult to predict with any degree of accuracy.
3. **Generation & Migration of Hydrocarbons .**
The Woody Fm correlate at Bruny is over- mature for sourcing. It can therefore be concluded that the hydrocarbons encountered in the Bundella equivalent sands are hosting hydrocarbons which have migrated into the formation, presumably from down-dip to the west. The source of these hydrocarbons is yet to be established. The most likely migration path at this stage is the pre-Permian unconformity.
4. **Pressure data**, although qualitative, suggests that the gas reservoir/s are over pressured. This is significant in that it raises the possibility of a sizeable column of gas, possibly located in a stratigraphic trap.



COMMENTS:

Shittim#1 has raised as many questions as it has answered, but must certainly be viewed as a most encouraging result so far. Unfortunately GSM are now faced with the problem of attempting to drill and evaluate a well originally designed as a stratigraphic core-hole. The well has first to be drilled to basement, (assuming casing integrity is established), and it would be most desirable if at all possible to firstly run electric logs and then drill-stem test at least the Bundella equivalent sands at around 810 m. The availability of logging tools for such small diameter hole within Australia may present an insurmountable problem, especially as it will also be necessary to first remove stuck rods from this part of the hole. The value of a sustained drill stem test should not be underestimated, however. The choking effect of such a small hole may restrict the size of the flow but the pressure and fluid recovery which may be anticipated would be of immense value in attempting to assess the importance of the results of Shittim#1.



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